RSU-503

Redundancy Switch Unit
Installation and Operation Manual

Part Number MN/RSU503.IOM
Revision 8

Errata A

Comtech EFData Documentation Update

Subject: Changes to Chapter 3 (Communications Link Jumper Setting)

Date: July 28, 1997
Document: RSU-503 Redundancy Switch Unit Installation and Operation Manual, Rev. 8, dated April 4, 1997
Part Number: MN/RSU503.EA8
Collating Instructions: Attach this page to page 3-1

Comments:

The following changes provide the correct information for jumper placement when choosing between RS-232 or -485. This information will be incorporated into the next revision.

Change Specifics:

3.4.1 Communications Link

The terminal functions can be remotely controlled and monitored via an RS-485 or RS-232 communications link.

- The RS-485 interface makes it possible to operate 255 terminals on a common communications link.
- The RS-232 interface is used to communicate with a single terminal.

The M&C module must be hardware configured on the M&C board to one of the two interfaces. Refer to the following table for jumper placement at JP1:

RS-485 Configuration	RS-232 Configuration
1-2	9-10
3-4	11-12
5-6	13-14
7-8	15-16

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RSU-503

Redundancy Switch Unit
Installation and Operation Manual

Part Number MN/RSU503.IOM
Revision 8
April 4, 1997

Special Instructions:

This is the ninth edition of the manual.

Change bars were not utilized. For an overview of changes made to Rev. 7, refer to the preface ("Overview of Changes to Previous Edition").

This revision supersedes part number MN/SDMRSU503 Rev. 7 dated January 22, 1996.

Comtech EFData, 2114 West 7th Street, Tempe, Arizona 85281 USA, (480) 333-2200, FAX: (480) 333-2161.

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Preface

About this Manual

This manual provides installation and operation information for the EFData RSU-503 redundancy switch unit, referred to in this manual as “the switch.” This is a technical document intended for earth station engineers, technicians, and operators responsible for the operation and maintenance of the RSU-503 redundancy switch unit.

Conventions and References Used in this Manual

Cautions and Warnings

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.

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

Trademarks

Product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

Related Documents

The following documents are referenced in this manual:

- *EFData Specification* SP/3000
- *EFData KP-10 External Keypad Installation and Operation Manual*

Overview of Changes to Previous Edition

A summary of the changes made to Rev. 7 includes:

- Incorporated various cosmetic (non-technical) changes (e.g., formatting, spelling)
- Addition of RFT-705 and KST-2000 to Section 1.1
- Corrected part numbers in Section 1.2
- Addition of RSU-503 dimensional drawing in Chapter 2
- Corrected installation parts kit in Chapter 2
- Addition of an external connection locations photos in Chapter 2 and Appendix A
- Updated firmware information in Appendix B

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   Be prepared to supply the Customer Support representative with the model number, serial number, and a description of the problem.

2. To ensure that the product is not damaged during shipping, pack the product in its original shipping carton/packaging.

3. Ship the product back to EFData. (Shipping charges should be prepaid.)

For more information regarding the warranty policies, refer to the disclaimer page located behind the title page.

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Table of Contents

Figures

Tables

1 Chapter 1. INTRODUCTION

This chapter provides an overview, included assemblies, and specifications for the RSU-503 (Figure 1-1).

Note: Refer to Appendix A for information on the RSU-503L, a low-loss version of the RSU-503.

Figure 1-1. RSU-503

1.1 Overview

The switch is a fully automated 1:1 protection switch designed to work with the following EFData Radio Frequency Terminals (and their amplifiers):

- RFT-500
- RFT-505
- RFT-700
- RFT-705
- RFT-1200 (for RSU-503L information, refer to Appendix A)
- RFT-1225 (for RSU-503L information, refer to Appendix A)
- KST-2000 (for RSU-503L information, refer to Appendix A)

Note: All references in this document to "RFT" apply to all the models listed above.

The switch has a weather resistant enclosure which houses the indicators and controls to:

- Switch RFTs and LNAs
- Command the waveguide switch to toggle

Specifically, the switch performs the following functions:

- Controls waveguide/coaxial switch positions
- Provides independent uplink and downlink paths
- Routes the IF input to the online RFT
- Routes the IF output from the online RFT
- Initiates a switch-over in Auto mode by monitoring RFT faults
- Supplies test ports for testing the standby channel
- Receives RS-232/485 serial commands, routing them to the appropriate RFTs, and returns their responses
- Receives its own RS-232/485 command set for Auto/Manual mode, A/B online, and address select
- Provides FORM-C relay contacts for Summary Fault status

Power is supplied by one or both RFTs.

Although there are no external indicators or switches (due to the nature of the weatherproof housing), there is an access panel that can be removed, allowing use of internal switches and indicators (refer to Chapter 4 for more information).

Note: The internal indicators and switches are only used for factory testing and troubleshooting.

The system, during setup and while running, is intended to be controlled remotely.

Refer to Figure 1-2 for an interconnection block diagram of the switch.

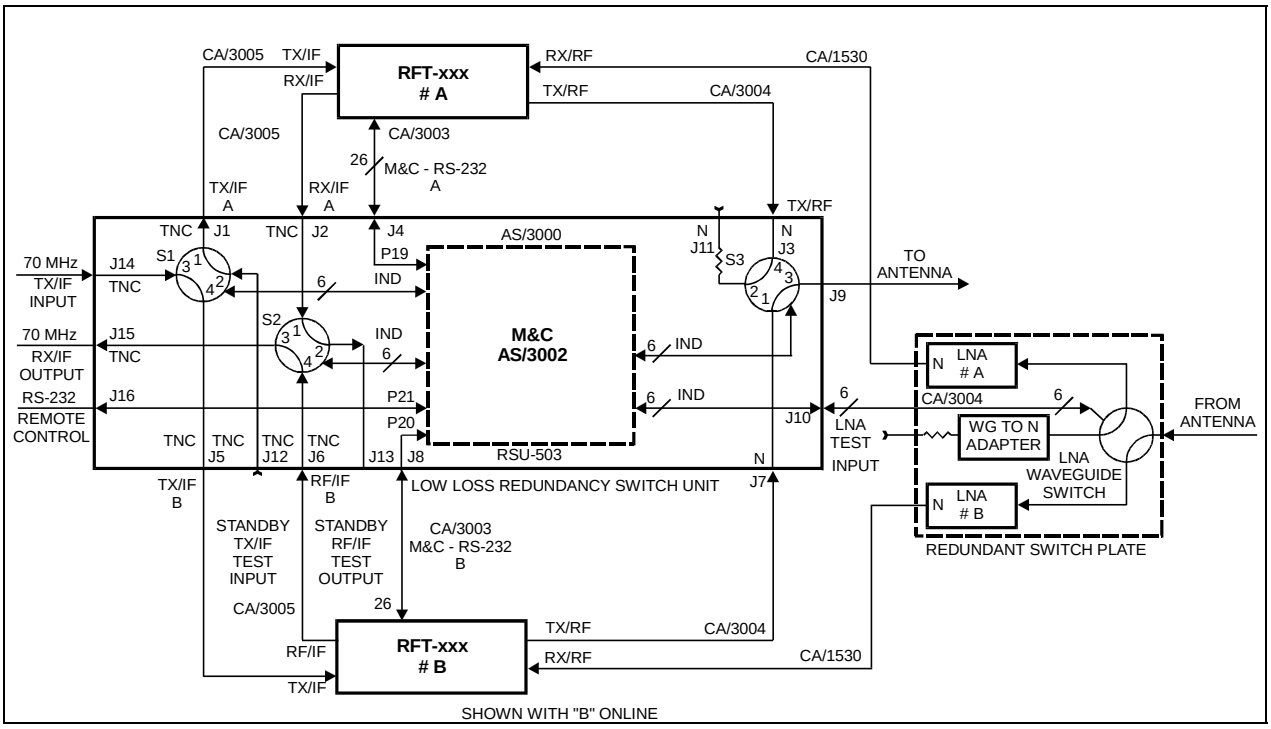


Figure 1-2. RSU-503 Interconnect Block Diagram

1.2 Assemblies

The switch consists of the following assemblies:

Assembly	EFData Part #
Top Assembly	PL/3000
RSU-503 Cable Harness	PL/3001
Chassis Base	FP/3802
Panel Divider	FP/3139
M&C Assembly, RSU-503	PL/3002
M&C Firmware, RSU-503	FW/3080-1

1.3 Specifications

Table 1-1 lists the operating specifications for the switch.

Note: For more information pertaining to RSU-503 specifications, refer to *EFData Specification SP/3000.*

Table 1-1. RSU-503 Specifications

Input power	10.8V, 1A (from either RFT)
Power consumption	5W
Physical: Depth Height Width Weight	 7.5” 8” 11” 7.4 lbs.
Environmental: Operating Temperature Storage Temperature Humidity	 -40 to +55°C -40 to +100°C 5 to 85%, noncondensing
Front Panel Controls	none
External Indicators	none

Chapter 2. INSTALLATION

This chapter provides installation instructions and external connector information for the switch.

2.1 Unpacking

Generally, the switch and manual are shipped as part of a redundant terminal system, and are packaged in a wooden crate along with the redundant LNA plate and cables.

1. Remove the screws from the lid of the wooden crate, and remove the lid.
2. Remove the unit and manual from the cardboard and foam enclosure.

   Note: Save the packing material for reshipment.

If the switch and manual are shipped in a cardboard box:

1. Cut the tape at the top of the carton where it is indicated OPEN THIS END.

   Do not use any cutting tool that will extend more than 1" into the container and cause damage to the switch.

2. Lift the switch and manual out of the box, and remove the bubblepack and plastic bag from the switch.

   Note: Save the packing material for reshipment.

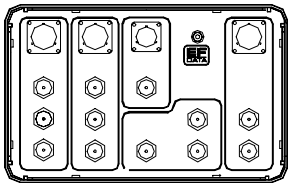
2.2 Inspecting the Equipment

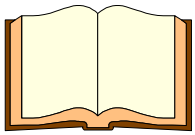
1. Carefully check the equipment for damage incurred during shipment.

2. Carefully check the equipment against the packing list shipped with the equipment to ensure that the shipment is complete. Refer to the following paragraphs.

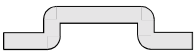
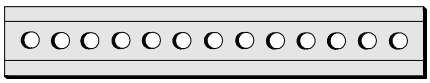
2.2.1 Included Parts

Note: Parts are not drawn to scale.

Qty.	Description
1	RSU-503. 

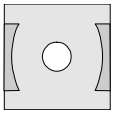
Qty.	Description
1	Installation and operation manual. 

Note: The installation hardware listed below is included in the redundant system installation parts kit KT/3577.

Qty.	Description
1	Spar support bracket.  *EFData Part # FP/3175. Used for spar mount only.*
2	Unistrut — 14” long.  *EFData Part # FP/3595.*
6	5/16-18 hex nut.  *EFData Part # HW/5/16-18HEXNT.*

Qty.	Description
4	5/16-18 x 1” bolt.  *EFData Part # HW/5/16-18X1BLT.*
10	5/16” split lockwasher.  *EFData Part # HW/5/16-SPLIT.*
10	5/16” flat washer.  *EFData Part # HW/5/16-FLT.*

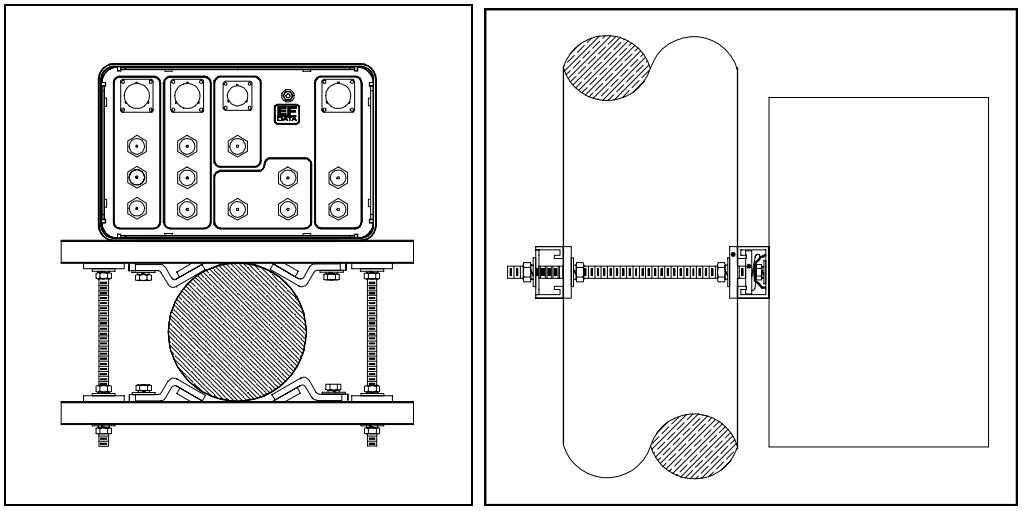
4	Pipe block.  *EFData Part # HW/BLK-PIPE2-8.* *Used for round pole mount only.*
2	Threaded rod, 5/16-18 x 14”.  *EFData Part # HW/RD5/16-18X14.* *Used for round and square pole mount only.*
3	1/4-20 x 1” bolt.  *EFData Part # 03P1079.*
3	1/4” split lockwasher.  *EFData Part # HW/1/4-SPLIT.*

6	5/16-18 spring nut.  *EFData Part # HW/5/16-18SPNUT.*
4	Flat fitting plate, 5/16”.  *EFData Part # HW/FIT-PLT-5/16.*
3	1/4” flat washer.  *EFData Part # O4P1022.*

2.3 Switch Installation

At the customer's discretion, the switch can be installed anywhere on or near the antenna. The supplied hardware allows the installer a wide range of installation alternatives, including:

- Vertical pole (e.g., mast) (either square or round). This is the most typical installation.



- Within the hub of a large antenna.
- Spar (i.e., rectangular bar) on the antenna structure.

The switch is designed to be mounted with the interface connections facing the ground.

Note: For custom installations, refer to Figure 2-1 for dimensions of the RSU-503.

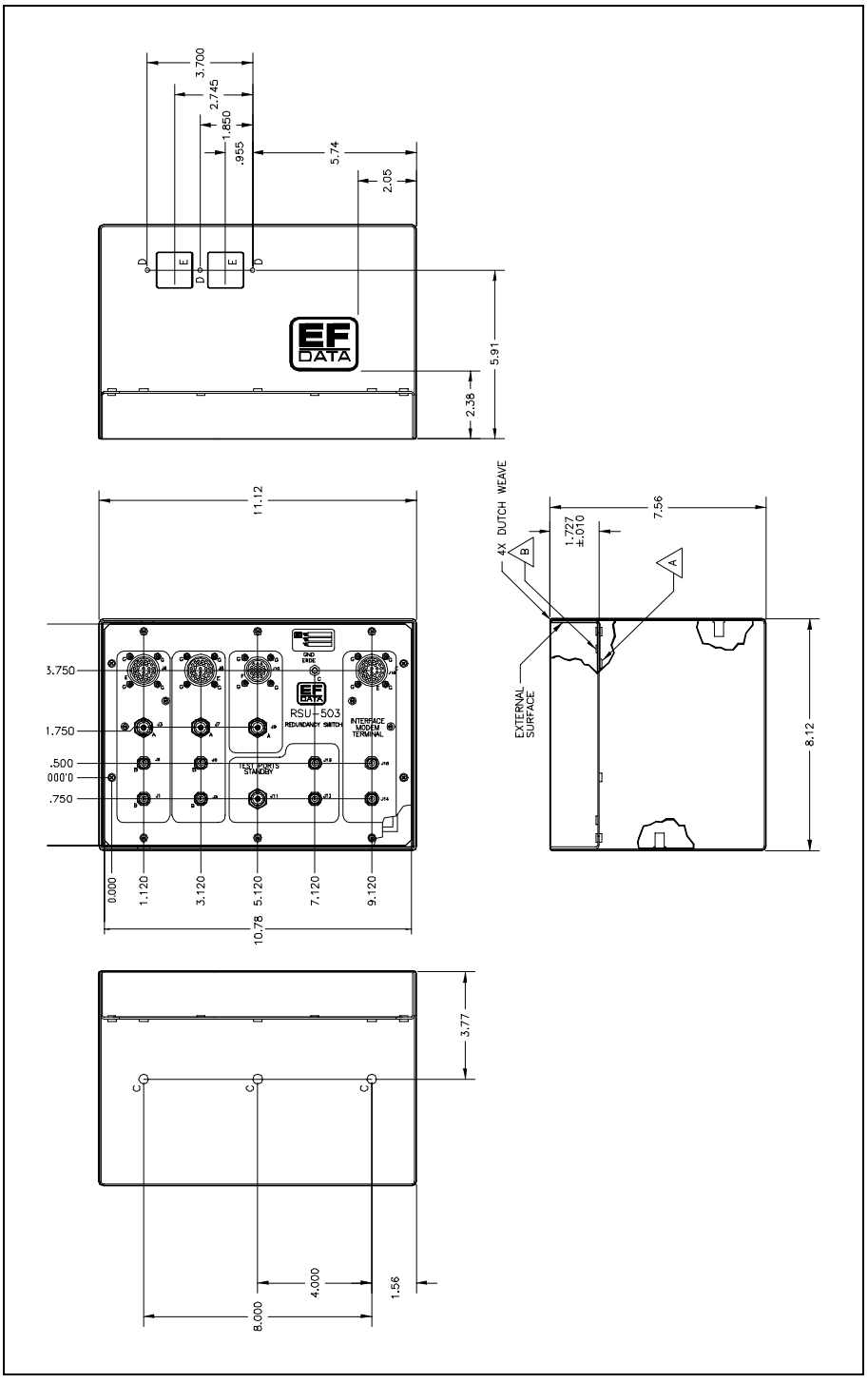


Figure 2-1. RSU-503 Dimensions

Note: All dimensions in inches.

2.3.1 Tools Required

Qty.	Description
1 1 1 1	3/8” drive ratchet. 3” x 3/8” drive extension. 7/16” x 3/8” drive socket. *(Metric equivalent: 11mm, 6 pt.)* 1/2” x 3/8” drive socket. *(Metric equivalent: 12mm, 6 pt.)*
1	1/2” combination wrench. *(Metric equivalent: 12mm combination wrench with a 6 pt. box end.)*

2.3.2 Vertical Pole Installation

2.3.2.1 Round Pole

The process described is for a typical installation. Custom kits may be ordered and are beyond the scope of this manual.

To install the switch to a round vertical pole:

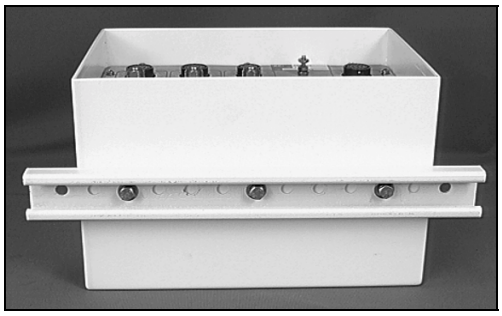
1. Set the switch on its side, with the mounting holes facing up.

2. Install the 14” unistrut as follows:

   a. Position a 14” long unistrut (with the open side facing up) over the mounting holes on the unit.

   b. Using three 1/4-20 x 5/8” bolts, 1/4” split lockwashers, and 1/4” flat washers, attach the unistrut to the switch.

   c. Tighten the bolts firmly.



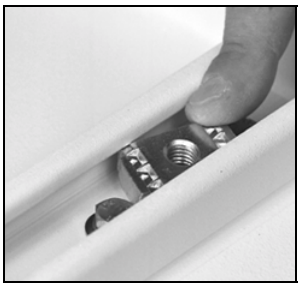
3. Install the pipe blocks as follows:

   a. Install two spring nuts in the 14” long unistrut which is mounted on the unit, and in a second 14” long unistrut.

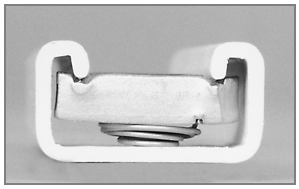
      Be sure to center the spring nuts in the unistruts wide enough apart so that when the pipe blocks are installed, they will clear the pole when the unit is lifted into place for installation.

   b. Install each spring nut as follows:

      (1) Place the spring nut in the unistrut channel, spring side down, with its wide side parallel with the unistrut channel.



(2) Press down on the spring nut to compress the spring, and rotate the nut 90° (perpendicular to the unistrut).

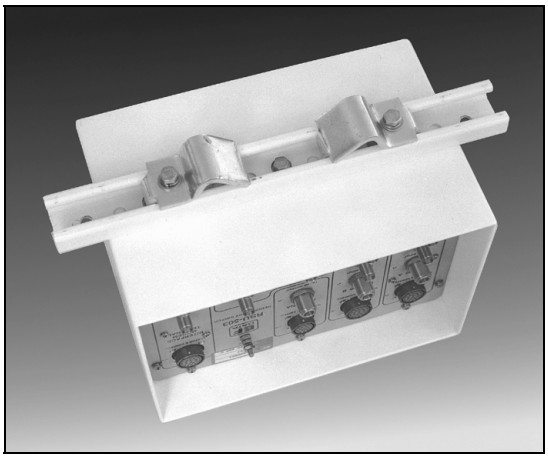


(3) Release pressure on the spring nut.

(4) Repeat Steps 3.b.(1) through 3.b.(3) for each spring nut.

c. Using four 5/16-18 x 1” bolts, 5/16” split lockwashers, and 5/16” flat washers, loosely secure the pipe blocks to the spring nuts in each 14” unistrut.

Ensure the pipe blocks are installed with the long angle facing inward, toward the pipe, as illustrated.



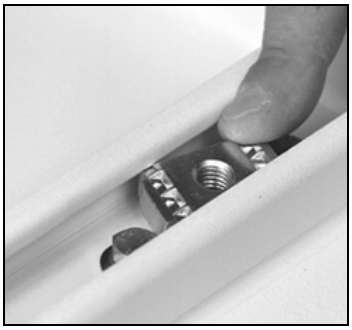
DO NOT tighten the pipe block bolts until after mounting the switch on the vertical pole (see Step 5.e.).

4. Install the threaded rods as follows:

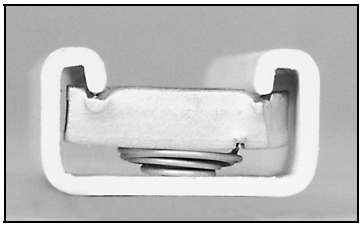
a. Install two spring nuts in the 14” long unistruts mounted on the unit.

Note: Ensure the spring nuts are positioned over the outer holes in the long unistruts.

b. To install each spring nut:



(1) Place the spring nut in the unistrut channel, spring side down, with its wide side parallel with the unistrut channel.



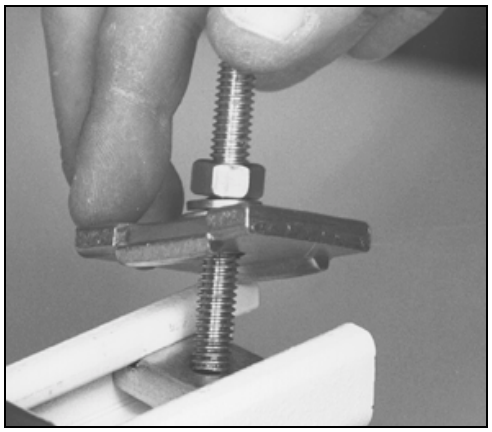
(2) Press down on the spring nut to compress the spring, and rotate the nut 90° (perpendicular to the unistrut).

(3) Release pressure on the spring nut.

(4) Repeat Steps 4.b.(1) through 4.b.(3) for each spring nut.

c. Thread a 5/16-18 nut approximately 1-1/2” onto each threaded rod. (This will ensure that the threaded rods will extend beyond the spring nuts when installed.)

d. Place a 5/16” split lockwasher, 5/16” flat washer, and flat fitting plate over each threaded rod.



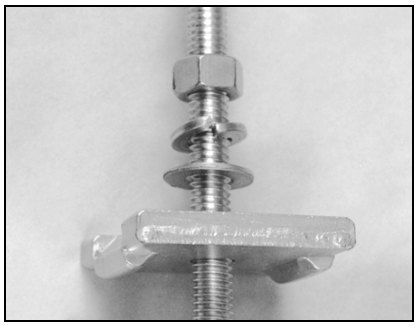
e. One threaded rod at a time, hold the washers and plate in place on the threaded rod and screw it into a spring nut, as illustrated.

Notes:

1. Be sure to position the flanges of the fitting plates in the grooves of the unistruts.
2. Before tightening the nuts on the threaded rods, ensure that the end of each rod is screwed in until it is flush with the backside of the unistrut. This ensures the rods are threaded completely through the spring nuts.

Tighten each nut firmly.

f. Thread a 5/16-18 nut about 2” onto the end of each threaded rod.



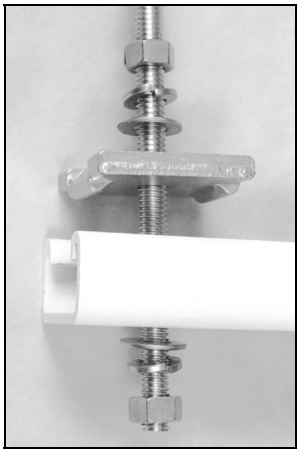
g. Slip a 5/16” split lockwasher, 5/16” flat washer and flat fitting plate (in that order) onto each threaded rod.

5. Mount the unit as follows:

a. Lift the unit into position on the vertical pole.

b Slip the 14” unistrut over the threaded rods (upper and lower).

Note: Install the 14” unistrut with its open face toward the pole.



c. Install a 5/16” flat washer, 5/16” split lockwasher, and 5/16-18 nut on each threaded rod.

d. Position the unit as desired, and tighten the 5/16-18 nuts installed in Step 5.c.

e. Slide the pipe blocks inward until they contact the vertical pole, then firmly tighten the 5/16-18 bolts.

2.3.2.2 Square Pole

For square vertical pole installation, follow the steps in Section 2.3.2.1, with the following exceptions:

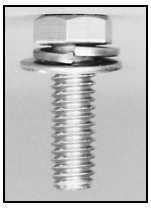
- Do not perform Step 3.
- Do not perform Step 5.e.

2.3.3 Spar Installation

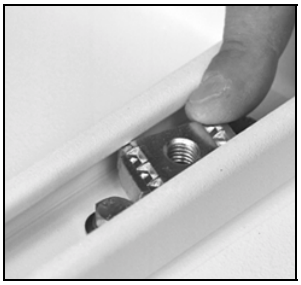
Note: The process described is for a typical installation. Custom kits may be ordered and are beyond the scope of this manual.

To install the switch to a spar:

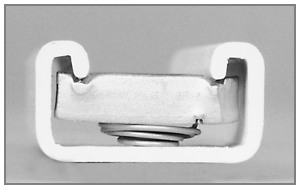
1. Set the unit on its side, with the mounting holes facing up.
2. Install a 14” unistrut.
   a. Position a 14” unistrut (with the open side facing up) over the mounting holes on the switch.
   b. Using three 1/4-20 bolts, 1/4” split lockwashers, and 1/4” flat washers, attach the unistrut to the switch.



   c. Tighten the bolts firmly.
3. Mount the switch as follows:
   a. Install two spring nuts in the unistrut (centered on the unistrut, the width of the spar bracket holes).
   b. To install each spring nut:
      (1) Place the spring nut in the unistrut channel, spring side down, with its wide side parallel with the unistrut channel.



      (2) Press down on the spring nut to compress the spring, and rotate the nut 90° (i.e., perpendicular to the unistrut).

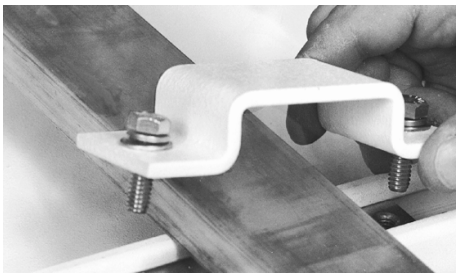


(3) Release pressure on the spring nut.

(4) Repeat Steps 3.b.(1) through 3.b.(3) for each spring nut.

c. Lift the switch into position.

d. Using two 5/16-18 bolts, 5/16” split lockwashers, and 5/16” flat washers, bolt the spar bracket in place.



d. Tighten the bolts firmly.

2.4 External Connections

All connections between the switch and other equipment are made through front panel connections, as shown in Table 2-1 (refer to Figure 2-2 for connector locations).

Failure to properly connect the units will result in loss of communications between the switch and the RFTs.

Table 2-1. External Connections

Name	Desig.	Type	Function
Switch to RFT #A (Primary)			
TX/IF OUTPUT	J1	TNC, 50Ω	IF Uplink to Unit A
RX/IF INPUT	J2	TNC, 50Ω	IF Downlink from Unit A
TX/RF INPUT	J3	N	TX Uplink from Unit A
MONITOR & CONTROL	J4	26-pin Circ.	Monitor and control See Section 2.4.4 for pinouts *(See note)*
Switch to RFT #B (Backup)			
TX/IF OUTPUT	J5	TNC, 50Ω	IF Uplink to Unit B
RX/IF INPUT	J6	TNC, 50Ω	IF Downlink from Unit B
TX/RF INPUT	J7	N	TX Uplink from Unit B
MONITOR & CONTROL	J8	26-pin Circ.	Monitor and control See Section 2.4.4 for pinouts *(See note)*
Switch to Antenna			
TX/RF OUTPUT	J9	N	TX Uplink from online unit
WAVEGUIDE SWITCH	J10	19-pin Circ.	Waveguide switch control See Section 2.4.6.1 for pinouts
Standby Unit Test Ports			
TX/RF OUTPUT	J11	N	TX output test signal
TX/IF INPUT	J12	TNC, 50Ω	IF input test signal
RX/IF OUTPUT	J13	TNC, 50Ω	IF output test signal
Switch to Modem Terminal Interface			
TX/IF INPUT	J14	TNC, 50Ω	IF Uplink
RX/IF OUTPUT	J15	TNC, 50Ω	IF Downlink
MONITOR & CONTROL	J16	26-pin Circ.	Modem Terminal Interface (MTI) See Section 2.4.12 for pinouts
Ground			
GND ERDE	None	#10-32 Stud	Chassis Ground

Note: Refer to Section 2.6 for addressing information.

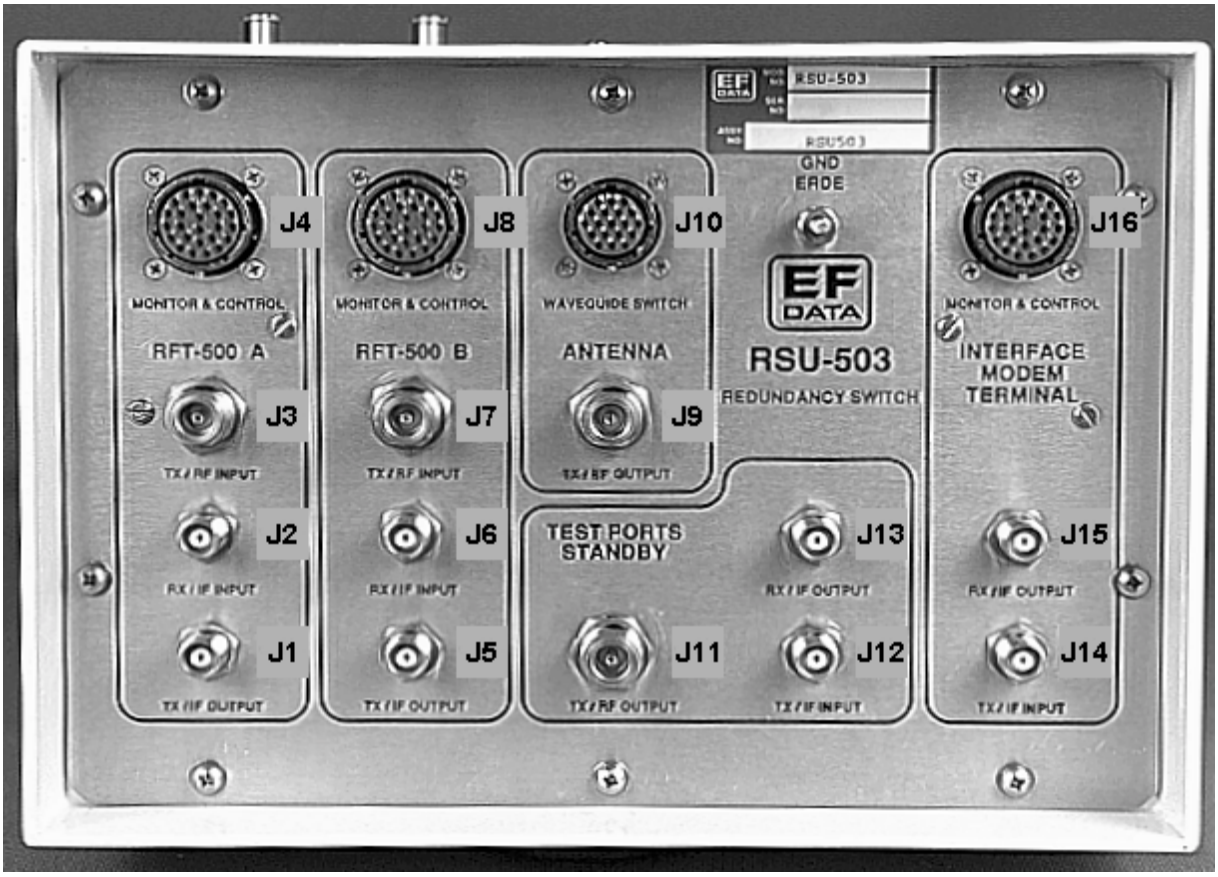


Figure 2-2. RSU-503 External Connections

2.4.1 TX/IF Output (J1, J5)

The TX/IF Output connectors are TNC connectors, each with an impedance of 50Ω. These connectors carry the IF uplink signal to the online RFT (Unit A or B).

2.4.2 RX/IF Input (J2, J6)

The RX/IF Input connectors are TNC connectors, each with an impedance of 50Ω. These connectors carry the IF downlink signal from the online RFT (Unit A or B).

2.4.3 TX/RF Input (J3, J7)

The TX/RF Input connectors are type N connectors, each with an impedance of 50Ω. These connectors carry the transmit uplink signal from the online RFT (Unit A or B).

2.4.4 M&C (J4, J8)

The M&C connectors are used to interface with Units A and B, respectively. Included on these connectors are:

- Nine RS-232/485 communication pins (A to J)
- Switch power (L)
- Fault reporting

The M&C connectors are 26-pin circular female connectors, with the following pinouts:

Pin #	Name		Function
	RS-232	RS-485	
A	GND	-RX/TX	
B		-RX/TX	
C		+RX/TX	
D	CTS	+RX/TX	Clear to Send
E	TD/TX		Transmit Data
F	RTS		Ready to Send
G	RD/RX		Receive Data
H	DSR		Data Set Ready
J		GND	Ground
K	LNA POWER	10V to LNA	
L	EXT POWER	Input Voltage, 11V, 1A max.	
M	EXT FLT IN	Fault Input from TWT	
N	Reserved		
P	N/C		
R	GND	Ground	
S	Chassis Ground	Ground	
T	Reserved		
U	UL FLT NC	Fault relay input, closes with Uplink fault	
V	UL FLT COM	Fault relay input, COMMON	
W	UL FLT NO	Fault relay input, opens with Uplink fault	
X	DL FLT NC	Fault relay input, closes with Downlink fault	
Y	DL FLT COM	Fault relay input, COMMON	
Z	DL FLT NO	Fault relay input, opens with Downlink fault	
a	LNA RTN	Ground return from LNA	
b	Reserved		
c	Reserved		

Notes:

1. Clear to Send (CTS) is tied to Ready to Send (RTS) in RS-232 mode.
2. RD/RX and TD/TX are switched in the switch in order to communicate with the RFTs.

2.4.5 TX/RF Output (J9)

The TX/RF Output connector is a 50Ω type N connector that carries the transmit uplink signal from the online RFT (Unit A or B) to the antenna.

2.4.6 Waveguide Switch (J10)

The Waveguide Switch connector connects the switch to the LNA plate using a 1:1 cable.

2.4.6.1 Waveguide Switch Pinout (J10)

The Waveguide Switch connector uses a 19-pin circular female connector with the following pinouts:

Name	Pin #	Function
LNA Position 1 Command	C	+28V pulse for 500 milliseconds
LNA Command Common	G	Ground
LNA Position 2 Command	D	+28V pulse for 500 milliseconds
LNA Indicator, Position 1	H	Connects to Common when in position 1
LNA Indicator, Common	R	Ground
LNA Indicator, Position 2	T	Connects to Common when in position 2
RF Position 1 Command	E	+28V pulse for 500 milliseconds
RF Command Common	L	Ground
RF Position 2 Command	F	+28V pulse for 500 milliseconds
RF Indicator, Position 1	J	Connects to Common when in position 1
RF Indicator, Common	V	Ground
RF Indicator, Position 2	K	Connects to Common when in position 2
LNA PWR #A	A	
LNA RTN #A	B	
LNA PWR #B	N	
LNA RTN #B	P	

2.4.6.2 LNA Plate to Waveguide Switch

The following table outlines the pinouts of the LNA plate to Waveguide Switch cable. This cable is internal on the redundant LNA plate.

Note: This pinout table may be helpful if an EFData Waveguide Switch is used.

Name	Pin #	Function
Command, Position 1	A	+28V pulse for 500 milliseconds
Command Common	B	Ground
Command, Position 2	C	+28V pulse for 500 milliseconds
Indicator, Position 1	D	Connects to Common when in position 1
Indicator Common	E	Ground
Indicator, Position 2	F	Connects to Common when in position 2

2.4.7 TX/RF Output (J11)

The TX/RF Output connector is a 50Ω type N connector used to monitor the transmit output signal from the offline RFT. This connector is used to test the offline unit.

2.4.8 TX/IF Input (J12)

The TX/IF Input connector is a 50Ω TNC connector used to input the IF test signal to the offline RFT. This connector is used to test the offline unit.

2.4.9 RX/IF Output (J13)

The RX/IF Output connector is a 50Ω TNC connector used to monitor the IF output signal from the offline RFT. This connector is used to test the offline unit.

2.4.10 TX/IF Input (J14)

The TX/IF Input connector is a 50Ω TNC connector used to receive the IF uplink signal from the modem. The switch routes the signal to the online RFT for transmission.

2.4.11 RX/IF Output (J15)

The RX/IF Output connector is a 50Ω TNC connector used to provide the IF downlink signal to the modem (after the signal is picked up by the antenna and routed through the online LNA and RFT).

2.4.12 Monitor & Control (J16)

The Modem Terminal Interface (MTI) connector is the remote control interface connector. Included on this connector are RS-232/485 communication lines and a summary fault indication. For standard RS-232/485 applications, an adapter cable is available to connect the 26-pin circular connector to a standard 9-pin D.

Refer to Figure 2-3 for an illustration of the adapter cable and its pinouts.

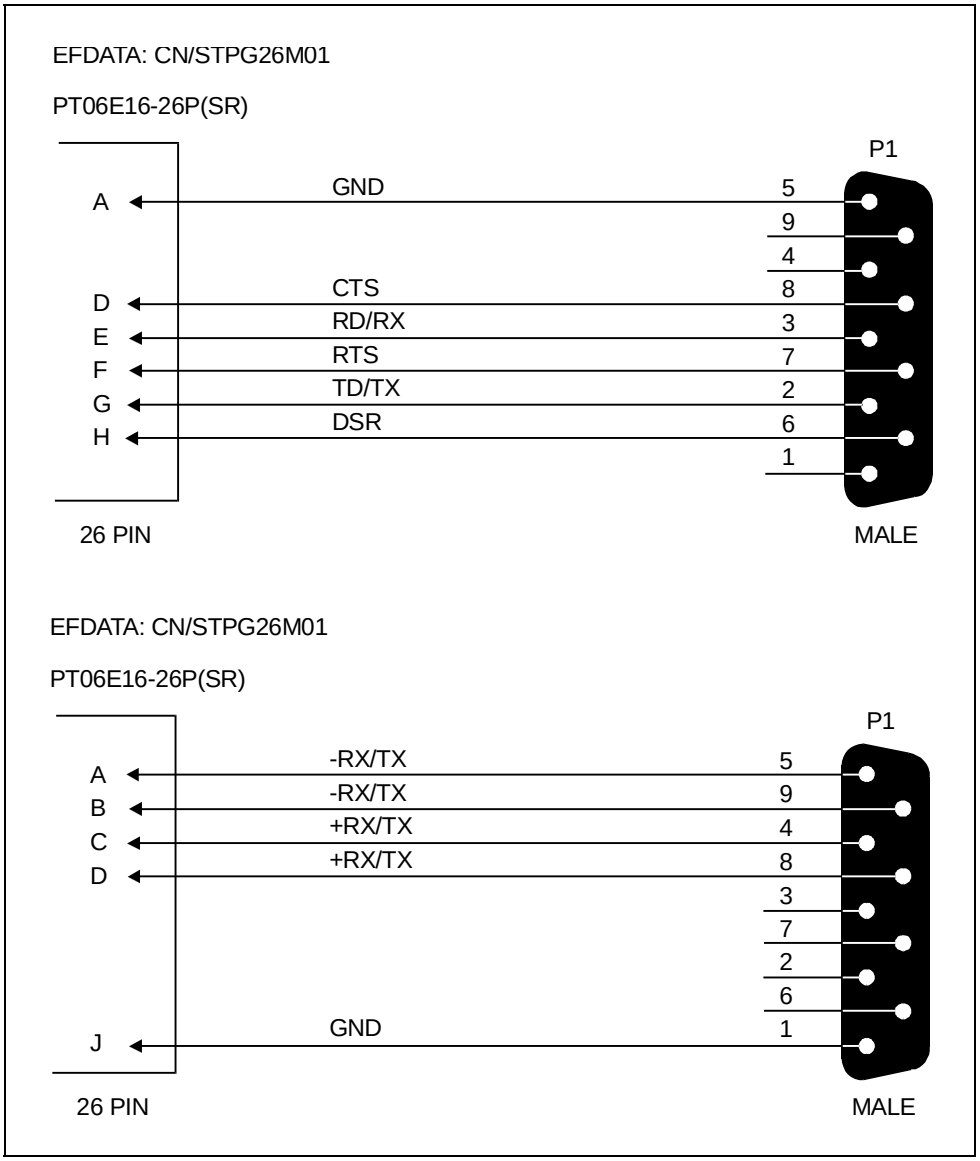


Figure 2-3. Adapter Cables

The MTI connector is a 26-pin circular female connector with the following pinouts:

Pin #	Name		Function
	RS-232	RS-485	
A	GND	-RX/TX	
B		-RX/TX	
C		+RX/TX	
D	CTS	+RX/TX	Clear to Send
E	RD/RX		Receive Data
F	RTS		Ready to Send
G	TD/TX		Transmit Data
H	DSR		Data Set Ready
J		GND	Ground
K	Reserved		
L	EXT_PWR	Output, 11V for KP-10	
M			
N	EXT FLT1 #A	TWT FLT input for primary channel	
P	EXT FLT1 #B	TWT FLT input for secondary channel	
R	N/C		
S	Ground	Chassis Ground	
T	Reserved		
U	Reserved		
V	Reserved		
W	Reserved		
X	FLT NC	Summary fault relay, connects to COM with fault	
Y	FLT COM	Summary fault relay, COMMON	
Z	FLT NO	Summary fault relay, opens with fault	
a	Reserved		
b	Reserved		
c	Reserved		

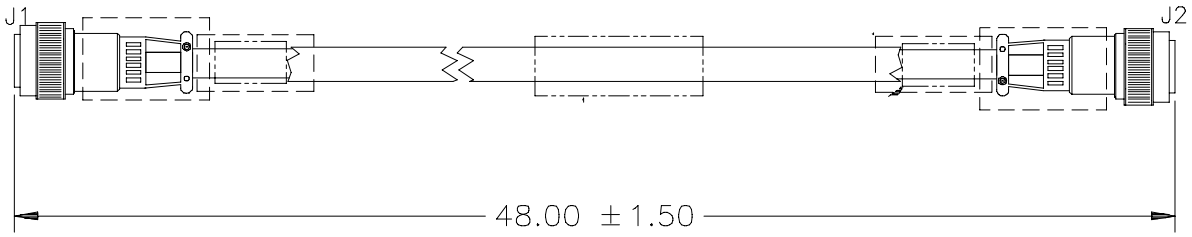
Note: Clear to Send (CTS) is tied to Ready to Send (RTS) in RS-232 mode.

2.4.13 GND (ERDE)

GND is a #10-32 stud for the purpose of connecting all units to a common chassis ground.

2.5 External Cables

Refer to Figures 2-4 and 2-5 for diagrams of the two different external multi-conductor cables used with the switch in a redundant system.



WIRE LIST			
FROM	TO	SIGNAL RS232	SIGNAL RS485
J1−A	J2−A	GND	−RX/TX
J1−B	J2−B	−RX/TX	−RX/TX
J1−C	J2−C	+RX/TX	+RX/TX
J1−D	J2−D	CTS	+RX/TX
J1−E	J2−E	RD/RX	
J1−F	J2−F	RTS	
J1−G	J2−G	TD/TX	
J1−H	J2−H	DSR	
J1−J	J2−J	GND	GND
J1−K	J2−K	LNA PWR	
J1−L	J2−L	DC PWR	
J1−M	J2−M	EXT FLT 1	
J1−N	J2−N	SPARE 1	
J1−P	J2−P	SPARE 2	
J1−R	J2−R	DC GND	
J1−S	J2−S	SHIELD	
J1−T	J2−T	SPARE 3	
J1−U	J2−U	UL FLT NC	
J1−V	J2−V	UL FLT COM	
J1−W	J2−W	UL FLT NO	
J1−X	J2−X	DL FLT NC	
J1−Y	J2−Y	DL FLT COM	
J1−Z	J2−Z	DL FLT NO	
J1−a	J2−a	LNA RTN	
J1−b	J2−b	SPARE 4	
J1−c	J2−c	SPARE 5	

Figure 2-4. RSU-503 M&C, J4 and J8 (to RFT)

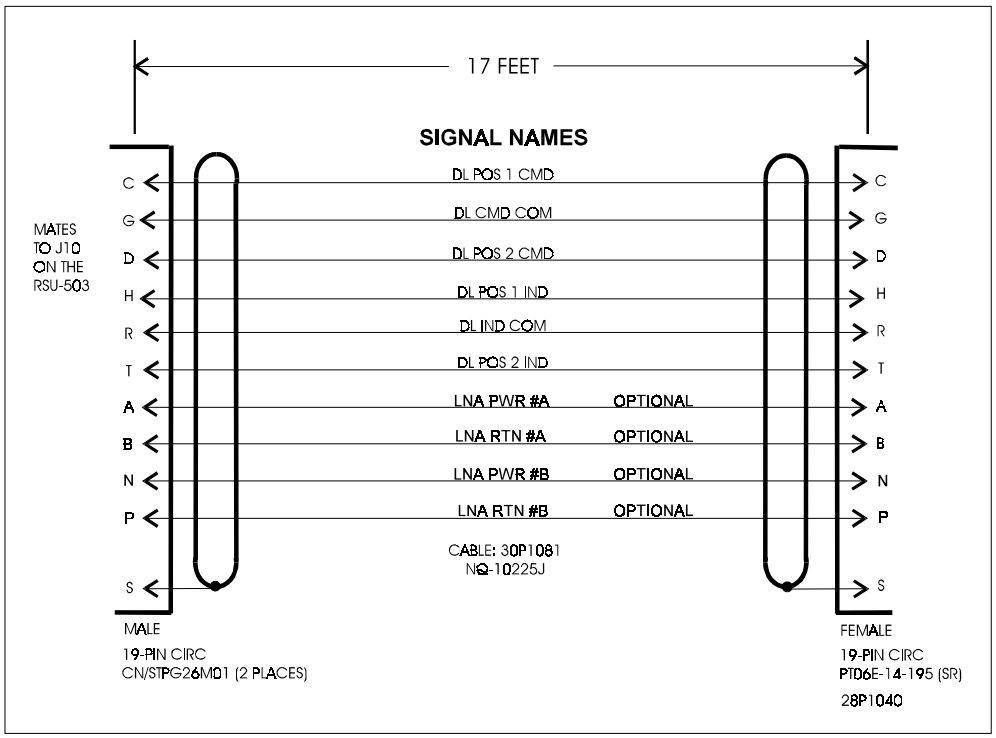


Figure 2-5. RSU-503, J10 to Waveguide Switch Plate

Note: Be sure to connect the primary RFT (A) to J4, and the backup RFT (B) to J8.

2.6 Addressing

The following are the factory default addresses:

- Switch is set to address 1
- RFT A is set to address 2
- RFT B is set to address 3

The proper M&C cable hook-up is critical:

- RFT A must be connected to the switch Port A
- RFT B must be connected to the switch Port B

Note: If these connections are reversed, no communications will take place.

3 Chapter 3. THEORY OF OPERATION

This chapter provides the basic theory for the following:

- Switch power
- Waveguide and coax switch drivers
- LNA
- M&C operational control

3.1 Power

In a redundant system, the switch is powered from either of the two RFT terminals via the M&C interconnect cable. External DC power (approximately 10.8V) enters the M&C on pins 1 and 2 of connector J17 (25-pin D), and is “ORed” through diodes CR1 and CR2.

The switch is monitored by the analog-to-digital (A/D) converter U16, and is made available as a maintenance status through the serial terminal.

A 3-terminal regulator, U1, converts and regulates the +5V to all the logic, including the microcontroller U18.

PS1 converts the 10V input voltage to 30V, where it is stored by capacitors C6 through C10 to supply the 500 millisecond pulses to the transfer switches.

3.2 Waveguide and Coax Switch Drivers

The microcontroller creates the 500 millisecond pulses to control the positions of all four transfer switches. Photovoltaic opto-isolated switches U8, U9, U10, and U11 transform the +5V logic into 30V pulses to drive the latching coils of the switches.

Each microwave transfer switch contributes 0.3 dB of insertion loss, with a minimum of 70 dB of isolation.

3.3 LNA

The LNAs are powered directly from their respective RFTs through the RF coax cable. The RFT performs a current sense on its LNA, and informs the switch by declaring a downlink fault, if one is detected.

3.4 M&C Operational Control

3.4.1 Communications Link

The terminal functions can be remotely controlled and monitored via an RS-485 or RS-232 communications link.

- The RS-485 interface makes it possible to operate 255 terminals on a common communications link.
- The RS-232 interface is used to communicate with a single terminal.

The M&C module must be hardware configured on the M&C board to one of the two interfaces. Refer to the following table for jumper placement at JP3:

RS-485 Configuration	RS-232 Configuration
1-2	9-10
3-4	11-12
5-6	13-14
7-8	15-16

Although the switch M&C is considered to be the slave unit on the MTI RS-232 bus, it becomes the master when communicating to each of the two RFTs.

When not servicing MTI requests, the M&C monitors indicators, faults, and voltages. When applicable, it generates switch-over pulses.

When polled from the MTI, the switch M&C will perform the following functions:

1. Return a response acknowledging receipt of the command.
2. Decode the address in the message, compare it to the stored addresses, and route it to its intended destination.
3. Return a block of status information when requested.

3.4.2 Switch Indicators

Address 9000 reads in the eight indicator bits representing the four uplink and four downlink indicator positions. The following tables show how the four bits are decoded to indicate whether the unit A or B is currently online.

Uplink					
B0	**B1**	**B2**	**B3**	**WR8000, B0**	**WR8000, B4**
IF_A	RF_A	IF_B	RF_B	1 = A ON LINE 0 = B ON LINE	1 = OKAY 0 = AMBIGUITY FAULT
0	0	0	0	1	0
0	0	0	1	1	0
0	0	1	0	1	0
0	0	1	1	1	1 - Valid state, A online
0	1	0	0	0	0
0	1	0	1	0	0
0	1	1	0	0	0
0	1	1	1	0	0
1	0	0	0	1	0
1	0	0	1	1	0
1	0	1	0	1	0
1	0	1	1	1	0
1	1	0	0	0	1 - Valid state, B online
1	1	0	1	0	0
1	1	1	0	0	0
1	1	1	1	0	0

Downlink					
B4	**B5**	**B6**	**B7**	**WR8000, B2**	**WR8000, B5**
IF_A	RF_A	IF_B	RF_B	1= A ON LINE 0 = B ON LINE	1 = OKAY 0 = AMBIGUITY FAULT
0	0	0	0	1	0
0	0	0	1	1	0
0	0	1	0	1	0
0	0	1	1	1	1 - Valid state, A online
0	1	0	0	0	0
0	1	0	1	0	0
0	1	1	0	0	0
0	1	1	1	0	0
1	0	0	0	1	0
1	0	0	1	1	0
1	0	1	0	1	0
1	0	1	1	1	0
1	1	0	0	0	1 - Valid state, B online
1	1	0	1	0	0
1	1	1	0	0	0
1	1	1	1	0	0

3.4.3 Auto/Manual Modes

In Auto mode, switch-over can only occur as a result of a fault, as listed in the following table:

RD9001		
B0	**B1**	
UL FLT A	**UL FLT B**	**Fault Description**
0	0	No faults.
0	1	Fault on B uplink, switch to uplink A, WR8001 B0.
1	0	Fault on A uplink, switch to uplink B, WR8001 B1.
1	1	Fault on both, do nothing. Monitor, and switch to the first unit to remote the fault.
B2	**B3**	
DL FLT A	**DL FLT B**	**Fault Description**
0	0	No faults.
0	1	Fault on B downlink, switch to downlink A, WR8001 B2.
1	0	Fault on A downlink, switch to downlink B, WR8001 B3.
1	1	Fault on both, do nothing. Monitor, and switch to the first unit to remote the fault.

In Manual mode, the switch initiates the online pulses from only two sources:

- Request from the MTI
- Onboard push-button switches

In normal service with the cover secured, switch-over can occur only from an MTI request.

Chapter 4. MAINTENANCE

This chapter provides information on the following:

- Internal switches, indicators, and connections
- How to service the switch with the power on
- Troubleshooting

Note: Under normal conditions, this switch does not require periodic or preventive maintenance. Most problems, if any, will arise during the initial installation. These problems will most often be due to improper cabling, waveguide wiring, or indicator positions.

4.1 Internal Switches

The switch does not have any external switches or controls. The internal switches (shown in Figure 4-1) are not normally used by the operator. However, if the switch must be opened, descriptions of the four push-button switches are provided in the following table.

Switch	Description
UL AUTO/MAN	Depress to alternate between Uplink Auto and Manual.
UL A/B ONLINE	Depress to alternate between A and B uplink online.
DL AUTO/MAN	Depress to alternate between downlink Auto and Manual.
DL A/B ONLINE	Depress to alternate between A and B downlink online.

4.2 Internal Indicators

The switch does not have any external indicators. The internal indicators (shown in Figure 4-1) are not normally used by the operator. However, if the switch must be opened, descriptions of the indicators are provided in the following table.

Indicator	LED	Cause
System Status		
PWR A	Green	Illuminates if RFT A power is available.
PWR B	Green	Illuminates if RFT B power is available.
32V	Green	Illuminates when power available to switches.
SUM FLT	Red	Illuminates an ambiguity failure, RFT fault, or power supply fault.
Uplink		
FLT A	Red	Illuminates with failure of unit A uplink.
FLT B	Red	Illuminates with failure of unit B uplink.
FLT AMB	Red	Illuminates if uplink switch indicators do not agree.
B OL	Yellow	Illuminates when unit B uplink is online.
MAN	Yellow	Illuminates when uplink is in manual mode.
Downlink		
FLT A	Red	Illuminates with failure of unit A downlink.
FLT B	Red	Illuminates with failure of unit B downlink.
FLT AMB	Red	Illuminates if downlink switch indicators do not agree.
B OL	Yellow	Illuminates when unit B downlink is online.
MAN	Yellow	Illuminates when downlink is in manual mode.

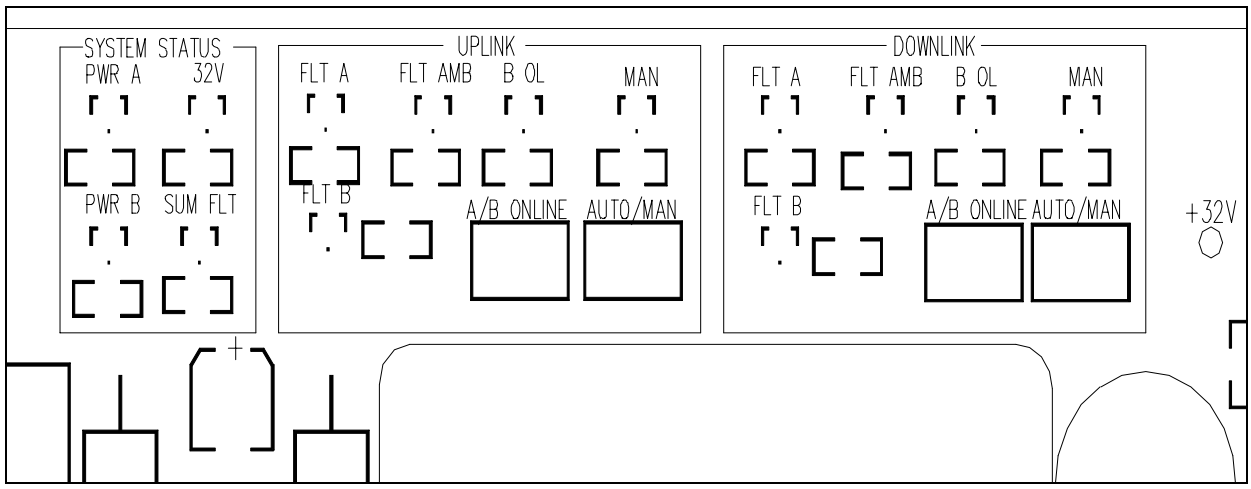


Figure 4-1. LED and Switch Locations

4.3 Servicing with Power On

If maintenance must be performed on the unit while the link remains on the air, proceed as follows:

1. Loosen the access panel screws on the side of the switch case (refer to Figure 4-2) to expose the internal M&C Logic Control PCB.

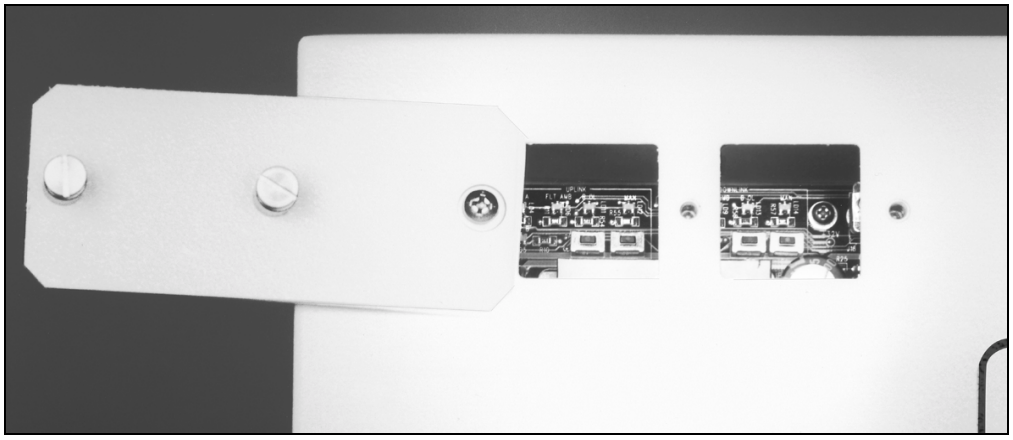


Figure 4-2. Access Panel

2. Observe the LEDs on the M&C board, which will indicate the following:

   a. Receipt of power from RFT A
   b. Receipt of power from RFT B
   c. Transfer switch power (32V) available
   d. Summary fault indicator, if any fault in the system
   e. Uplink RFT, Unit A fault
   f. Uplink RFT, Unit B fault
   g. Uplink Indicator Ambiguity fault
   h. Uplink unit A or B currently online
   i. Uplink mode in Auto or Manual
   j. Downlink RFT, Unit A fault
   k. Downlink RFT, Unit B fault
   l. Downlink Indicator Ambiguity fault
   m. Downlink unit A or B currently online
   n. Downlink mode in Auto or Manual

3. Refer to Section 4.4 for troubleshooting assistance.

4.4 Troubleshooting

The following paragraphs may be used to diagnose problems within the system. Locate the malfunction in the left column that most closely matches the situation. Then, read across to the possible problem.

All conditions except the first can be observed only when the cover of the switch is removed.

Refer to Figure 4-1 for LED locations.

Condition	Possible Problem
Cannot initiate switch-over from A to B, or vice versa	System could be in AUTO mode, where switch-overs are automatic.
PWR A LED not lit	Cable not connected from RFT A. RFT A not powered up.
PWR B LED not lit	Cable not connected from RFT B. RFT B not powered up.
32V LED not lit	DC/DC module PS1 bad on M&C board. Short on output of module PS1.
UL or DL Unit A fault LED lit	RFT A has a fault in either the UL or DL. Cable from RFT A disconnected, or RFT A turned off.
UL or DL Unit B fault LED lit	RFT B has a fault in either the UL or DL. Cable from RFT B disconnected, or RFT B turned off.
UL or DL Ambiguity Fault LED lit	IF and RF transfer switches (input/output) are not in sync. Use remote terminal, or M&C push-buttons to alternate between A and B online. This will synchronize the pair.
Summary fault LED lit	Request Fault Status from remote terminal to ascertain the specific fault from fault list.

4.5 Internal Connections

The internal connections are not normally seen by the user, since the switch is designed to prevent the weather from damaging the internal circuitry. However, if the switch must be opened, pinouts of the three internal connectors have been provided.

Refer to Figure 4-3 for location of the internal connections.

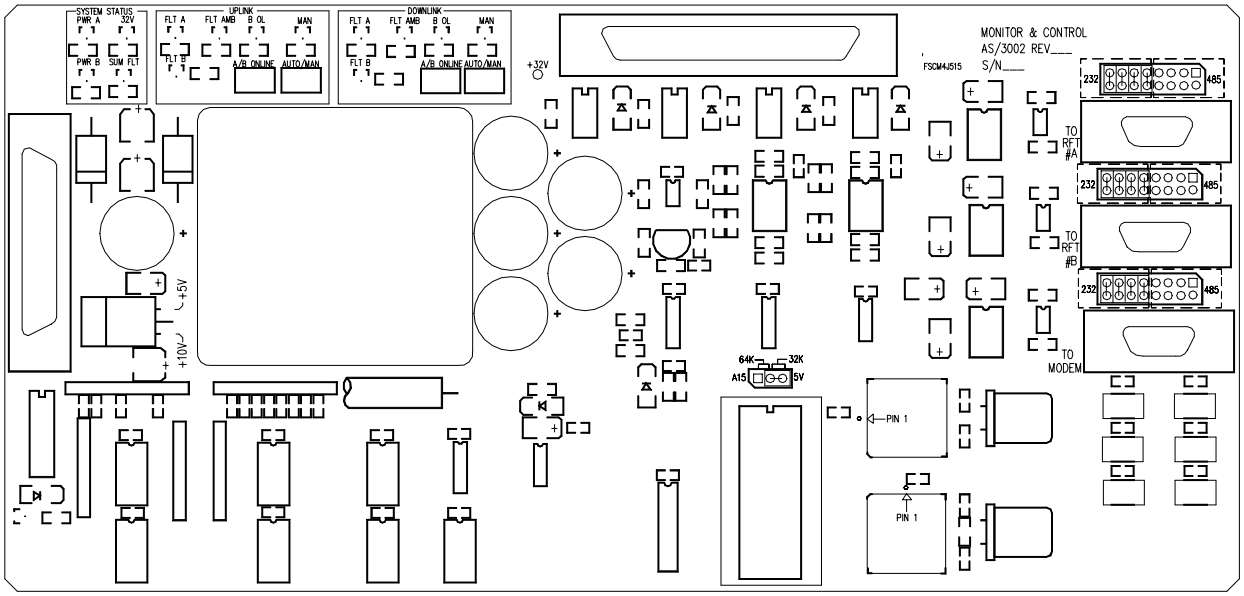


Figure 4-3. Internal Connections

4.5.1 Serial Interfaces (J19, J20, J21)

The internal Serial Interface connectors are 9-pin D with the following pinouts:

Pin #	Name		Function
	RS-232	RS-485	
1		GND	
2	TD/TX		Transmit Data
3	RD/RX		Receive Data
4		+RX/TX	
5	GND		
6	DSR		Data Set Ready (Tied high) *(see Note 1)*
7	RTS	-RX/TX	Ready to Send *(see Note 2)*
8	CTS		Clear to Send *(see Note 2)*
9		-RX/TX	

Notes:

1. J19 and J20 do not use DSR on pin 6.
2. Clear to Send (CTS) is tied to Ready to Send (RTS) in RS-232 mode.

4.5.2 M&C Switch CMD and Indicators (J18)

This connector is a 37-pin female D connector with the following pinouts:

Pin #	Name	Function
1	Terminal Power	Output, 10V power for the KP-10
20	Spare	
2	UL IF IND COM	Tied to signal ground
21	DL IF IND COM	Tied to signal ground
3	UL RF IND COM	Tied to signal ground
22	DL RF IND COM	Tied to signal ground
4	Spare	
23	UL IF A IND	0V = Indicates uplink IF connected to unit A
5	UL IF B IND	0V = Indicates uplink IF connected to unit B
24	Spare	
6	UL RF A IND	0V = Indicates uplink RF connected to unit A
25	UL RF B IND	0V = Indicates uplink RF connected to unit B
7	Spare	
26	DL IF A IND	0V = Indicates downlink IF connected to unit A
8	DL IF B IND	0V = Indicates downlink IF connected to unit B
27	Spare	
9	DL RF A IND	0V = Indicates downlink RF connected to unit A
28	DL RF B IND	0V = Indicates downlink RF connected to unit B
10	Spare	
29	Spare	
11	Spare	
30	UL IF A CMD	+28V pulse, commands UL IF switch to unit A
12	UL RF A CMD	+28V pulse, commands UL RF switch to unit A
31	Spare	
13	UL IF B CMD	+28V pulse, commands UL IF switch to unit B
32	UL RF B CMD	+28V pulse, commands UL RF switch to unit B
14	Spare	
33	DL IF A CMD	+28V pulse, commands DL IF switch to A
15	DL RF A CMD	+28V pulse, commands DL RF switch to unit A
34	Spare	
16	DL IF B CMD	+28V pulse, commands DL IF switch to unit B
35	DL RF B CMD	+28V pulse, commands DL RF switch to unit B
17	Spare	
36	UL IF CMD COM	Tied to signal ground
18	UL RF CMD COM	Tied to signal ground
37	DL IF CMD COM	Tied to signal ground
19	DL RF CMD COM	Tied to signal ground

4.5.3 M&C Input/Output Signals (J17)

The M&C I/O connector is a 25-pin male D connector with the following pinouts:

Pin #	Name	Function
13	DC GND A	Tied to signal ground
25	DC GND B	Tied to signal ground
12	UL FLT COM A	Tied to signal ground
24	UL FLT COM B	Tied to signal ground
11	DL FLT COM A	Tied to signal ground
23	DL FLT COM B	Tied to signal ground
10	Spare	
22	UL FLT NO A	Input, connected to ground when normal
9	UL FLT NC A	Input, connected to ground when faulted
21	UL FLT NO B	Input, connected to ground when normal
8	UL FLT NC B	Input, connected to ground when faulted
20	Spare	
7	DL FLT NO A	Input, connected to ground when normal
19	DL FLT NC A	Input, connected to ground when faulted
6	DL FLT NO B	Input, connected to ground when normal
18	DL FLT NC B	Input, connected to ground when faulted
5	Spare	
17	Spare	
4	SUM FLT NO	Output, connected to COM when normal
16	SUM FLT COM	Output common
3	SUM FLT NC	Output, connected to COM with any fault
15	Spare	
2	XVA	Input, DC power from unit A (approx. 11V)
14	Spare	
1	XVB	Input, DC power from unit B (approx. 11V)

Appendix A. RSU-503L OPTION

This appendix describes the RSU-503L (Figure A-1), a low-loss version of the RSU-503.

Note: The RSU-503 and RSU-503L are similar units. As a result, only the primary differences of the RSU-503L are provided in this appendix.

Figure A-1. RSU-503L Front Panel

A.1 Description

Refer to Figure A-2 for an interconnection block diagram of the RSU-503L in a typical earth station application.

Using WR229 (C-band) or WR75 (Ku-band) waveguide, the RSU-503L routes the RF outputs from both RFTs directly to a waveguide switch on the antenna plate.

In addition to the RSU-503 functions, the RSU-503L provides command pulses for the external uplink waveguide switch (28V).

A.2 Assemblies

The RSU-503L consists of the following assemblies:

Assembly	EFData Part #
Top Assembly	PL/3000-1
Cable Harness	PL/3001-1
Chassis Base	FP/3802
Panel Divider	FP/3139
M&C Assembly, RSU-503L	PL/3002
M&C Firmware, RSU-503L	FW/3080-1

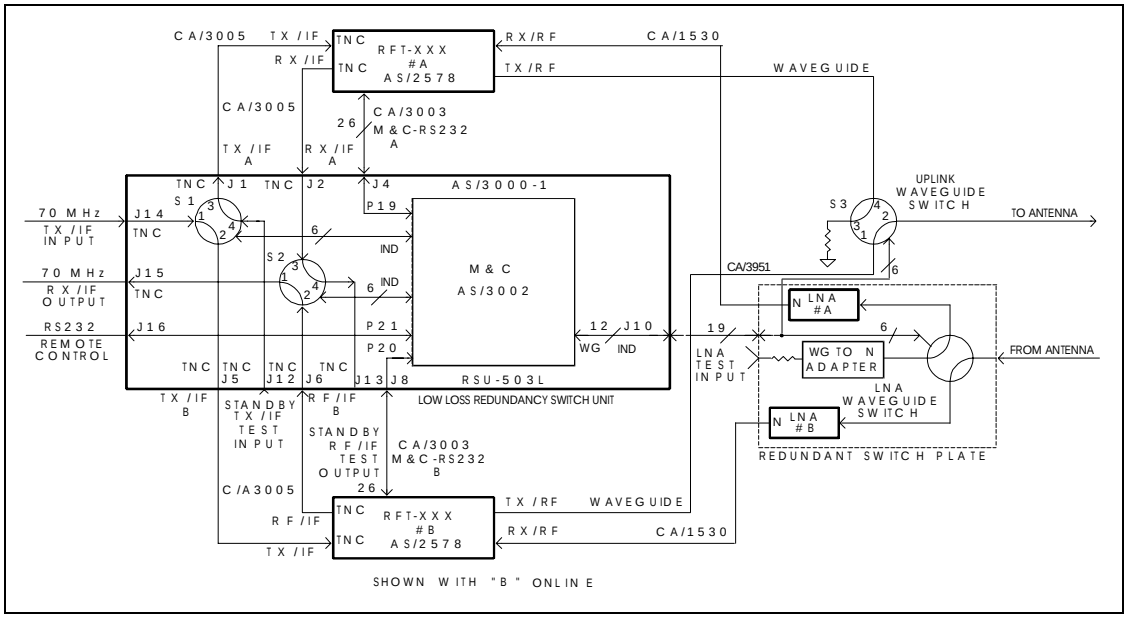


Figure A-2. RSU-503L Low Loss Block Diagram

A.3 External Connections

Note: The following connections, available on the RSU-503, are not available with the RSU-503L:

- TX/RF Input (J3, J7)
- TX/RF Output (J9)
- TX/RF Output (J11) (test output only)

Failure to properly connect the units will result in loss of communications between the switch and the RFTs.

All connections between the switch and other equipment are made through front panel connections, as shown in Table A-1 (refer to Figure A-3 for connector locations).

Table A-1. RSU-503L External Connections

Name	Desig.	Type	Function
Switch to RFT #A (Primary)			
TX/IF OUTPUT	J1	TNC, 50Ω	IF Uplink to Unit A
RX/IF INPUT	J2	TNC, 50Ω	IF Downlink from Unit A
MONITOR & CONTROL	J4	26-pin Circ.	Monitor and control See Section 2.4.4 for pinouts *(See note)*
Switch to RFT #B (Backup)			
TX/IF OUTPUT	J5	TNC, 50Ω	IF Uplink to Unit B
RX/IF INPUT	J6	TNC, 50Ω	IF Downlink from Unit B
MONITOR & CONTROL	J8	26-pin Circ.	Monitor and control See Section 2.4.4 for pinouts *(See note)*
Switch to Antenna			
WAVEGUIDE SWITCH	J10	19-pin Circ.	Waveguide switch control See Section 2.4.6.1 for pinouts
Standby Unit Test Ports			
TX/IF INPUT	J12	TNC, 50Ω	IF input test signal
RX/IF OUTPUT	J13	TNC, 50Ω	IF output test signal
Switch to Modem Terminal Interface			
TX/IF INPUT	J14	TNC, 50Ω	IF Uplink
RX/IF OUTPUT	J15	TNC, 50Ω	IF Downlink
MONITOR & CONTROL	J16	26-pin Circ.	Modem Terminal Interface (MTI) See Section 2.4.12 for pinouts
Ground			
GND ERDE	None	#10-32 Stud	Chassis Ground

Note: Refer to Section A.5 for addressing information.

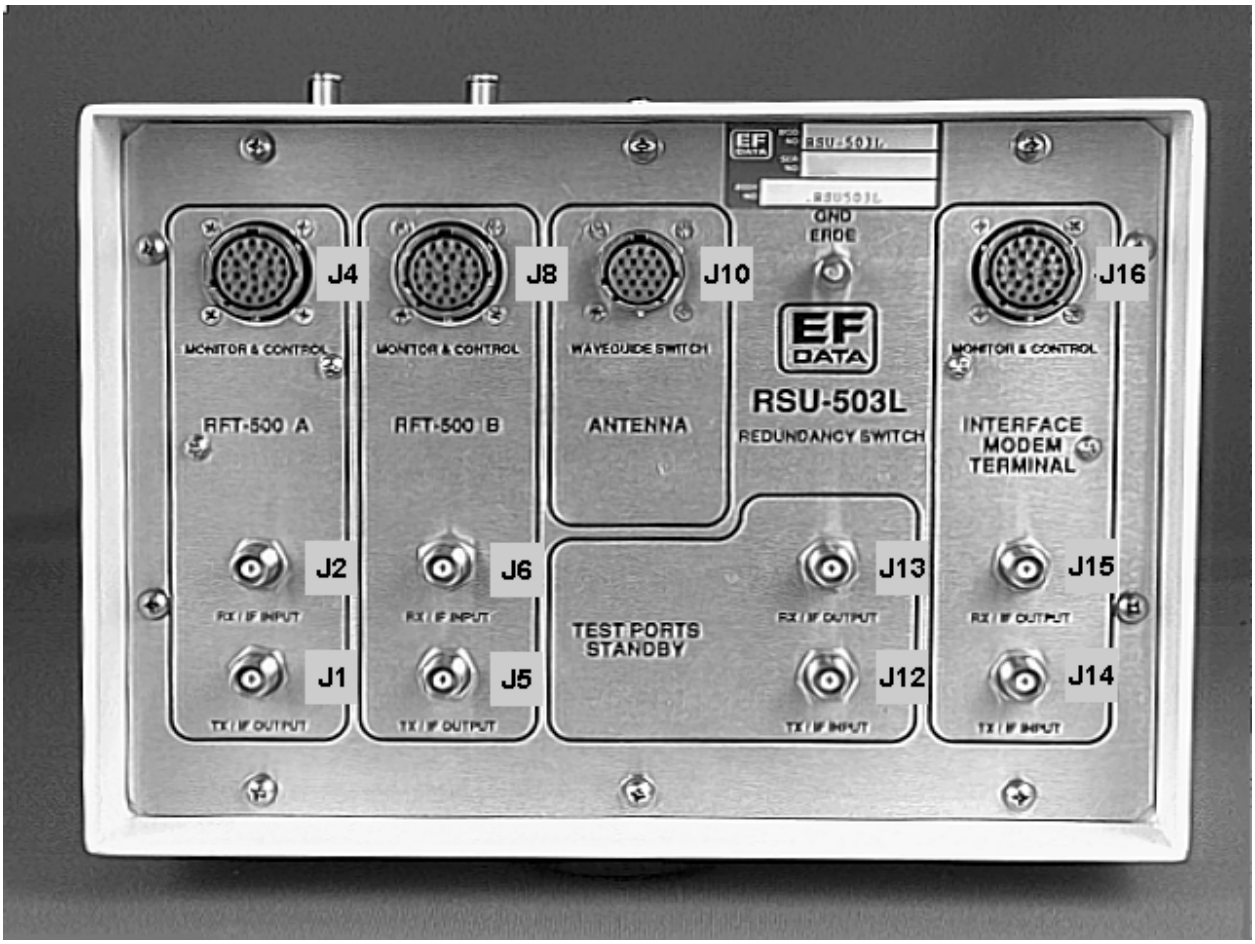


Figure A-3. RSU-503L External Connections

A.3.1 LNA Waveguide Switch Pinout (J10)

Name	Pin #	Function
Command, LNA Position 1	C	+28V pulse for 500 milliseconds
LNA Command Common	G	Ground
Command, LNA Position 2	D	+28V pulse for 500 milliseconds
LNA Indicator, Position 1	H	Connects to Common when in position 1
LNA Indicator, Common	R	Ground
LNA Indicator, Position 2	T	Connects to Common when in position 2
Command, RF Position 1	E	+28V pulse for 500 milliseconds
RF Command Common	L	Ground
Command, RF Position 2	F	+28V pulse for 500 milliseconds
RF Indicator, Position 1	J	Connects to Common when in position 1
RF Indicator, Common	V	Ground
RF Indicator, Position 2	K	Connects to Common when in position 2
LNA PWR #A	A	10V power for LNA 1
LNA RTN #A	B	Ground Return for LNA 1
LNA PWR #B	N	10V power for LNA 2
LNA RTN #B	P	Ground Return for LNA 2
Chassis Ground	S	Ground for Shields

A.4 External Cables

Refer to Figure A-4 for a diagram of the waveguide switch cable and Table A-2 for cable dimensions.

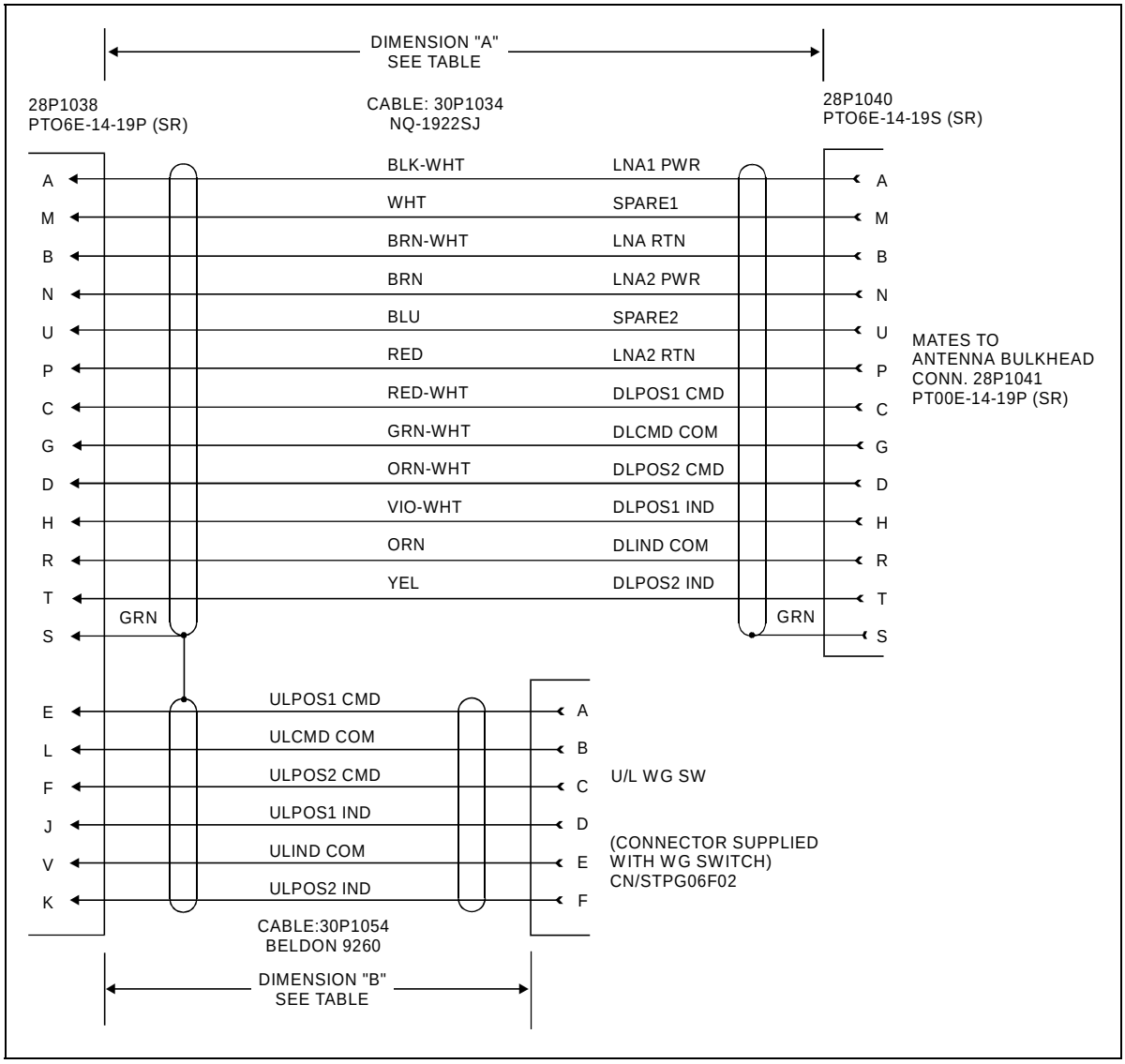


Figure A-4. RSU-503L, J10 to Waveguide Switches

Table A-2. Waveguide Switch Cable Dimensions

Dimension "A"	Dimension "B"
12 ft.	10 ft.
17 ft.	15 ft.
22 ft.	20 ft.

A.5 Addressing

The following are the factory default addresses:

- RSU-503 is set to address 1
- RFT A is set to address 2
- RFT B is set to address 3

The proper M&C cable hook-up is critical:

- RFT A must be connected to the RSU Port A
- RFT B must be connected to the RSU Port B

Note: If these connections are reversed, no communications will take place**.**

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Appendix B. REMOTE CONTROL OPERATION

This appendix describes the remote control operation of the RSU-503 and RSU-503L.

- Firmware number: FW/3080-1P
- Software version: 1.14

Notes:

1. Unless indicated otherwise, any references in this appendix to "the switch" apply to both the RSU-503 and RSU-503L.

2. Before operating the system, ensure the installation is complete and the cable connectors are tight, especially the connections from the waveguide switch indicators. If not, no harm will come to the unit, but the online indicators might read erroneously if the waveguide switch is not set to the same online position as the coax switches in the switch.

Ambiguity between any of the RF switches can be corrected by commanding a switchover from A to B, or B to A. This will then latch all switches on the same channel. This natural ambiguity only occurs during installation, and would only reoccur if a switch becomes faulty.

Note: The firmware referenced in this manual may be an earlier version of the actual firmware supplied with the unit.

B.1 General

Remote controls and status information are transferred via an RS-485 (optional RS-232) serial communications link.

Commands and data are transferred on the remote control communications link as US ASCII-encoded character strings.

The remote communications link is operated in a half-duplex mode.

Communications on the remote link are initiated by a remote controller or terminal. The switch never transmits data on the link unless it is commanded to do so.

Serial communications with either RFT through the switch remains the same as communicating directly with the unit. Each individual RFT is assigned its own unique address, and will respond when that address is polled. To the RFT, the interconnection is transparent—it will not know whether the command came through the switch or directly from the terminal.

The switch receives all commands from the interface, decodes the contained address, compares it to its stored addresses, and routes the message to the intended destination. When an RFT communication parameter (address, baud rate, and parity) is changed, the switch will also store that information in its EEPROM.

Note: All three units must have unique addresses.

B.2 Message Structure

The ASCII character format used requires 11 bits/character:

- 1 start bit
- 7 information bits plus 1 parity bit
- 2 stop bits

or:

- 1 start bit
- 8 information bits with no parity bit
- 2 stop bits

Messages on the remote link fall into the categories of commands and responses.

Commands are messages which are transmitted to the switch, while responses are messages returned by the switch in response to a command.

The general message structure is as follows:

- Start Character
- Device Address
- Command/Response
- End of Message Character

B.2.1 Start Character

A single character precedes all messages transmitted on the remote link. This character flags the start of a message. This character is:

- "<" for commands
- ">" for responses

B.2.2 Device Address

The device address is the address of the switch which is designated to receive a transmitted command, or which is responding to a command.

Valid device addresses are 1 to 3 characters long, and in the range of 1 to 255. Address 0 is reserved as a global address which simultaneously addresses all devices on a given communications link. Devices do not acknowledge global commands.

Each switch and RFT connected to a common remote communications link, must be assigned its own unique address. Addresses are software selectable at the unit, and must be in the range of 1 to 255.

Note: Global address "*" is reserved for KP-10 (the external keypad) commands. Refer to the *KP-10 External Keypad Installation and Operation Manual*.

B.2.3 Command/Response

The command/response portion of the message contains a variable-length character sequence which conveys command and response data.

If the switch receives a message addressed to it which does not match the established protocol or cannot be implemented, a negative acknowledgment message is sent in response. This message is:

- >add/?ER1_parity error'cr''lf']
  (Error message for received parity errors.)
- >add/?ER2_invalid parameter'cr''lf']
  (Error message for a recognized command which cannot be implemented or has parameters which are out of range.)
- >add/?ER3_unrecognizable command'cr''lf']
  (Error message for unrecognizable command or bad command syntax.)
- >add/?ER4_converter in lock mode'cr''lf']
  (Controller in Lock mode. Must go to Enable mode first.)
- >add/?ER5_not supported by hardware'cr''lf']
  (Command is valid command, but it is not supported by the current hardware configuration.)
- >add/?ER6_address in use'cr''lf']
  (Address specified in the ASA, ASB, or ASR command is already assigned.)
- >add/?ER7_RSU-503 in auto mode'cr''lf']
  (Switch is in Auto mode. Must go to Manual mode first.)

Note: "add" is used to indicate a valid 1 to 3 character device address in the range between 1 and 255.

B.2.4 End Character

Each message is ended with a single character which signals the end of the message:

- "cr" Carriage return character for commands
- "]" End bracket for responses

B.3 Switch Redundancy Commands/Responses

B.3.1 RFT Commands/Responses

For information on remote control operation of the two individual RFT units, refer to the remote control operation specification in the RFT Radio Frequency Terminal Installation and Operation Manual.

B.3.2 Configuration Commands/Responses

The following commands control the redundancy configuration and its operating modes.

Redundant System Address Selection			The following messages are addressed to the switch (or corresponding redundant RFT) and, if applicable, will be reformatted before the transmission to the selected RFT. These commands assign the addresses to the three units which make up the redundancy system.
RFT A Address	Command : Response: Status: Response:	<add/ASA_XXX'cr' >add/ASA_XXX'cr''lf'] <add/ASA_'cr' >add/ASA_XXX'cr''lf']	Where: XXX = 1 to 255. Default = 2. add = Current address of the switch. XXX = New address for unit A. This command selects the address of RFT, unit A (RFT_A).
RFT B Address	Command : Response: Status: Response:	<add/ASB_XXX'cr' >add/ASB_XXX'cr''lf'] <add/ASB_'cr' >add/ASB_XXX'cr''lf']	Where: XXX = 1 to 255. Default = 3. add = Current address of the switch. XXX = New address for unit B. This command selects the address of RFT, unit B (RFT_B).
RSU-503 Address	Command : Response: Status: Response:	<add/ASR_XXX'cr' >add/ASR_XXX'cr''lf'] <add/ASR_'cr' >add/ASR_XXX'cr''lf']	Where: XXX = 1 to 255. Default = 1. add = Current address of the switch. XXX = New address for the switch. This command selects the address of the switch. If the desired address is currently in use, the response will be: >add/?ER_ADDRESS IN USE'cr''lf']

Redundant System Comm Poll	Command : Response: Response:	<add/POLL_XXXX'cr' >add/POLL_A'cr' Address = XXX'cr' Baud Rate = YYYYY'cr' Parity = ZZ'cr''lf'] <add/POLL_B'cr' Address = XXX'cr' Baud Rate = YYYY'cr' Parity = ZZ'cr''lf']	Where: add = Switch address. XXXX = A, B, or both. XXX = 1 to 255. YYYYY = 19200, 9600, 4800, 2400, 1200, 600, or 300. ZZ = EV, OD, or NO (none, for 8 bit). This command is used to retrieve address, baud rate, and parity information for the three communication links: • Terminal to switch • Switch to RFT Unit A • Switch to RFT Unit B The user can specify the polling of either Unit A or Unit B, or both, but must know the address of the switch. Upon receipt of this command, the switch will commence a polling sequence of the specified unit(s) at all possible combinations of address, baud rate, and parity. The polling is completed when polled unit responds, or all combinations have been exhausted. The switch then transmits the polled information back to the user terminal. If the switch does not receive a response from the polled unit, it will respond with the following message in place of the address, baud rate, and parity information: <add/POLL_X'cr' X = A or B Unable To Communicate'cr''lf'] Note: Approximately 24 minutes are required to poll all combinations of address, baud rate, and parity per unit (A or B). The only way to abort this operation once it has been started is to cycle power.

B.3.3 Status Commands/Responses

Lock Mode	Command : Response: Status: Response:	<add/LM_XX'cr' >add/LM_XX'cr''lf'] <add/LM_'cr' >add/LM_XX'cr''lf']	Where: XX = LK (lock) or EN (enable). Default = EN. Lock mode prevents the current settings from being changed.
Uplink Switch Config	Command : Response: Status: Response:	<add/ULS_X'cr' >add/ULS_X'cr''lf'] <add/ULS_'cr' >add/ULS_X'cr''lf']	Where: X = A or B. This command is only applicable for the RSU-503L. This command selects the uplink switch configuration, placing the selected unit online, and the other on standby.
Uplink Redundancy Switch Mode	Command : Response: Status: Response:	<add/ULM_X'cr' >add/ULM_YYYY'cr''lf'] <add/ULM_'cr' >add/ULM_YYYY'cr''lf']	Where: X = M (Manual) or A (Auto). YYYY = MAN or AUTO. This command places the switch uplink in either Manual or Auto mode. In Auto mode, the switch will activate a switchover upon a fault of the online unit.
Downlink Switch Config	Command : Response: Status: Response:	<add/DLS_X'cr' >add/DLS_X'cr''lf'] <add/DLS_'cr' >add/DLS_X'cr''lf']	Where: X = A or B. This command selects the downlink switch configuration, placing the selected unit online, and the other on standby.
Downlink Redundancy Switch Mode	Command : Response: Status: Response:	<add/DLM_X'cr' >add/DLM_YYYY'cr''lf'] <add/DLM_'cr' >add/DLM_YYYY'cr''lf']	Where: X = M (Manual) or A (Auto). YYYY = MAN or AUTO. This command places the switch downlink in either Manual or Auto mode.
Hardware	Command : Response: Status: Response:	<add/HWC_X'cr' >add/HWC_X'cr''lf'] <add/HWC_'cr' >add/HWC_X'cr''lf']	Where: X = A (both Uplink and Downlink), B (Uplink only), C (Downlink only), D (both Uplink and Downlink without LNA plate - mask off DLA_FLT). This command is used to configure the RSU for either "Uplink and Downlink", "Uplink Only", or "Downlink Only" operation.
Switch Initialization Config	Command : Response: Status: Response:	<add/SWI_X'cr' >add/SWI_X'cr''lf'] <add/SWI_'cr' >add/SWI_X'cr''lf']	Where: X = A (UL/DL, last state on power-down) (default), B (UL/DL A/A online), C (UL/DL B/B online), D (UL/DL A/B online), E (UL/DL B/A online). Note: Valid for all HWC configurations (see the HWC_ command). This command is used to configure the switch online initialization on power-up, and clears any ambiguity faults.
Redundancy Operating Status	Command : Response:	<add/ROS_'cr' >add/ROS_'cr' ULS_X'cr' ULM_X'cr' DLS_X'cr' DLM_X'cr' ASA_nnn'cr' ASB_nnn'cr''lf']	Where: X = A or B, uplink switches. X = A (auto) or M (manual). X = A or B, downlink switches. X = A (auto) or M (manual). nnn = 1 to 255, Unit A address. nnn = 1 to 255, Unit B address. This command returns a block of data from the switch, reflecting the status of the current redundancy configuration.

Redundancy Fault Status	Command : Response:	<add/RFS_'cr' >add/RFS_'cr' XVA_XXX'cr' XVB_XXX'cr' P05_XXX'cr' P32_XXX'cr' ULA_XXX'cr' ULB_XXX'cr' ULS_XXX'cr' DLA_XXX'cr' DLB_XXX'cr' DLS_XXX'cr''lf']	Where: XXX = OK or FLT. Input power from Unit A. XXX = OK or FLT. Input power from Unit B. XXX = OK or FLT. Internal +5V power. XXX = OK or FLT. Internal +32V power. XXX = OK or FLT. Uplink fault on Unit A. XXX = OK or FLT. Uplink fault on Unit B. XXX = OK or FLT. Uplink switch ambiguity. XXX = OK or FLT. Downlink fault on Unit A. XXX = OK or FLT. Downlink fault on Unit B. XXX = OK or FLT. Downlink switch ambiguity. This command returns a block of data reflecting the current and logged faults in the switch. Logged faults will be reset when receiving this command, while current faults can be read on the second request.
Redundancy Summary Fault	Command : Response:	<add/RSF_'cr' >add/RSF_'XXX'cr''lf']	Where: XXX = OK or FLT. Returns status of current faults only.
Redundancy Maintenance Status	Command : Response:	<add/RMS_'cr' >add/RMS_'cr' XVA_nn.n'cr' XVB_nn.n'cr' P05_nn.n'cr' P32_nn.n'cr''lf']	Where: nn.n = Voltage of input power A. nn.n = Voltage of input power B. nn.n = Internal +5V power supply. nn.n = Internal +32V power supply. This command returns a block of data from the switch, reflecting the status of certain internal parameters for the purpose of troubleshooting.
RS232 Baud Rate Select	Command : Response: Status: Response:	<add/BR_XXXX'cr' >add/BR_XXXX'cr''lf'] <add/BR_'cr' >add/BR_XXXX'cr''lf']	Where: XXXX = 300 to 19200, in standard settings of 300, 600, 1200, 2400, 4800, 9600, and 19200. Default = 9600.
RS232 Parity Select	Command : Response: Status: Response:	<add/PS_XX'cr' >add/PS_XX'cr''lf'] <add/PS_'cr' >add/PS_XX'cr''lf']	Where: XX = OD (odd), EV (even), or NO (none, for 8 bit). Default = EV.
Equipment Type Status	Command : Response:	<add/ET_'cr' >add/ET_'cr' R - RSU-503 SW_X.XX'cr' A - RFT SW_X.XX'cr' B - RFT SW_X.XX'cr''lf']	Where: X.XX = software version. This command returns the equipment type polled and software version of each unit in the redundant system. If unit A and/or B is not communicating with the switch, the following response(s) will be displayed: A - NO COMMUNICATION'cr' B - NO COMMUNICATION'cr''lf']

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Glossary

The following is a list of acronyms and abbreviations that may be found in this manual.

Acronym/ Abbreviation	Definition
Ω	Ohms
A	Ampere
A/D	Analog-to-Digital
C	Celsius
CMD	Commands
COM	Common
CR	Carriage Return
CTS	Clear to Send
dB	Decibels
DC	Direct Current
DL	Downlink
DSR	Data Signal Rate
EEPROM	Electrically-Erasable Programmable Read-Only Memory
EXT	External Reference Clock
FLT	Fault
GHz	Gigahertz (10^9 Hertz)
GND	Ground
IF	Intermediate Frequency
IND	Indicates
lbs	Pounds
LED	Light Emitting Diode
LNA	Low Noise Amplifier
M&C	Monitor and Control
MAN	Manual
Max	Maximum
MHz	Megahertz (10^6 Hertz)
MTI	Modem Terminal Interface
NC	No Connection or Normally Closed
NO	Normally Open
PCB	Printed Circuit Board
PWR	Power

RD	Receive Data
RF	Radio Frequency
RFT	Radio Frequency Terminal
RMA	Return Material Authorization
RSU	Redundancy Switch Unit
RTN	Return
RTS	Ready to Send
RX	Receive
SP	Specification
SUM	Summary
SW	Switch
TD	Transmit Data
TWT	Traveling Wave Tube
TX	Transmit
UL	Uplink
V	Volts
W	Watts
WG	Waveguide

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