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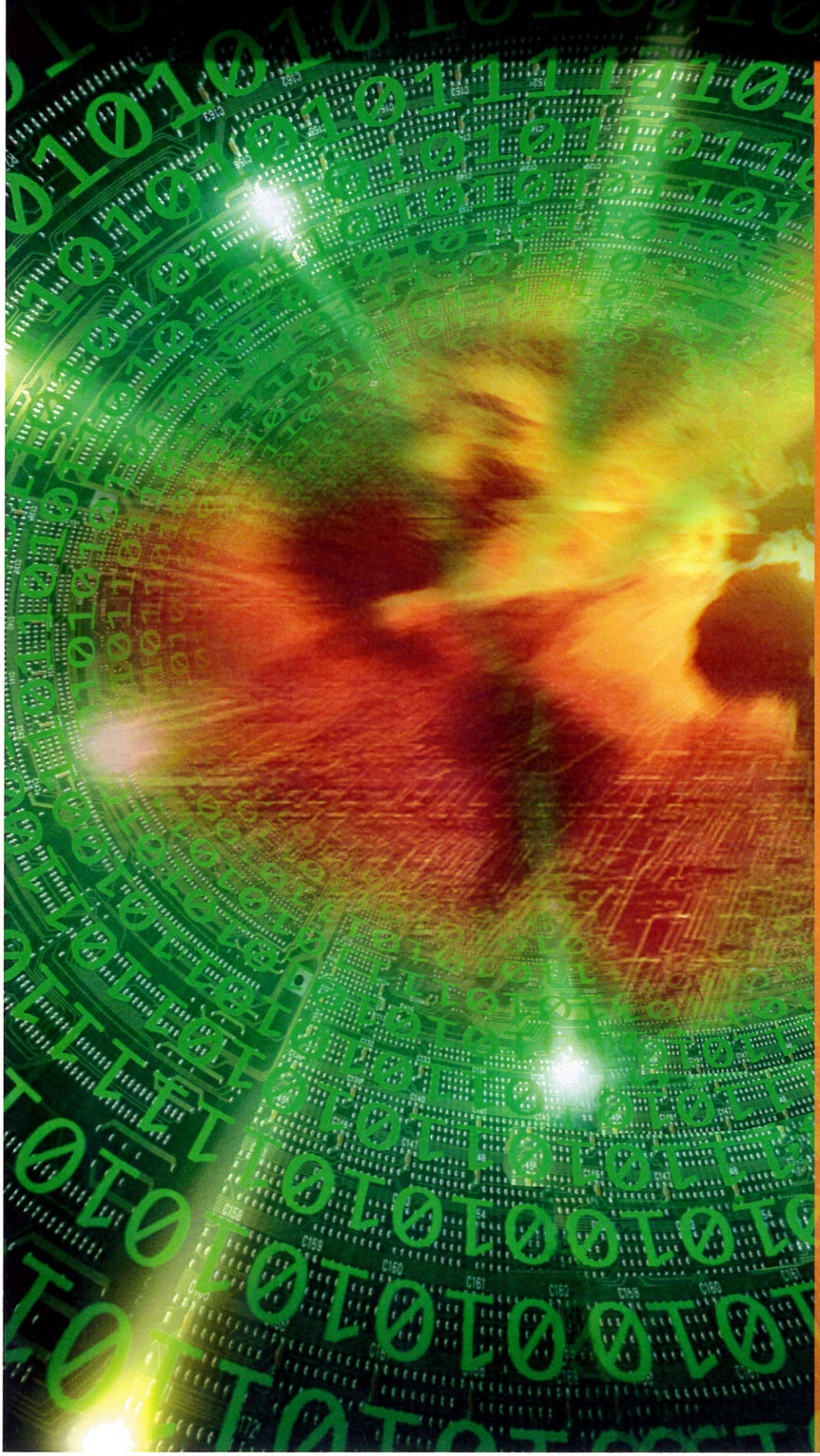

Digital Tracking Receiver

CG-1220

Controls & Structures Division

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REV B
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OPERATION AND MAINTENANCE MANUAL

FOR THE

DIGITAL TRACKING RECEIVER

Controls & Structures Division
1915 Harrison Road
Longview, Texas 75604

NOTICES

WARNING

THE ELECTRICAL CURRENTS AND VOLTAGES IN THIS EQUIPMENT ARE DANGEROUS. PERSONNEL MUST OBSERVE SAFETY REGULATIONS AT ALL TIMES.

This manual is intended as a general guide for trained and qualified personnel who are aware of the dangers of handling potentially hazardous electrical and electronic circuits. This manual is not intended to contain a complete statement of all safety precautions that should be observed by personnel in using this or other electronic equipment.

WARNING

IN CASE OF EMERGENCY BE SURE THAT POWER IS DISCONNECTED.

The manufacturer has attempted to detail in this manual all areas of possible danger to personnel in connection with the use of this equipment. Personnel should use caution when installing, operating, and servicing this equipment. Care should be taken to avoid electrical shock, whether the hazard is caused by design or malfunction.

WARNING

ALWAYS DISCONNECT POWER BEFORE OPENING COVERS, ENCLOSURES, PANELS, OR SHIELDS. ALWAYS USE GROUNDING STICKS AND SHORT OUT HIGH VOLTAGE POINTS BEFORE SERVICING. NEVER MAKE INTERNAL ADJUSTMENTS OR PERFORM MAINTENANCE OR SERVICE WHEN ALONE OR FATIGUED.

The manufacturer is specifically not liable for any damage or injury arising from improper procedures or failure to follow the instructions contained in this manual or failure to exercise due care and caution in the installation, operation, and service of this equipment or use by improperly trained or inexperienced personnel performing such tasks. During installation and operation of this equipment, local building codes and fire protection standards must be observed.

PROPRIETARY NOTICE

PREFACE

About This Manual

This manual is intended for anyone who uses the VertexRSI Digital Tracking Receiver (DTR). First time users as well as experienced operators will find necessary information about features, installation and operation of the DTR.

This manual contains only the information related to the DTR, and does not include information about the antenna structure, the equipment used for positioning the antenna, and other equipment peripheral to the DTR.

This manual is divided into the following sections:

- Section 1.0, Introduction, Identifies standard and optional features of the DTR, and briefly outlines the components of its front and rear panels.
- Section 2.0, Theory, explains the theory of operation of the DTR.
- Section 3.0, Installation, outlines installation, pin-outs, setup and initial power-up of the DTR.
- Section 4.0, Operation, describes the operation of the DTR, including menu structure, navigation and other functional details.
- Section 5.0, Maintenance, provides information necessary for maintaining the DTR.
- Section 6.0, Engineering Drawings, contains the engineering drawings.
- Appendix A, Technical Support, provides the user with contact information for customer support.
- Appendix B, Menu Tree, contains a complete visual representation of the menu hierarchy.
- Appendix C, Remote M&C Protocol, contains commands necessary for remote communication with the DTR.
- Appendix D, Acronyms and Abbreviations, lists the definitions of all acronyms and abbreviations used in this manual.

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1.0 INTRODUCTION

1.1 General Information Regarding the Digital Tracking Receiver

The DTR, developed for satellite tracking, is a fully synthesized tracking receiver. The Digital Signal Processor (DSP) based receiver accepts wideband RF inputs, performs frequency selection, downconverts RF to 70 MHz, and digitally processes the digital samples.

The DTR's user interface is powerful and intuitive giving the operator the ability to custom configure specific applications in a very straight forward manner. The unit's versatile settings allow the unit to interface with a wide range of next-level system components.

1.1.1 DTR Standard Features

The following are the standard features of the DTR:

- Input frequency range of 950 MHz to 2050 MHz for L-band configuration
- Wide input signal dynamic range (70 dB Nominal)
- Sensitivity signal range of –40 dBm to –110 dBm
- Minimum C/No better than 35 dB/Hz
- Synthesized tuning
- Tuning resolution of 1 kHz
- Selectable tracking slope
- Signal linearity (± .5dB over a 10dB nominal tracking range)
- Intelligent signal/side-band recognition
- 240x64-pixel graphics display
- User interface with logically grouped menus
- Optimal mix of "dedicated and soft keys" for efficient menu navigation and data entry
- Spin knob for alternate means of tuning and adjusting parameter values
- Dedicated online Help key
- Remote control capability (RS-232, RS-422, contact closures)
- Front panel 70 MHz monitor port (50 Ω BNC female)
- Real time spectral display of tracking signal
- Field upgradable software
- C/No and power measurement information display
- Compatibility with TRL series L-band Tracking Receivers, including I/O interface and serial communications protocol

1.1.2 DTR Optional Features

- Input frequency range covering S, C, X, Ku and Ka-band configurations
- Up to 6 RF inputs
- Dual polarization input
- Multi-band switching
- Single/dual channel monopulse tracking
- Wideband operation
- Complete backward compatibility with TRL series L-band Tracking Receivers, including monopulse interfaces and TBT (Tracking Band Translator) support
- Rack Slides

1.2 Controls and Indicators

The controls and indicators located on the DTR front panel provide the normal operator interface. The DTR front panel is shown in Figure 1-1 with its controls and indicators identified. The function of each is detailed in Section 4, Operation.

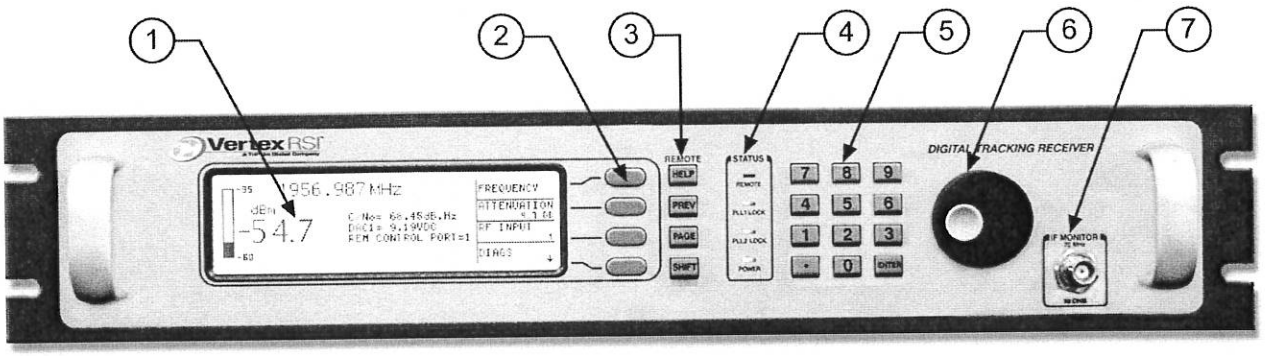


Figure 1-1 DTR Front Panel

TABLE 1-1 CONTROLS AND INDICATORS
1. Receiver Status Display
2. Soft Keys
3. Navigation Keys
4. Status Indicators
5. Numeric Keypad
6. Spin Knob
7. IF Monitor Port

1.3 Inputs and Outputs

The inputs and outputs located on the DTR rear panel provide the external interfaces. The number of inputs varies with user configuration. The DTR rear panel is shown in Figure 1-2. The function of each input and output is listed in Table 1-1.

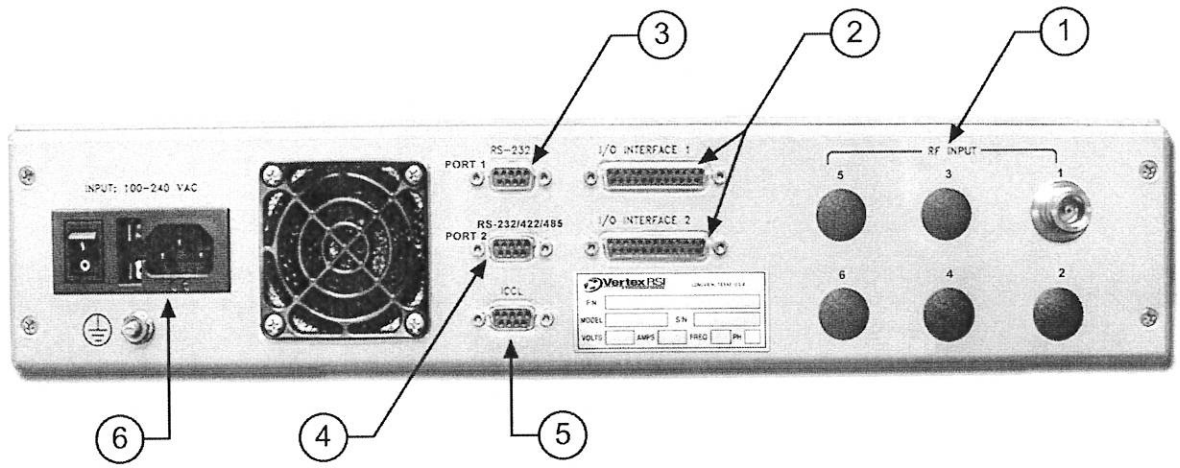


Figure 1-2 DTR Rear Panel

TABLE 1-2 INPUTS AND OUTPUTS

CONNECTOR	FUNCTION
1. RF Input (Type N Connectors)	Provides up to 6 selectable inputs for RF signals in the following bands: • L-band • X-band • S-band • Ku-band • C-band • Ka-band
2. I/O Interface 1 and 2	Analog Interface and Control ports. Provides analog control and status.
3. RS-232	A standard RS-232 serial port.
4. RS-422	A standard RS-422 serial port. Also configurable as an RS-232 serial port.
5. ICCL	VertexRSI Standard "Inter-Component Communication Link"
6. Power Supply	Universal power supply accepting 100 – 240 VAC, 50/60 Hz. A fuse is accessible by pulling out a holder between the switch and the plug. This holder also contains a spare fuse. **IMPORTANT:** The safety grounding bolt below the input should be securely connected to the rack ground bar (or adequate earth ground) to eliminate a potential failure hazard.

1.4 Model Numbers

The model number of the DTR can be found on the serial/model number tag found on the side of the unit. For reference, the following tables list possible configurations.

TABLE 1-3 DTR MODEL NUMBER DESIGNATION

Standard Four-Digit Prefix					OPTIONS (Only if Applicable)	
Base No.						
200800-	**1st Digit**	**2nd Digit**	**3rd Digit**	**4th Digit**	**5th Digit**	**6th Digit**
(Standard)	**1st Freq.**	**2nd Freq.**	**3rd Freq.**	**4th Freq.**	**Options**	**Options**
201046- **(Wideband)**	See chart below	See chart below	See chart below	See chart below	Blank – No options 0 – None 1 – Monopulse 2 – TBT Interface 3 – TBT & Monopulse	Blank – No options 0 – None 1 –w/ Ethernet

Note: One to four frequency ranges are allowed. The first four digits are entered in ascending order of frequencies. Zeros are entered for ranges not used.

TABLE 1-4 FREQUENCY RANGE CHART FOR DTR

Digit	Band	Include Pol Select Switch	Freq. Range	BDC P/N
0	None			
1	L – Band	No	0.95 – 2.0 Ghz	None
2		Yes		
3	S – Band	No	2.0 – 2.8 Ghz	BRF108
4		Yes		
5	C – Band	No	3.4 – 4.2 Ghz	BRF107
6		Yes		
7	X – Band	No	7.25 – 7.75 Ghz	BRF110
8		Yes		
A	Ku – Low Band	No	10.7 – 11.75 Ghz	BRF111
B		Yes		
C	Ku – High Band	No	11.7 – 12.75 Ghz	BRF112
D		Yes		
E	C – High Band	No	3.7 – 4.8 Ghz	BRF109
F		Yes		
G	Ka-A	No	17.0 – 18.1 Ghz	BRF121
H		Yes		
J	Ka-B	No	18.1 – 19.2 Ghz	BRF122
K		Yes		
L	Ka-C	No	19.2 – 20.3 Ghz	BRF123
M		Yes		
N	Ka-D	No	20.2 – 21.3 Ghz	BRF124
P		Yes		
Q	Ka-E	No	21.2 – 22.3 Ghz	BRF125
R		Yes		

Examples:

200800 1000	L-Band with single pol input
200800 2000	L-Band with dual pol input
200800 AC00 10	Ku-Low, Ku-High with single pol input and monopulse option
200800 6BD0 01	C, Ku-Low, Ku-High with dual pol input and ethernet option

2.0 THEORY

2.1 Standard L-band DTR

The use of advanced DSP techniques coupled with conventional analog radio techniques provides enhanced flexibility and sensitivity to the DTR.

The L-Band DTR, illustrated by the block diagram in Figure 2-1, takes a RF input signal in the L-Band frequency range and down-converts the signal to a 70 MHz Intermediate Frequency (IF) using a super-heterodyne process. The signal is then routed through an anti-aliasing filter prior to being sampled by a high-speed analog to digital converter (A/D). This digital data is then passed through a decimating Finite Impulse Response (FIR) filter, which provides both a sample rate reduction and a band limiting function.

The DSP chip then transforms the data using a Fast Fourier Transform (FFT) and analyzes the band for signal and noise content. The signal power and signal to noise information is estimated and the values are sent to the System Control Processor (SCP).

The SCP sets and manages module functions and communication with the user and other equipment via the front panel controls and data interfaces. The SCP also makes slope adjustments and reports the received signal power level to control equipment via serial communications.

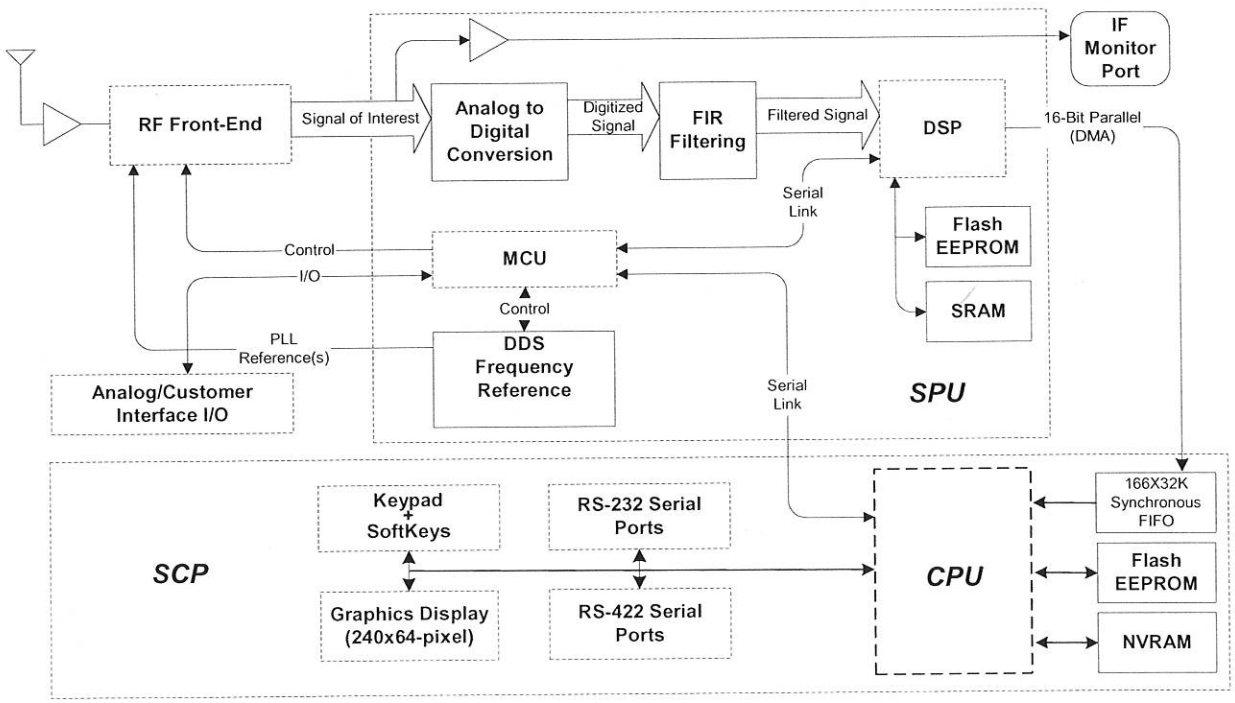


Figure 2-1 DTR Block Diagram

2.2 Optional Configurations

2.2.1 Dual Polarization Input

Versatile unit configurations allow dual-receive signal polarization to be connected to separate RF inputs on the DTR's back panel. Linear polarizations (vertical and horizontal) and circular polarizations (clockwise and counter clockwise) can be connected to the DTR without external combining or switching.

2.2.2 Down Converter Frequencies

RF signals enter the DTR on one of six possible inputs and are routed to the proper Block Down Converter (BDC) for conversion to an L-band signal of 950 MHz to 2050 MHz. Each band accepts an input level of −110 to −40 dBm (decibel referred to 1 milliwatt).

The output of each block downconverter is connected to appropriate switching and routed to the input of the L-band downconverter. To prevent unnecessary heat and noise, the DC power to each BDC is switched so that the BDC is only powered when its particular band is selected.

3.0 INSTALLATION AND INITIAL SETUP

3.1 Introduction

This section provides the information necessary for the installation and initial setup of the DTR.

3.2 Mechanical Installation

Using four #10 screws, mount the DTR in a standard 19-inch Electronic Industries Association (EIA) equipment rack. Rear support and/or rack slides are not usually necessary; however, rack slides may prove helpful during maintenance operations and are available as an option.

3.3 Input and Output Connections

Refer to Figure 3-1 for a diagram showing the possible Input/Output (I/O) connections to the DTR. Table 3-1 provides brief descriptions of each connection or group of connections.

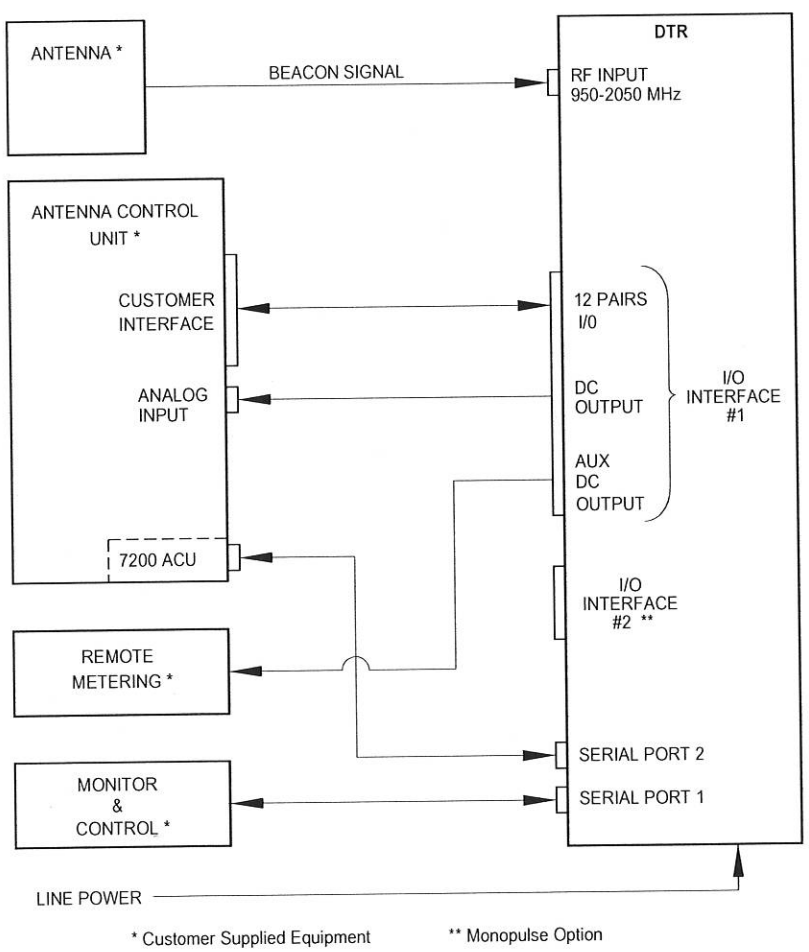


Figure 3-1 L-Band DTR-I/O Connections

NOTE: ACU I/O connections shown for reference only. The DTR may be interfaced with any ACU having contact closures for beacon selection and a tracking voltage input or a serial link utilizing the DTR's M&C command set.

TABLE 3-1 DESCRIPTION OF I/O CONNECTIONS

CONNECTION	DESCRIPTION
Line POWER ENTRY MODULE	For 120 V operation, a standard 3-prong National Electrical Manufacturers Association (NEMA) plug is provided; for 220/230/240 V operation, the same power cable assembly is provided, but the customer may be required to install a more appropriate plug on site. Note that the ground conductor MUST be utilized with the line power connection.
RF INPUTS	The RF inputs to the DTR are provided through 50 ohm, type N female connectors on the rear panel. The allowable input signal range is -110 decibel referred to 1 milliwatt (dBm) to -40 dBm. The DTR input Voltage Standing-Wave Ratio (VSWR) is 1.25:1, nominal. The standard receiver configuration has INPUT #1 available only. In multiband receivers, lower input numbers correspond with lower frequencies. For example, in a C and Ku receiver, Inputs 1 & 2 would be C-band and Inputs 3 & 4 would be Ku-band.
I/O INTERFACE	The I/O interface provides the classic analog interface for ACU control. There are two sets of analog output signals: OUT(+,-) and AUX(+,-). Four contact lines are provided, as well as a summary fault closure. Additionally, there are several general-purpose inputs and outputs that can be used to change the receiver's operational mode. See Tables 3-2 and 3-3 for pin-outs.
SERIAL INTERFACE #1	This serial port provides a sophisticated digital control and status interface for advanced ACU and M&C systems. Interface #1 is configured for RS-232 only. Full remote control of the receiver is realized with this interface. See Table 3-5 for pin-outs.
SERIAL INTERFACE #2	This serial port provides a sophisticated digital control and status interface for advanced ACU and M&C systems. Interface #2 is fully configurable for RS-232 or RS-422. Full remote control of the receiver is realized with this interface. See Table 3-6 for pin-outs.
ICCL	Proprietary VertexRSI Standard "Inter-Component Communication Link" for dedicated communication with other advanced VertexRSI components.

3.3.1 Input/Output Interface Connector Pin-Out

The I/O Interface Connector Pin-Out section describes the signals and configuration of the I/O INTERFACE connectors (25-pin D female subminiature socket).

3.3.1.1 Default Configuration

Table 3-2 and 3-3 describes the pin number, designation and function of the two I/O ports. The tables show the default configuration only.

TABLE 3-2 I/O INTERFACE 1, STANDARD & WIDEBAND CONFIG.		
PIN NUMBER	DESIGNATION	FUNCTION
1,14	+OUT, -OUT (DAC#1)	Positive, negative side of analog output voltage.
2	SHLD_OUT	Shield for +/- OUT pair
3,16	+AUX, -AUX (DAC#2)	Positive, negative side of analog output voltage, auxiliary
15	SHLD_AUX	Shield for +/- AUX pair
4,17	SUM_FLT	Summary fault relay contacts.
5,18	GPIO 0, (Beacon 1, Common)	Beacon 1 Input
6,19	GPIO 1, (Beacon 2, Common)	Beacon 2 Input
7,20	GPIO 2, (Beacon 3, Common)	Beacon 3 Input
8,21	GPIO 3, (Beacon 4, Common)	Beacon 4 Input
9,22	GPIO 4	General purpose I/O
10,23	GPIO 5	General purpose I/O
11,24	GPIO 6, (Command, Return)	POL 1 select control line
12,25	GPIO 7, (Command, Return)	POL 2 select control line
13	SIG_GND (Reserved signal)	DTR signal ground; THIS IS NOT A SAFETY GROUND POINT

TABLE 3-3 I/O INTERFACE 2, STANDARD & WIDEBAND CONFIG.		
PIN NUMBER	DESIGNATION	FUNCTION
1,14	+OUT, -OUT	Positive, negative side of analog output voltage.
2	SHLD_OUT	Shield for +/- OUT pair
3,16	+AUX, -AUX	Positive, negative side of analog output voltage, auxiliary
15	SHLD_AUX	Shield for +/- AUX pair
4,17	SUM_FLT	Summary fault relay contacts.
5,18	GPIO 8	General purpose I/O
6,19	GPIO 9	General purpose I/O
7,20	GPIO 10	General purpose I/O
8,21	GPIO 11	General purpose I/O
9,22	GPIO 12	General purpose I/O
10,23	GPIO 13	General purpose I/O
11,24	GPIO 14	General purpose I/O
12,25	GPIO 15	General purpose I/O
13	SIG_GND (Reserved signal)	DTR signal ground; THIS IS NOT A SAFETY GROUND POINT

3.3.1.1.1 Analog Output Voltage Pin-Out

There are two separate analog voltage outputs available; both are capable of producing +/- 10 VDC. Pins 1, 14 and 2 provide the positive, negative, and shield connections respectively. Pins 3, 16 and 15, respectively, provide an auxiliary analog output.

3.3.1.1.2 Summary Fault Output

Pins 4 and 17 provide the SUMMARY FAULT relay contact closure in the standard product model. If any faults occur or DTR supply power is lost, the Summary fault contact will open. The ACKNOWLEDGE FAULTS menu has the effect of removing the highlight from the fault display on the DTR LCD and restoring the Summary Fault contact to the normal (no-fault) state, which is CLOSED. However it may not clear the fault condition. If any new faults occur after the Summary fault relay was forced to close by using ACKNOWLEDGE FAULTS, the Summary Fault relay will open again to indicate a new fault condition.

3.3.1.1.3 Beacon Select Inputs (GPIO 0-3)

The BEACON SELECT inputs (not available on Monopulse units) are formed through pin groups (5,18), (6,19), (7,20) and (8,21)—internal drive common ground, short GPIO + to – to turn off optically coupled isolator. GPIO 0-3 are inputs that switch the DTR to a pre-set BEACON (set of parameters). The main purpose is to provide a discrete, parallel control interface that is compatible with existing 7134 (and 7200) controllers. Selecting one of the 4 BEACON inputs, while the DTR is in REMOTE CONTROL (not Local) and the REMOTE CONTROL PORT parameter is set to I/O Interface #1, will enable the DTR to switch to the pre-set BEACON parameters.

To setup the beacons, the appropriate DTR parameters should be set, and the STORE BEACON command excecuted. (Refer to Section 3.5.2 for further information about setting up beacons.) This action will store the BEACON parameters into NVRAM, which may then be recalled from the CONFIGS/BEACON-SETUP/RESTORE-BEACONS menu or from the I/O Interface #1 inputs while the DTR is in REMOTE control.

3.3.1.1.4 General Purpose I/O

GPIO 4, 5, and 8–15 are reserved for future use on the standard product; no connections should be made to these pins.

3.3.1.1.5 External Pol Select Control Lines (GPIO 6-7)

Pin groups (11,24) and (12,25)–isolated output relays, normally closed--provide two polarization select control lines for a customer furnished switch (external to the DTR). The menu item POL SELECT controls the two polarization select control lines on the GPIO 6 and 7 of I/O Interface #1. This was implemented for backward compatibility with a VertexRSI Model TRL Tracking Receiver which provided some I/O lines to facilitate control of an external POL Switch, mounted on the hub with the RF equipment. Notice that these lines are controlled by the Pol Select item on the DTR main menu.

3.3.1.1.6 Signal Ground

Pin 13 is reserved for future use on the standard receiver. No connection should be made to this pin.

3.3.1.2 Monopulse Option

Table 3-4 and 3-5 describes the pin number, designation and function of the two I/O ports. The tables show the monopulse option configuration. Connections to the monopulse tracking plate are described below; refer to the preceding section, Default Configuration, for pins that are not described here.

TABLE 3-4 I/O INTERFACE 1, MONOPULSE CONFIG.

PIN NUMBER	DESIGNATION	FUNCTION
1,14	+OUT, -OUT (DAC#1)	Positive, negative side of analog output voltage.
2	SHLD_OUT	Shield for +/- OUT pair
3,16	+AUX, -AUX (DAC#2)	Positive, negative side of analog output voltage, auxiliary
15	SHLD_AUX	Shield for +/- AUX pair
4,17	SUM_FLT	Summary fault relay contacts.
5,18	GPIO 0, (90 DEG, return)	90 degree command control
6,19	GPIO 1, (180 DEG, return)	180 degree command control
7,20	GPIO 2, (Mute, return)	Phase shifter mute control
8,21	GPIO 3	General purpose I/O
9,22	GPIO 4	General purpose I/O
10,23	GPIO 5	General purpose I/O
11,24	GPIO 6, (Command, Return)	POL 1 select control line
12,25	GPIO 7, (Command, Return)	POL 2 select control line
13	SIG_GND (Reserved signal)	DTR signal ground; THIS IS NOT A SAFETY GROUND POINT

TABLE 3-5 I/O INTERFACE 2, MONOPULSE CONFIG.

PIN NUMBER	DESIGNATION	FUNCTION
1,14	+OUT, -OUT	Positive, negative side of analog output voltage.
2	SHLD_OUT	Shield for +/- OUT pair
3,16	+AUX, -AUX	Positive, negative side of analog output voltage, auxiliary
15	SHLD_AUX	Shield for +/- AUX pair
4,17	SUM_FLT	Summary fault relay contacts.
5,18	GPIO 8 (Mute status, return)	Mute status (short = on)
6,19	GPIO 9 (Mute status, return)	Mute status (short = off)
7,20	GPIO 10 (1.40625 DEG, return)	1.40625 degree command control
8,21	GPIO 11 (2.8125 DEG, return)	2.8125 degree command control
9,22	GPIO 12 (5.625 DEG, return)	5.625 degree command control
10,23	GPIO 13 (11.25 DEG, return)	11.25 degree command control
11,24	GPIO 14 (22.5 DEG, return)	22.5 degree command control
12,25	GPIO 15 (45 DEG, return)	45 degree command control
13	SIG_GND (Reserved signal)	DTR signal ground; THIS IS NOT A SAFETY GROUND POINT

3.3.1.2.1 Degree Command Control (GPIO 0-1, 10-15)

The phase shifter outputs are formed through I/O Interface #1 pin groups (5,18) and (6,19) as well as I/O Interface #2 (7,20), (8,21), (9,22), (10,23), (11,24), and (12,25)—common ground driver IC.

3.3.1.2.2 Mute Control (GPIO 2)

The mute select control line output is formed through I/O Interface #1 pin group (7,20)--isolated output relay, normally closed. Mute commands the tracking plate to bypasses the monopulse error channel while allowing the sum channel to pass. Mute is normally on; when the DTR is commanded to start monopulse, mute is turned off.

3.3.1.2.3 Mute Status (GPIO 8-9)

The MUTE STATUS inputs are formed through I/O Interface #1 pin groups (5,18) and (6,19)—internal drive common ground, short GPIO + to – to turn off optically coupled isolator. GPIO 8-9 are inputs that the DTR uses to monitor the operation of the mute switch on the monopulse tracking plate. A fault is set if the switch fails to operate. NOTE: Some monopulse tracking plates may not have this functionality.

3.4 Serial Interface Hardware Configuration

Both serial ports are factory set to:

TABLE 3-6 DEFAULT SERIAL INTERFACE SETTINGS

Setting	Changes Allowed
19200 bps	These parameters can be changed using the following menu: Configs/Comm Parameters/Port 1 or Port 2
Echo enabled	
Newline enabled (CR-LF)	
Shell = M&C	
8 Data bits	These parameters cannot be changed by the user.
No parity	
1 stop bit	

Port 1 can only be an RS-232 port, while Port 2 may be configured as RS-232 or RS-422. Note that these two pin outs coexist on the same 9-pin connector without conflict. Both serial ports are 9-pin D subminiature socket connectors.

Pin-outs for the Serial Interface Ports are given in Tables 3-7 and 3-8.

TABLE 3-7 SERIAL INTERFACE PORT #1 PIN-OUTS (RS-232)	
PIN	FUNCTION
1	No Connection
2	RX
3	TX
4	No Connection
5	Signal Ground
6	No Connection
7	No Connection
8	No Connection
9	No Connection

TABLE 3-8 SERIAL INTERFACE PORT #2 PIN-OUTS (RS-232/422)		
PIN	FUNCTION	
	RS-232 ONLY	RS-422 ONLY
1		TX+
2	RX (from DCE)	
3	TX (from DTE)	
4		RX+
5	Signal Ground	
6		TX-
7	Request to send (RTS) (from DTE)	
8	Clear to send (CTS) (from DCE)	
9		RX -

3.5 Initial Setup and Power-up

Detailed operating instructions for the DTR are provided in Section 4.0 of this manual. The operator should become familiar with the general operating procedures before continuing.

> ***NOTE: Prior to powering the DTR, observe the incoming beacon signal using a spectrum analyzer to ensure proper level (-110 dBm to -40 dBm) and sufficient Carrier to Noise ratio (C/No) (35 dbHz minimum). Also, make note of the beacon signal frequency. Then connect the RF input(s) to the appropriate N-Type connectors and proceed with the following steps.***

1. Set the DTR rear panel POWER switch to ON.

2. Verify that the 240x64-pixel graphical receiver status display shows a normal operational mode. A default frequency and signal acquisition status should be displayed.

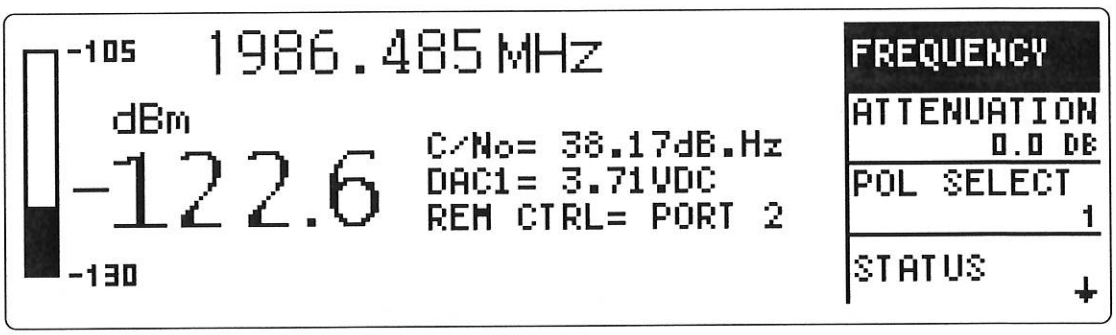


Figure 3-2 Typical Operational Display

3. Set **POL SELECT** item to the desired input (on multiple port configurations).

4. If necessary, select **FREQUENCY** and enter the desired frequency by either rotating the spin knob, or by using the numeric keys to enter the appropriate frequency.

5. Select **ATTENUATION**. This menu controls the lower end of the analog voltage output in conjunction with the parameters in the ANALOG OUTPUTS configuration menu.

6. Once signal acquisition occurs, verify that no faults are indicated.

7. For troubleshooting assistance, navigate to STATUS\TROUBLE-SHOOT. This menu describes what some of the possible error messages mean and how to fix them.

3.5.1 Analog Voltage Output (DAC) Setup

1. Tune frequency to obtain desired signal at maximum power level.

2. Use DAC SETUP menu to establish VOLTAGE RANGE, MINIMUM REF POWER LEVEL, and SLOPE.

   DAC1 provides an analog DC voltage, proportional to signal level, on pins 1 and 14 (+OUT, -OUT) of I/O Interface #1 on the back panel.

   A. The DC VOLTAGE RANGE of the Digital to Analog Converter (DAC) is set to the default range of (0 to +10V). For Special uses, the voltage range can alternatively be set to (-10 to +10V), or (-5 to +5V).

   B. The SLOPE defaults to 0.3V/dB. SLOPE controls the rate of change of the DC output voltage with respect to a 1 dB change in signal power level.

   C. The MINIMUM REF POWER LEVEL establishes the power level corresponding to the minimum DAC voltage. The default is –90 dBm which emulates VertexRSI "TRL" operation.

3. Check DAC1 output voltage (displayed on the front panel) and adjust MINIMUM REF POWER LEVEL to obtain 8 VDC.

Note: If both DAC1 and DAC2 are enabled, the front panel display will report DAC1 voltage real-time (not at specifed DAC1 update rate). If DAC1 is disabled and DAC2 is enabled, front display will report DAC2 voltage real-time; label will change to DAC2=. If DAC1 is enabled and DAC2 is disabled, front display will report DAC1 voltage real-time. If DAC1 is disabled and DAC2 is disabled, front display will not report anything (blank field).

3.5.2 Setting up Beacons for 7134 Remote Control

This brief summary outlines steps necessary to establish beacons which can be accessed via remote control from VertexRSI 7134 ACUs.

1. Set necessary parameters such as FREQUENCY, SLOPE, etc. See Section 4.2.5.4, BEACON SETUP for a complete list of beacon parameters.

2. Execute the STORE BEACON 1-4 menu at CONFIGS\BEACON-SETUP\STORE-BEACONS. These current settings will be stored in the respective beacon (BEACON 1-4).

3. Test by recalling BEACON 1-4.

4. The connection to the 7134 is via the I/O Interface #1. (Refer to Table 3-2)

5. To allow the 7134 ACU to select beacons, set CONFIGS\REMOTE CONTROL to I/O Interface #1.

6. On the front panel, press SHIFT-REMOTE to enter REMOTE mode.

7. Test by selecting BEACON 1-4 at the 7134 ACU.

3.5.3 Controlling DTR with 72XX ACUs via Serial port

The information below briefly describes the connections for controlling a DTR from a VertexRSI 7200-series ACU.

1. Verify that the port is compatible with the 72XX ACU port. Match RS232 or RS/422 interfaces.

2. Match communications parameters as in the table below.

TABLE 3-9 EXAMPLE OF COMM PARAMETERS

DTR	ACU
Port2 BPS 19200 (max. 57600) Echo Disabled Newline set to CR (only) Shell M&C Shell (8 data, No parity, 1 stop bit are factory set, cannot be changed)	ACU – PORT2 (or any available port) BPS 19200 (max is 38400) Parity None Data bits 8 Stop Bits 1 Shell TRL Echo Disabled Newline CR (only) Checksums Disabled Handshake None

3. The connecting cable must have Tx and Rx crossed as shown in the table below.

TABLE 3-10 SERIAL PIN CONNECTIONS TO 7200 ACU

DTR	ACU
2 – Rx	2 – Tx
3 – Tx	3 – Rx
5 – GND	7 – GND

3.5.4 ACU Setup

Proceed with setup of the ACU by calibrating the tracking signal slope.

4.0 OPERATION

This section of the manual explains in detail how to operate the DTR. Table 4-1 describes the function of each control and indicator shown in Figure 4-1.

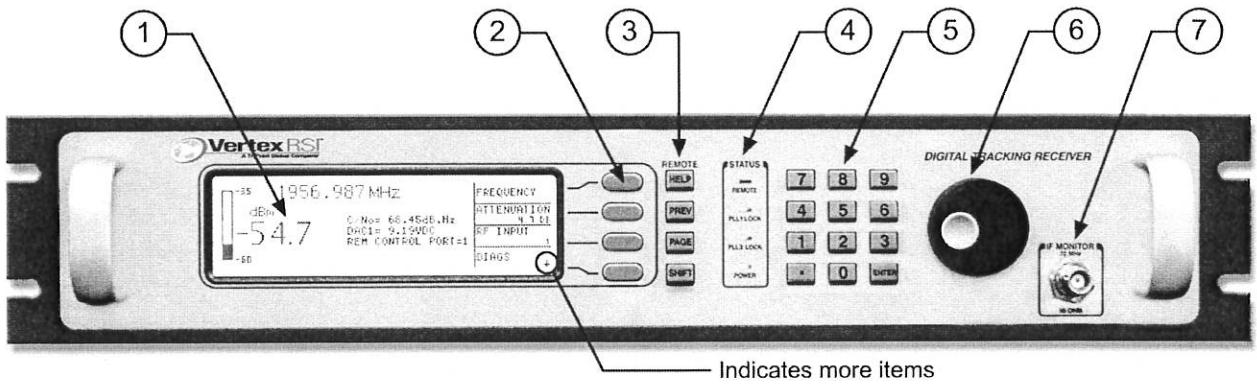


Figure 4-1 DTR Controls and Indicators

TABLE 4-1 CONTROLS AND INDICATORS

CONTROL OR INDICATOR	FUNCTION
1. Receiver Status Display	The Receiver Status Display is a 240x64-pixel graphical display that indicates the selected frequency, power level, operational mode, and other user-selectable features such as the Spectral Display (detailed in Section 4.2.4).
2. Soft Keys	The Soft-Key interface lends flexibility to the unit and allows the user to select and navigate menus. The function of each key is defined by text displayed on the screen immediately to the left of each key and will change with context.
3. Navigation Keys	The dedicated Navigation Keys allow the user to move quickly between menus.
HELP	The **HELP** key on the front panel is used to assist the user by describing the highlighted menu item. When pressed, a help screen is displayed and assists the user by describing or clarifying the highlighted item. If pressed when a menu item is not highlighted, a summary of the help screen is displayed.
PREV	The **PREV** key is used to back out of menus. Pushing it after a menu item has been selected cancels the input.
PAGE	An ↓ or ↑, appearing at the bottom-right or top-right of the screen, indicates that more menu choices are available. Use **PAGE** to show these additional choices.
SHIFT	The **SHIFT** key is a "Dual Function" key. When used in conjunction with the other navigational keys, it performs alternate functions. SHIFT + PAGE reverses the PAGE function. **SHIFT** + **HELP** toggles **LOCAL/REMOTE** Mode.
4. Status Indicators	The Status Indicators indicate 1) LOCAL/REMOTE mode; 2) Failure in critical internal sub-systems (downconverter chain Phase-Locked Loops (PLL's) and loss of phase lock in receiver); 3) Power.
5. Numerical Keypad	A numeric keypad allows the user to enter numeric entries and control parameters.
6. Spin Knob	The Spin Knob is used to provide real-time frequency tuning and to edit other system parameters. It also allows the user to cycle through menus and choices.
7. IF Monitor	The IF Monitor taps the frequency being input into the DSP board. The BNC Connector on the front panel is a buffered 70 MHz Intermediate Frequency (IF) monitor port. The IF monitor port has a 50-Ohm output impedance.

The **Receiver Status Display**, shown below in Figure 4-2, displays the frequency, signal source and levels, faults, etc. along with the **Main Menu** of the DTR. Table 4-2 describes each display feature.

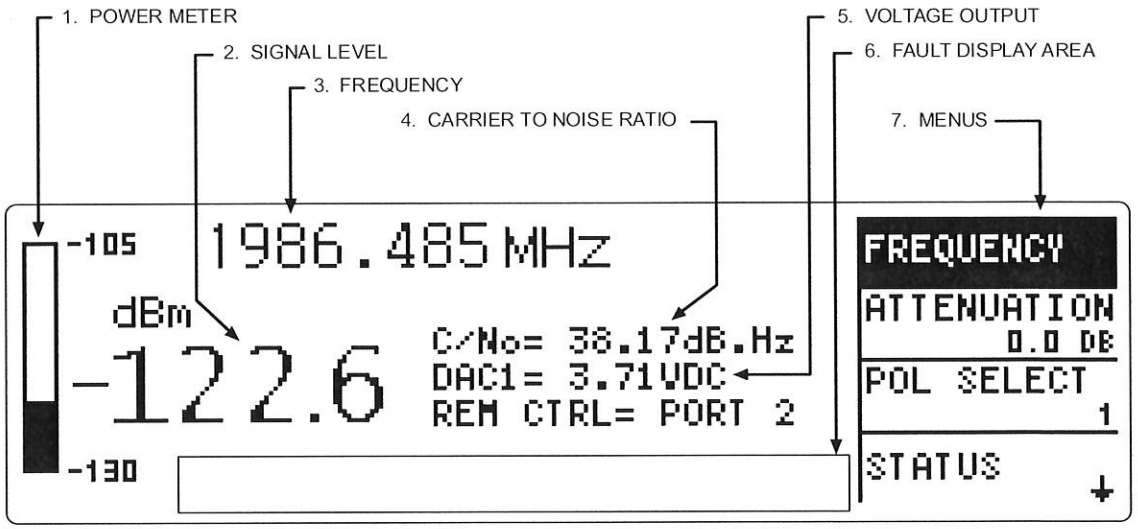


Figure 4-2 Receiver Status Display Screen

TABLE 4-2 RECEIVER STATUS DISPLAY

CONTROL OR INDICATOR	FUNCTION
1. Power Meter	Graphical representation of input signal level in dBm. Range automatically adjusts relative to power level.
2. Signal Level	Input Signal level in dBm
3. Frequency	Frequency of the receiver in MHz
4. Carrier to Noise Ratio	Calculated C/No of tracking signal
5. Voltage Ouput	Current analog voltage output
6. Fault Display	Displays faults and alarm conditions
7. Menu	Used to support the various system interfaces and control system parameters.

4.1 Understanding the DTR Menu Structure

The **MAIN MENU** on the **Receiver Status Display** contains items which support the various system interfaces and control system parameters. An arrow (↓ or ↑) at the top-right or bottom-right of the menu display indicates that additional menu items are available. These menu items can be accessed by pressing **[PAGE]**. The **Navigation keys [PREV], [PAGE] and [SHIFT]** allow the user to move within menu items (see Table 4-1). Each item of the **MAIN MENU** will be discussed in the following paragraphs. For a complete visual representation of the menu hierarchy, refer to Appendix B, DTR Menu Tree.

4.1.1 Selecting Menu Items

The **Soft Keys** and **Navigation keys** are the primary function keys used in making all menu choices. Menu items, displayed near the right side of the **Display,** are selected by pressing the Soft Key immediately to the right of the menu item (See Figure 4-1).

The DTR's flexible interface also lets the user cycle through menus items with the Spin Knob. Once the desired menu is highlighted, press the **[ENTER]** key.

4.1.2 What Happens When a Menu is Selected...

Selecting a menu does one of three things depending on its context:

4.1.2.1 Selects a Submenu

The most basic outcome of selecting a menu item is a resulting submenu. Each submenu item may contain additional submenus. Generally, no menu will have more than 8 items.

4.1.2.2 Opens an Editor Screen

The **[FREQUENCY]** menu, for example, opens an editor screen where the user inputs a value. There are no additional submenus below an editor screen.

The user can enter data in a number of ways within an editor. The Soft Key functions change to assist the user. In addition, the keypad can be used to directly enter data. Finally, the Spin Knob also may be used. For items that require numeric input, acceptable ranges of values will appear on the screen. If an out-of-range value is entered, the system will reject the value and the value of the parameter will remain as it was before it was edited. The **[ENTER]** key on the keypad should be pressed after the desired value has been input. The **[PREV]** key will "cancel" any input leaving the former value intact.

4.1.2.3 Executes an Action

A menu such as **[ACKNOWLEDGE FAULTS]** does not have submenus and does not open an editor. Instead it performs an action and maintains the current menu screen.

4.2 Main Menu Items

The menus used to support the system interfaces and control system parameters follow. See Appendix B for a complete Menu Tree.

The following are considered to be the **MAIN MENU** items:

- **1 - FREQUENCY**
- **2 - ATTENUATION**
- **3 - POL SELECT**
- **4 - STATUS**
- **5 - CONFIGS**
- **6 - ACKNOWLEDGE FAULTS**
- **7 - TESTS**

4.2.1 FREQUENCY

The [**FREQUENCY**] menu allows the user to edit the receiver tuning frequency in 1kHz increments. The valid frequency range depends on the DTR's block down converter configuration.

While the receiver is under **LOCAL** control the editing input source should be either the keypad interface or the spin-knob. When the receiver is in **REMOTE** control (controlled by the data link that is configured as the port in control) frequency editing is initiated and executed using ASCII M&C commands via the data link.

4.2.2 ATTENUATION

[**ATTENUATION**] controls the lower end of the Digital to Analog Converter (DAC) voltage output, in conjunction with the parameters in the ANALOG OUTPUTS configuration menu. The range is from 0 to 50 dB. Rotating the spin knob clockwise, for example, increases the apparent attenuation, resulting in a lower voltage level output; actual input power is not affected.

4.2.3 POL SELECT

[**POL SELECT**] allows the user to select which POL input is the active port for tracking. The numeral "1" or "2" will appear next to the POL SELECT menu in the main menu, indicating which POL input is active.

This setting is used to control an RF switch internal to the DTR, and may also be used to control an external switch using I/O Interface #1 on the back panel. GPIO 6 and 7 become active based on the POL SELECT setting. Pins 11,24 represent the POL 1 state and pins 12,25 represent the POL 2 state (see Table 3-2). Notice that if multiple POL switches are configured (i.e. in a tri-band system) changing POL will affect all bands (all POL switches are "ganged" together).

4.2.4 STATUS MENU

The Status menu [**STATUS**] allows the user to view various operational parameters, operating voltages, and settings in a single display window. This information can be useful in diagnosing system problems. The [**STATUS**] menu contains the following submenus.

- **SPECTRAL DISPLAY** – This feature allows the user to view real time amplitude vs. frequency data in a graphical manner similar to a spectrum analyzer. Use the Spin Knob to adjust frequency. Soft keys A/B change step size. Soft keys C/D change vertical scale. Press [**PREV**] to exit.

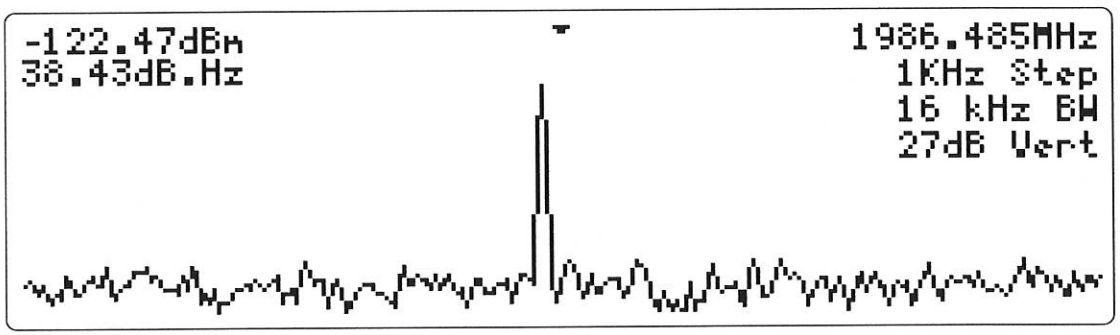


Figure 4-3 Spectral Display

- **SPU SERIAL LINK STATS** – This screen displays SPU RS422 serial link statistics separately for the MCU and DSP. Timeouts are displayed when the CPU did not get a response within 100ms. Errors are logged when an unexpected response did not match internal protocol. The percentage of errors plus timeouts versus the total number of commands is displayed. Linklosses displays the number of failures to establish communication with the MCU or DSP processors. Finally, the total number of commands sent is displayed.

- **I/O STATUS** – Current I/O status information obtained from the I/O card is displayed.

- **FIFO STATUS** – displays FIFO data statistics from the CPU/DSP link. The following are counted: Status Frames, Signal Frames, Spectrum Frames, Monopulse Frames, Missing Monopulse Frames, Unknown Frames and Total Frames.

- **MESSAGE LOG** displays the most recent events recorded in the system message buffer. Pressing [**PAGE**] and [**SHIFT**] + [**PAGE**] or spinning the knob scrolls the list; [**PREV**] exits.

- **DISPLAY VERSION** displays the current firmware version and configuration information for the DTR.

- **CPU TASKS** displays current CPU tasks, including task number, name, shell type and activity

- **TROUBLESHOOT** is a diagnostic tool to provide online assistance on the current faults.

4.2.5 CONFIGURATION MENU

The Configuration menu [**CONFIGS**] provides access to system parameters and settings. The [**CONFIGS**] menu provides the following:

- **COMM PARAMETERS**
- **RECEIVER OPERATION**
- **CONVERSION BANDS**
- **BEACON SETUP**
- **SYSTEM MEMORY**
- **INTERFACE OPTIONS**

4.2.5.1 COMM PARAMETERS

- **REMOTE CONTROL** - This editor selects which port on the back panel is in control when the DTR is in **REMOTE** mode. For remote M&C communications, select Port1 or 2, which support serial protocols.

- **PORT 1, PORT 2** – These two menus configure the port for M&C communications. Port 1 is RS-232 only, while Port 2 allows RS-232 or RS-422 connections. See Tables 3-7,8 for factory set data parameters for these ports.

  The following submenus are configurable for M&C communications:

  – **BPS (BAUD)** – The transfer rate of this port can be set from 1200 to 57,600 BPS.

  – **NEWLINE** – When enabled, a carriage return line-feed (CR-LF) is sent at the end of the command line. When disabled, only a carriage return (CR) is sent.

  – **ECHO** returns the received character to the port.

  – **SHELL** determines the communications protocol used on this serial port. DISABLED disables the serial port. M&C SHELL provides Monitor and Control protocol support including status polling and system configuration capability. MESSAGE PRINTER is a diagnostic tool which may be used to record system events when connected to a terminal program or a serial printer. TBT INTERFACE supports serial control of VertexRSI Tracking Band Translator (TBT).

  – **RESET PORT** resets the given port. The communication interface is reinitialized and the shell (if any) that was running on it is restarted.

4.2.5.2 RECEIVER OPERATION

The **RECEIVER OPERATION** configures how the Signal Processing Unit (SPU) will process the input signal.

- **FILTERS** controls the bandwidth of the band-pass filter, centered around the receiver tuning frequency. A signal is detectable if it is visible on the spectral display (MAIN\STATUS\SPECTRAL DISPLAY). A spectrum analyzer attached to the IF Monitor port may be used to view the filter band. Filters 1MHz and narrower are centered at 70 MHz. Filters wider than 1 MHz are centered at 72 MHz, except 16 MHz. For the 16 MHz filter, the tuning frequency is translated to 71 MHz; filter coverage is 9 MHz below to 7 MHz above. The 16 MHz filter has a 1.5 MHz notch 7 MHz below the tuning frequency. To use this filter, the NCO OFFSET should be zero (MAIN\CONFIGS\SYSTEM MEMORY\FACTORY CALIBRATION\NCO OFFSET). In standard configurations choose from: 16 kHz, 62.5 kHz, 125 kHz, or 250 kHz. Wide-band units provide: 32k, 500k, 1M, 2M, 4M, 8M, 12M, and 16MHz.

- **ANALOG OUTPUTS** - The ANALOG OUTPUTS menu controls the Digital to Analog Converter (DAC) and contains the following items:

  - **DAC1 and DAC2 SETUPS** – DAC1 provides an analog DC voltage proportional to signal level on pins 1 and 14 (+OUT, -OUT) of I/O Interface #1 on the back panel. DAC2 provides an analog DC voltage proportional to signal level on pins 3 and 16 (+AUX, -AUX) of I/O Interface #1 on the back panel. See Section 3.5.1 for DAC setup information. Both DAC1 and DAC2 SETUPS have the following submenus:

    - **VOLTAGE RANGE** selects the DC voltage range of the DAC. This value is used to represent the signal level as a tracking voltage

    - **MINIMUM REFERENCE POWER LEVEL** sets the minimum input power level reference which corresponds to minimum DAC voltage output.

    - **SLOPE** controls the rate of change of the DC output with respect to a 1 dB change in signal power level. Select a value from 0.001 to 1.000 V/dB.

    - **OUTPUT** enables or disables the respective DAC output, DAC1 or DAC2.

  - **UPDATE RATE**, in milliseconds, is used by the DSP to send the current signal level to both DAC1 and DAC2 outputs. Notice that the VOLTAGE RANGE, MINIMUM REFERENCE POWER LEVEL, and SLOPE may be independently set up. However, the UPDATE RATE applies to both DAC outputs.

- **FFT SAMPLE AVERAGING** determines how new FFT data is combined with previous data. Increasing AVERAGING smooths the spectral curve and increases the stability of the display. Decreasing AVERAGING improves the DTR response time.

- **DETECTION** selects how the DTR will report signal power. FFT SIGNAL is the default, used to track broad spectrum signals, using FFTs. FFT NOISE is a special mode used to track broad spectrum signals, using FFTs. RMS POWER will report a direct RMS power estimate, without using FFTs. RMS DENSITY will report direct RMS power density estimate, without using FFTs.

4.2.5.3 CONVERSION BANDS*

*Displays only in configurations with block down converters

The **[CONVERSION BANDS]** menu describes the downconverter setup and has various submenus, depending on the number of bands in any particular model. Each **BAND** menu (1-4) has the following submenus:

- **BDC GAIN** is the measured gain in dB of the BDC for this band.
- **OSCILLATOR FREQUENCY** is the local oscillator frequency of the BDC for this band.
- **HIGH FREQUENCY** is the high-end frequency of the BDC that supports this band.
- **LOW FREQUENCY** is the low-end frequency of the BDC that supports this band.
- **IS L-BAND?** – If "YES" is selected, Band1 is configured to L-Band and the other parameters within the CONVERSION BANDS menu are not editable. Only BAND1 can be configured as L-Band.

Each of these menus is an editor menu. Input the correct values for the submenus from Table 4-3 below, depending on the configuration.

TABLE 4-3 FREQUENCY RANGES AND OSCILLATORS (in MHz)

Band	Local Oscillator	Low Frequency	High Frequency
S	3,750	2,000	2,800
C	5,150	3,400	4,200
X	6,300	7,250	7,750
Ku-Low	9,750	10,700	11,700*
Ku-High	10,750	11,700	12,750
Ka-A	16,500	17,000	18,100
Ka-B	17,150	18,000	19,200
Ka-C	18,250	19,200	20,200
Ka-D	19,250	20,200	21,200
Ka-E	20,250	21,200	22,300

* For Ku-Low-ONLY configurations, High Frequency is 11,750 MHz

4.2.5.4 BEACON SETUP*

* Only available in Non-Monopulse units.

A subset of DTR system parameters may be stored as BEACONS to provide parallel control via I/O Interface #1. This provides support of legacy VertexRSI interfaces, such as the 7134 ACU. See Section 3.5.2 for more information on setting up beacons with a 7134 ACU.

- **STORE BEACONS** – Executing each item in this menu will store current values of the following parameters as a BEACON state:
  - FREQUENCY
  - POL-SELECT
  - ATTENUATION
  - FILTER
  - SLOPE
  - VOLTAGE RANGE
  - MINIMUM POWER REFERENCE LEVEL

  Only DAC1 SLOPE, VOLTAGE RANGE, and MINIMUM POWER REFERENCE LEVEL are stored. Those parameters for DAC2 are not stored.

- **RESTORE BEACONS** – Executing each item in this menu will restore values previously stored as a BEACON state.

4.2.5.5 SYSTEM MEMORY

The SYSTEM MEMORY menu contains functions related to the storage of system parameters in nonvolatile RAM (NVRAM).

- **FACTORY CALIBRATION** contains system parameters that are calibrated in factory and are NOT normally changed by the user. CHANGING THE PARAMETERS IN THIS MENU MAY DEGRADE THE PERFORMANCE OF THE DTR.

  - **SAMPLING FREQUENCY** compensates for the oscillator's slight deviation from nominal 64 MHz. Entering the actual oscillator frequency to within 1Hz maximizes the receiver's performance. This calibration is done in the factory for each DTR before shipment; it should NOT be changed in most cases.

    If it must be reconfigured, connect a cable from the 70 MHz IF monitor (on the front of the DTR) to a spectrum analyzer. Set up the spectrum analyzer as follows:

    1) Set Auto Couple to ALL.
    2) Set Frequency to 64 MHz.
    3) Set Span to 5 KHz.
    4) Peak-search the signal.
    5) Center the frequency.
    6) Span down to 500 Hz.
    7) Record and enter the measured value.

  - **NCO FREQUENCY** adjusts the frequency of the Numerically Controlled Oscillator (NCO) on the SPU.

  - **POWER LEVEL CALIBRATION** adjusts the calibration value used to calculate the signal power measurement reported by the DTR (shown on the front display in dBm). This parameter should NOT be modified under normal circumstances.

  - **MANUAL IF OVERRIDE** allows the user to manually select the Intermediate Frequency (IF) used by the L-band front end. The DTR normally selects the optimal IF; this menu provides flexibility for special cases.

    - **FREQUENCY #1-4 OVERRIDE** allows user selection of up to four IF1s used by the L-band front end for current frequency. IF1 specifies an approximate center for the digital filter within a 25 MHz analog filter centered at 836.5 MHz. "Automatic" is the default setting, but settings from 824.8 to 847.2 MHz are available.

- **SET DATE AND TIME**

  The port used to set the date or time (local or remote) must be the one in control.

  - **SET DATE** allows the current date to be set. In the M&C shell, the format is MMDDYYYY and al fields must be set.

  - **SET TIME** allows the current time to be set. In the M&C shell, the format is HHMMSS and all fields must be set. The time is in 24-hour format.

- **RESTORE ROM DEFAULTS – WARNING: This will erase user and factory calibration settings!**

  Selecting YES and pressing ENTER restores all DTR parameters to factory ROM defaults. The DTR will reset.

- **FORCE CLEAR FAULTS** forces the system to clear all faults. Faults which are set periodically will appear again. Also see ACKNOWLEDGE FAULTS below.

4.2.5.6 INTERFACE OPTIONS

- **LCD CONTRAST** adjusts the contrast of the LCD display. Choose a value between 0 (for least contrast) and 30 (for most contrast). The default value is 6.

- **LOW LEVEL SIGNAL** – This value, in dB, sets the trigger threshold for the LOW INPUT SIGNAL fault. Regardless of this value, the LOW INPUT SIGNAL fault will still occur if input signal is undetectable. The default value is -120 dBm.

- **HIGH TEMP LIMIT** – This value, in degrees Fahrenheit, is used to trigger the TEMPERATURE ALARM fault. The default value is 120° F.

4.2.6 ACKNOWLEDGE FAULTS

Choosing [**ACKNOWLEDGE FAULTS**] clears current alarm conditions. The fault messages remain displayed on the screen, but no longer cause an alarm and the summary fault contact closure is no longer asserted by the faults. Also see FORCE CLEAR FAULTS.

4.2.7 TESTS

The [**TESTS**] menu provides system integrity tests and are intended primarily for factory testing.

Use of some tests may obscure real-time data, and others may temporarily affect the performance of the receiver.

- **LCD DISPLAY** tests every pixel of the LCD by drawing lines in two alternating patterns. The first pattern displays automatically; the second pattern will display after a key-press. Press any key to exit test.

- **LEDS TEST** blinks the top three LED's four times (the power LED will remain lighted). The test should last no more than 5 seconds.

- **FIFO TEST** displays a test pattern received from the SPU, in hexadecimal values. The pattern should be:

R/C	A	B	C	D	E
1	0000	0001	1111	0002	2222
2	4444	0010	5555	0020	6666
3	8888	0100	9999	0200	AAAA
4	CCCC	1000	DDDD	2000	EEEE

FIFO TEST: PASSED

  In case of failure, a small "x" will precede the values that do not match. Press PREV to exit.

- **DISPLAY TIME DOMAIN** – This function displays the sampled waveform of the received signal in time domain. NOTE: this is for diagnostic purposes only; signal strength is not calculated while the time domain is displayed, thus preventing tracking functionality.

5.0 MAINTENANCE

5.1 Inspection and Preventive Maintenance

Scheduled maintenance should include the following:

- Check the inside of the unit for excessive dust accumulation every 6 to 12 months. If excessive dust is found, remove it using a clean, dry (non-oiled) high-pressure air source.

- Check and clean the fan filter, accessible from back of unit, whenever dirty to avoid overheating which may degrade system performance.

- Replace batteries for non-volatile memory as required. The long life battery ensures that user parameters are stored when the unit is powered off. If user parameters such as Frequency are not maintained (and return to defaults), the battery may need replacing.

5.2 System Spares

Due to the complex nature of the DTR, there are VERY FEW user serviceable parts inside. Repairs must be made by qualified service technicians under the direction of VertexRSI Technical Support ONLY. Failure to follow this recommendation will void your warranty.

The following spare parts can be ordered from VertexRSI.

TABLE 5-1 SPARE PARTS

P/N	DESCRIPTION	QTY PER SYS
CFU079	Fuse 1 Amp fuse	1
CSS091	Filter power entry module 85-265 VAC	1
BBA003	Battery coin 23mm DIA X 5.4mm	1
BFN010	Cooling Fan	1
CPS039	Power Supply	1

Additional parts such as printed circuit boards are NOT user-replaceable since they must be factory calibrated and matched with other components. In addition they must have the proper, compatible software version installed prior to installation in the unit.

6.0 ENGINEERING DRAWINGS

This section of the manual contains the following engineering drawing:

200807 Digital Tracking Receiver, Stock Level Drawing

NOTES:

1. ITEM 063 TO BE BAGGED AND PLACED WITH BOARDS IN KITS -03 AND -04 ONLY.
2. INSTALL FAN SO THAT FAN AIR FLOW INDICATOR POINTS INTO DTR CHASSIS.
3. INSTALL FILTER GUARD SO THAT REMOVABLE INSERT FACES OUTWARD.
4. BEFORE INSTALLATION OF ITEM 044, PEEL OFF PROTECTIVE PLASTIC FROM THE ADHESIVE ON THE BACK OF THE LABEL. FROM THE VIEWPOINT WITH THE DISPLAY CLOSEST TO YOU:
   A) INSTALL THE FIRST LABEL HORIZONTALLY AGAINST THE INSIDE LEFT WALL OF THE UNIT, ONE (1) INCH AWAY FROM THE FRONT PANEL AND HALFWAY BETWEEN THE VENT HOLES.
   B) INSTALL THE SECOND LABEL VERTICALLY AGAINST THE INSIDE LEFT WALL OF THE UNIT ONE (1) INCH FORWARD OF THE FIRST RACK MOUNTING HOLE (CLOSEST TOWARDS YOU) AND HALFWAY BETWEEN THE VENT HOLES.
   C) INSTALL THE THIRD LABEL HORIZONTALLY AGAINST THE INSIDE OF THE BACK WALL TOWARDS THE RIGHT-HAND SIDE, ABOVE THE INPUT POWER FILTER MODULE. INSTALL EVEN WITH THE LEFTMOST EDGE OF THE INPUT POWER MODULE.
5. MFG TO OBTAIN SEM003 AND CUT IT INTO A 1" X 1" SQUARE. PEEL PLASTIC BACKING AND COVER THE INSIDE OF THE SQUARE CUTOUT ON BACK PANEL BEFORE INSTALLING ITEM 30 (200880).
6. ROUTE SEMI-RIGID CABLES AWAY FROM BDC MOUNTING HOLES, AND CLOSER TO THE L-BAND BOARD HOUSING.
7. REPLACE HARDWARE FROM TB1 TERMINAL BLOCK WITH ITEMS 068, 069, 070.

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
RDP	H	REVISED PER ECO-4605	06/12/03	SNYDER

QUANTITY REQUIRED				ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES
04	03	01	00				
			20	050	CTW004	CABLE TIE 3.9"	
			4	049	CTW002	CABLE TIE FLAT CABLE CLIP	
			10	048	CTW001	CABLE TIE ANCHOR	
			2	047	CFU079	FUSE 1 AMP LITTLEFUSE 239001	
			1	046	CSS091	FILTER POWER ENTRY MODULE 85-265VAC	
			1	045	CPS039	POWER SUPPLY +5 +/-12 +24VDC	
			3	044	JLB038	IMPACT INDICATOR DROP(N) TELL 25G	4
				043			
				042			
2	2			041	BBB518	CABLE SEMI-RIGID ASSY 16"	6
1	1			040	BBB426	CABLE SEMI-RIGID ASSY 12"	6
1	1			039	BBB424	CABLE SEMI-RIGID ASSY 8"	6
1				038	BBB431	CABLE SEMI-RIGID ASSY 20"	6
1				037	CCW055	WIRE 22 AWG PINK	
1				036	CCW041	WIRE 22 AWG BLACK	
			1	035	BFN012	FAN GUARD FINGER 60MM X 60MM METAL	2,3
			1	034	BFN011	ASSY FILTERGUARD FAN 60MM X 60MM	2,3
			1	033	BFN010	FAN 24VDC 18CFM 60MM X 60MM	2,3
1				032	201024-01	DTR WIDE BAND PCB ASSY	
1				031	200893-02	DTR WIDE BAND RF PCB HOUSING	
1	1			030	200880-01	DTR CONNECTOR INTERFACE PCB	
1	1			029	200867-01	DTR SYSTEM CONTROL PROCESSOR PCB	
1	1			028	200865-01	DTR POWER FILTER PCB	
1	1			027	200879-01	DTR I/O CARD	
	1			026	200893-01	DTR RF PCB HOUSING ASSY	
			1	025	200806-01	DTR FRONT PANEL ASSY	
			1	024	200801-02	2RU MODULAR CHASSIS LID	
			1	023	200801-01	2RU MODULAR CHASSIS	
1	1			022	200765-01	DTR SIGNAL PROCESSING UNIT PCB	
				REF 021	200898-15	POWER ENTERY MODULE/PS/GROUND LUG CABLE ASSY	
1				020	200898-14	WIDE BAND -I/O CARD CABLE ASSEMBLY	
				019			
				018			
				REF 017	200898-10	RF ENCLOSURE CABLE ASSY DTR	
				016			
				REF 015	201266-01	DTR DC POWER DISTRIBUTION HARNESS ASSY	7
				014			
				REF 013	200898-06	GROUND LUG-LINE FILTER CABLE ASSY DTR	
				REF 012	200898-05	SPU-I/O CARD CABLE ASSY DTR	
				REF 011	200898-04	CONNECTOR CARD-SCP CABLE ASSY DTR	
				REF 010	200898-03	SCP-SPU CABLE ASSY DTR	
				REF 009	200898-02	SCP-KEYPAD CABLE ASSY DTR	
			1	008	200898-01	CABLE KIT STOCK LEVEL DTR	
				007			
				006			
				005			
X				004	-04	DTR WIDE BAND BOARD KIT	
	X		1	003	-03	DTR STOCK LEVEL BOARD KIT	
		X		002	-01	DTR STOCK LEVEL COMPLETE	
			1	X 001	-00	DTR STOCK LEVEL W/O BOARDS	-

QUANTITY REQUIRED				ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTES
04	03	01	00				
			2	070	DHW185	SCREW 4-40 UNC X 1-1/4 FHMS SS	7
			2	069	DHW072	NUT HEX 4-40 UNC W/EXTERNAL LW SS	7
			2	068	DHW118	WASHER FLAT #4 X 5/16 SS	7
			8	067	DHW080	STANDOFF 6-32 UNC X 3/4" F/F HEX NYLON	
			4	066	DHW572	SCREW 6-32 UNC X 1/4 FHMS SS	
			2	065	DKC006	HANDLE 4" CENTERS 10924-A-1032-E	
			4	064	DHW062	STANDOFF 6-32 X 1 1/2" F/F ROUND ALUM.	
23	23			063	DHW014	SCREW 6-32 UNC X 1/4" PHMS SS	1
			4	062	DHW559	SCREW 6-32 UNC X 1 3/4" FHMS 82 DEG SS	
			1	061	DHW050	SCREW 10-32 UNF X 3/4 BIND. HD SS	
			8	060	DHW134	WASHER FLAT #6 SS	
			51	059	DHW127	SCREW 6-32 X 3/8" PHLPS FHMS 100° SS	
			5	058	DHW064	NUT 6-32 UNC W/EXTERNAL STAR LOCKWASHER SS	
			4	057	DHW054	WASHER STAR #10 SS	
			11	056	DHW029	STANDOFF 6-32 UNC X 3/4" F/F ROUND STEEL	
			4	055	DHW558	SCREW 10-32 UNF X 5/8" BHMS PHLPS SS	
			10	054	DHW008	SCREW LOCK KIT FEMALE	
			2	053	DHW051	NUT 10-32 UNF W/EXTERNAL LOCKWASHER SS	
			2	052	DHW025	WASHER FLAT #10	
			1	051	CTB001	TERMINAL RING 18-22AWG #10 STUD	

LIST OF MATERIALS OR PARTS LIST

DASH NO.	NEXT ASS'Y	USED ON
		1ST APPLICATION

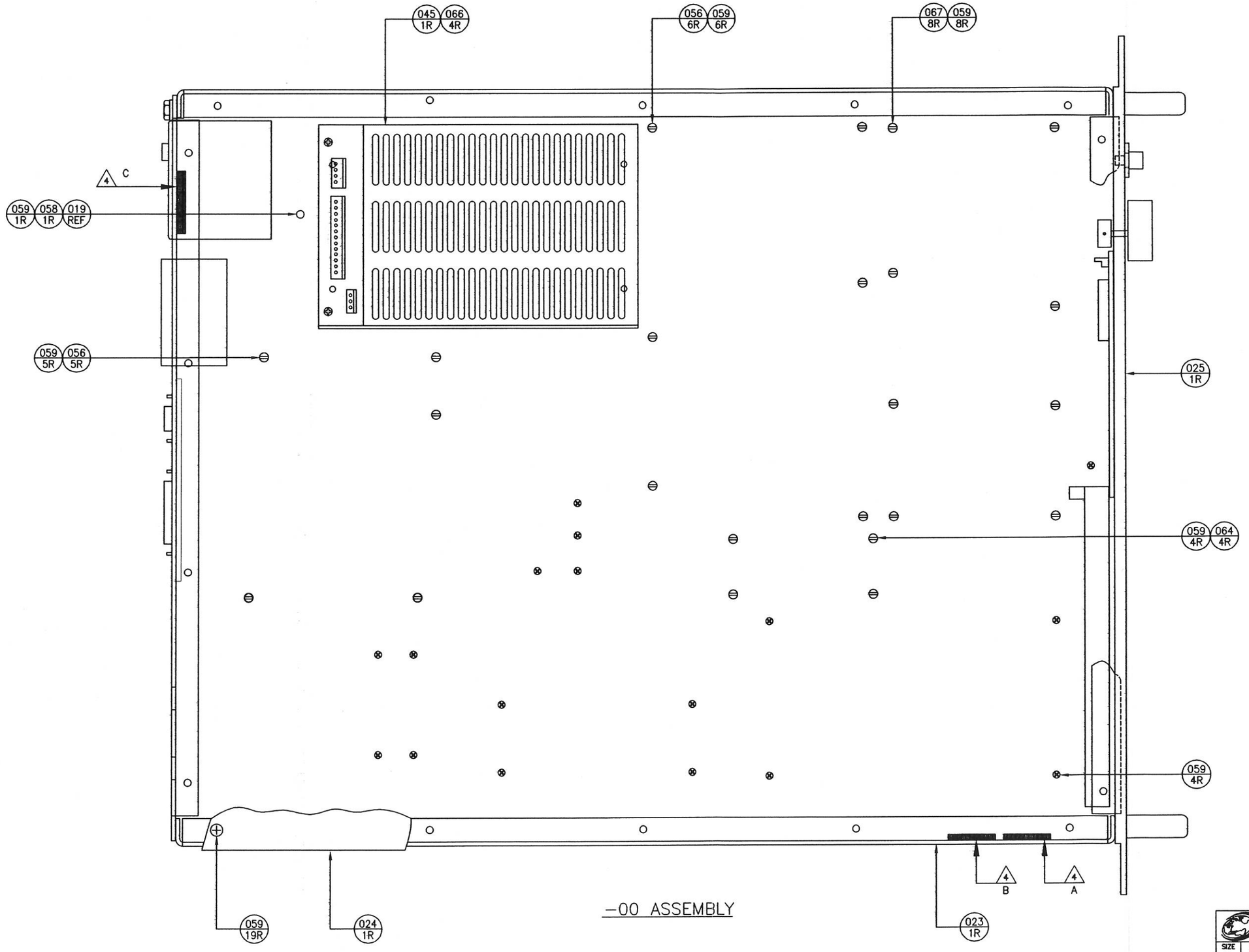
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE APPLIED FINISH TOLERANCES
2 PLACE DIM. ± N/A
3 PLACE DIM. ± N/A
ANGLES ± N/A
---DO NOT SCALE DRAWING---
TOLERANCE ON FRACTIONAL DIMENSIONS:
DETAILS ± N/A
ASSEMBLIES ± N/A
TO CONVERT TO METRIC SYSTEM, MULTIPLY INCHES SHOWN ON DRAWING BY 25.4 TO OBTAIN MILLIMETERS.

DRAWN BY R PUGH	06/18/99
CHECKED BY M BARTON	06/18/99
ENGINEER C BONNER	01/18/00
PROJECT ENGINEER C BONNER	01/18/00
PRODUCT ENGINEER C BONNER	01/18/00

VertexRSI CONTROLS & STRUCTURES DIVISION Longview, Texas

TITLE:
STOCK LEVEL ASSEMBLY
100-240VAC 1P
DTR

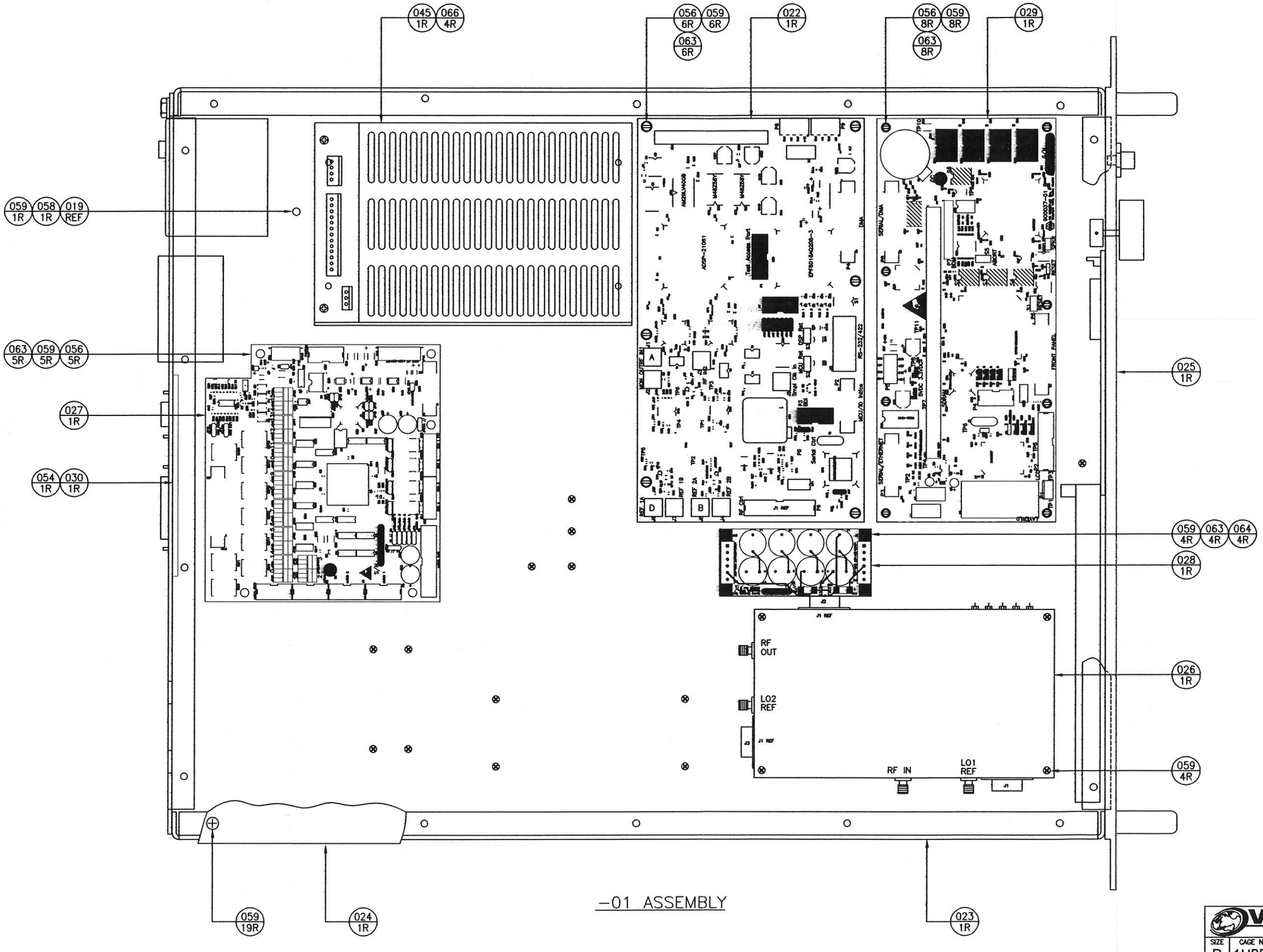
SIZE	CAGE NO.	FILE NAME:		REV
B	1MBF0	200807H1	200807	H
DWG SCALE: N/A	PLOT SCALE: 1:1	ACADM Z45	SHEET 1 OF 7	



-00 ASSEMBLY

VertexRSI CONTROLS & STRUCTURES DIVISION Longview, Texas

SIZE	CAGE NO.	FILE NAME:		REV
B	1MBF0	200807H2	200807	H
DWG SCALE: 1:2	PLOT SCALE: 1:1	ACADM 245	SHEET 2 OF 7	

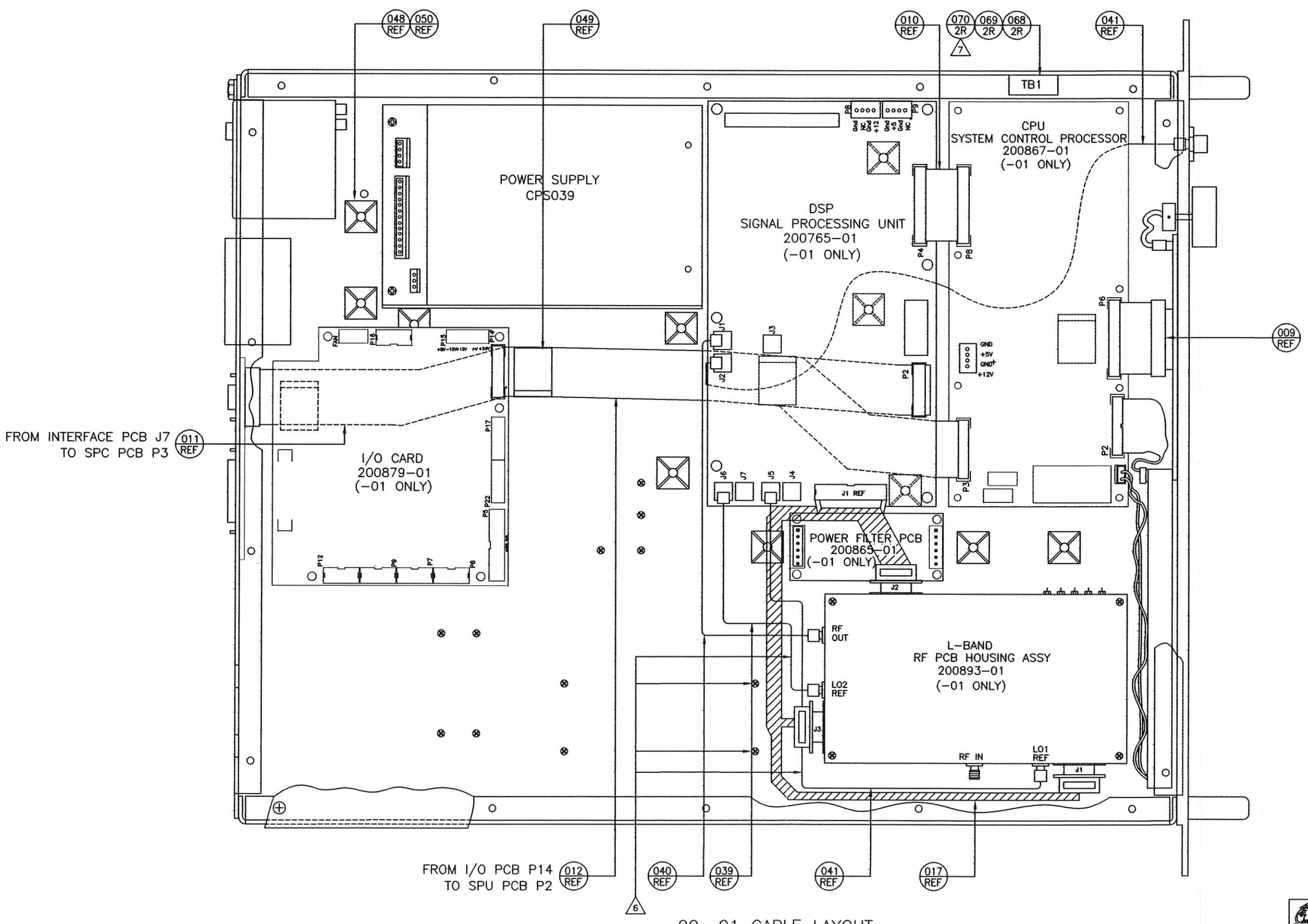


-01 ASSEMBLY

VERTEXRSI CONFIDENTIAL & PROPRIETARY

CG BFORM2 03/03/00 REV.D

VertexRSI	CONTROLS & STRUCTURES DIVISION Longview, Texas			
SIZE B	CAGE NO. 1MBF0	FILE NAME: 200807H3	200807	REV H
DWG SCALE: 1:2	PLOT SCALE: 1:1	ACADM Z45	SHEET 3 OF 7	

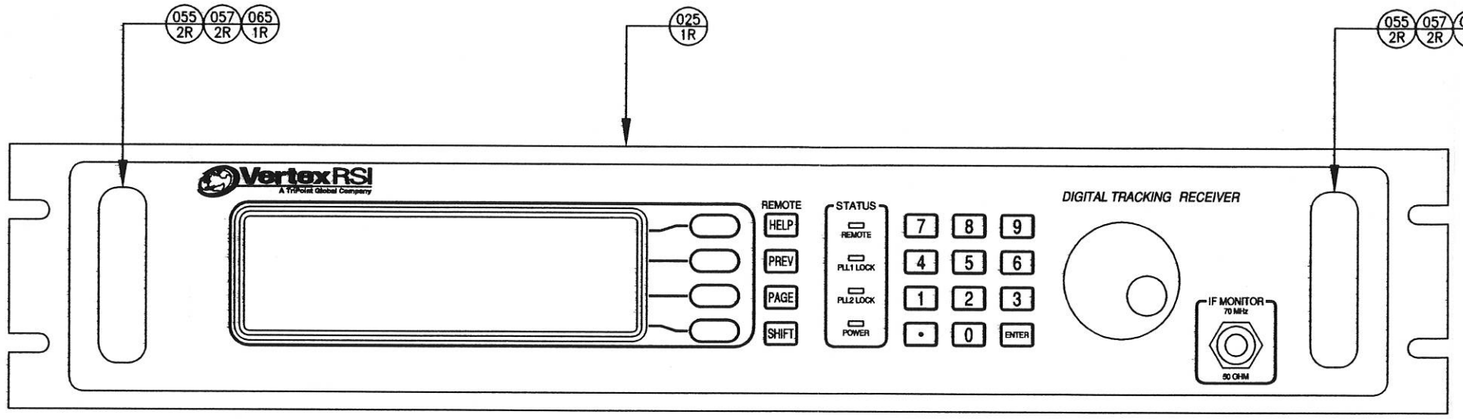


-00,-01 CABLE LAYOUT

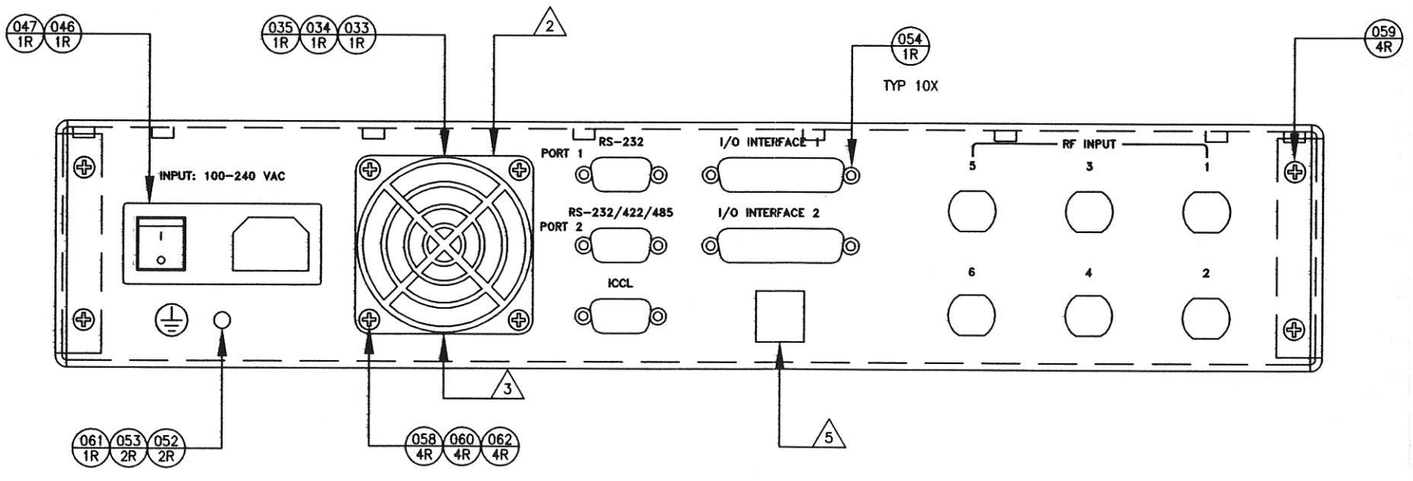
VERTEXRSI CONFIDENTIAL & PROPRIETARY

VertexRSI	CONTROLS & STRUCTURES DIVISION Longview, Texas			
SIZE B	CAGE NO. 1MBF0	FILE NAME: 200807H4	200807	REV H
DWG SCALE: 1:2	PLOT SCALE: 1:1	ACADM Z45	SHEET 4 OF 7	

CG BFORM2 03/03/00 REV.D



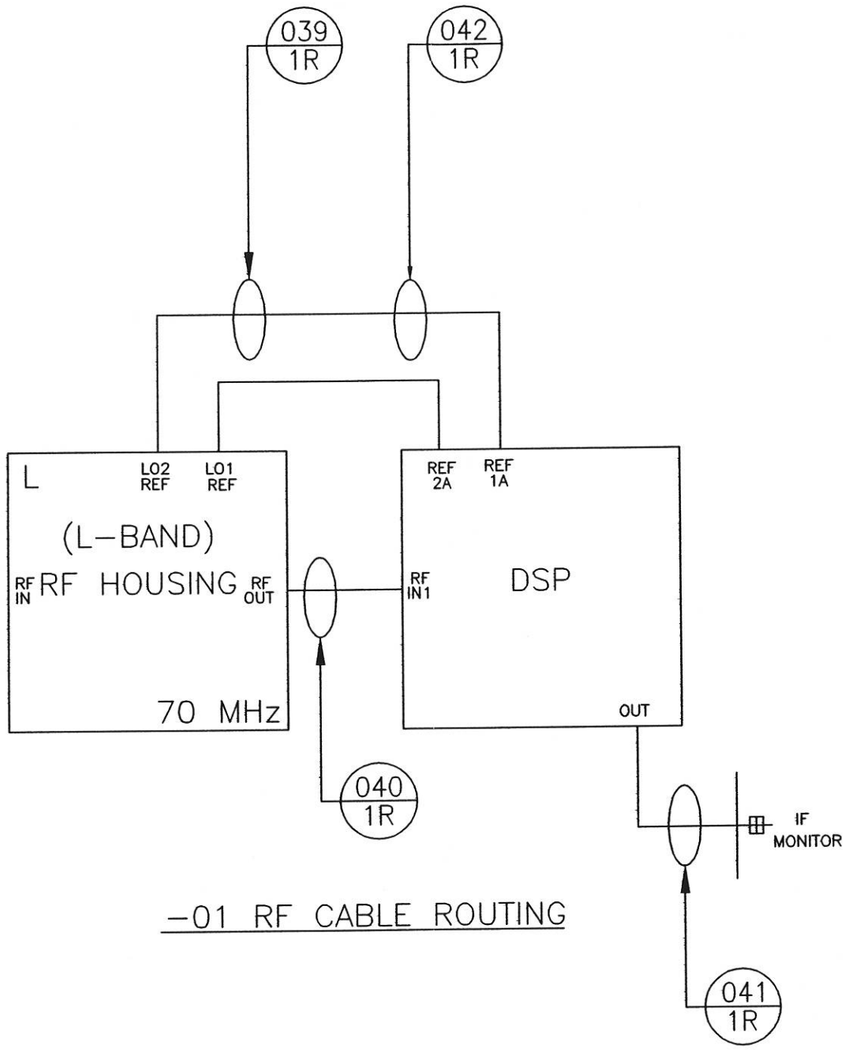
FRONT VIEW



REAR VIEW

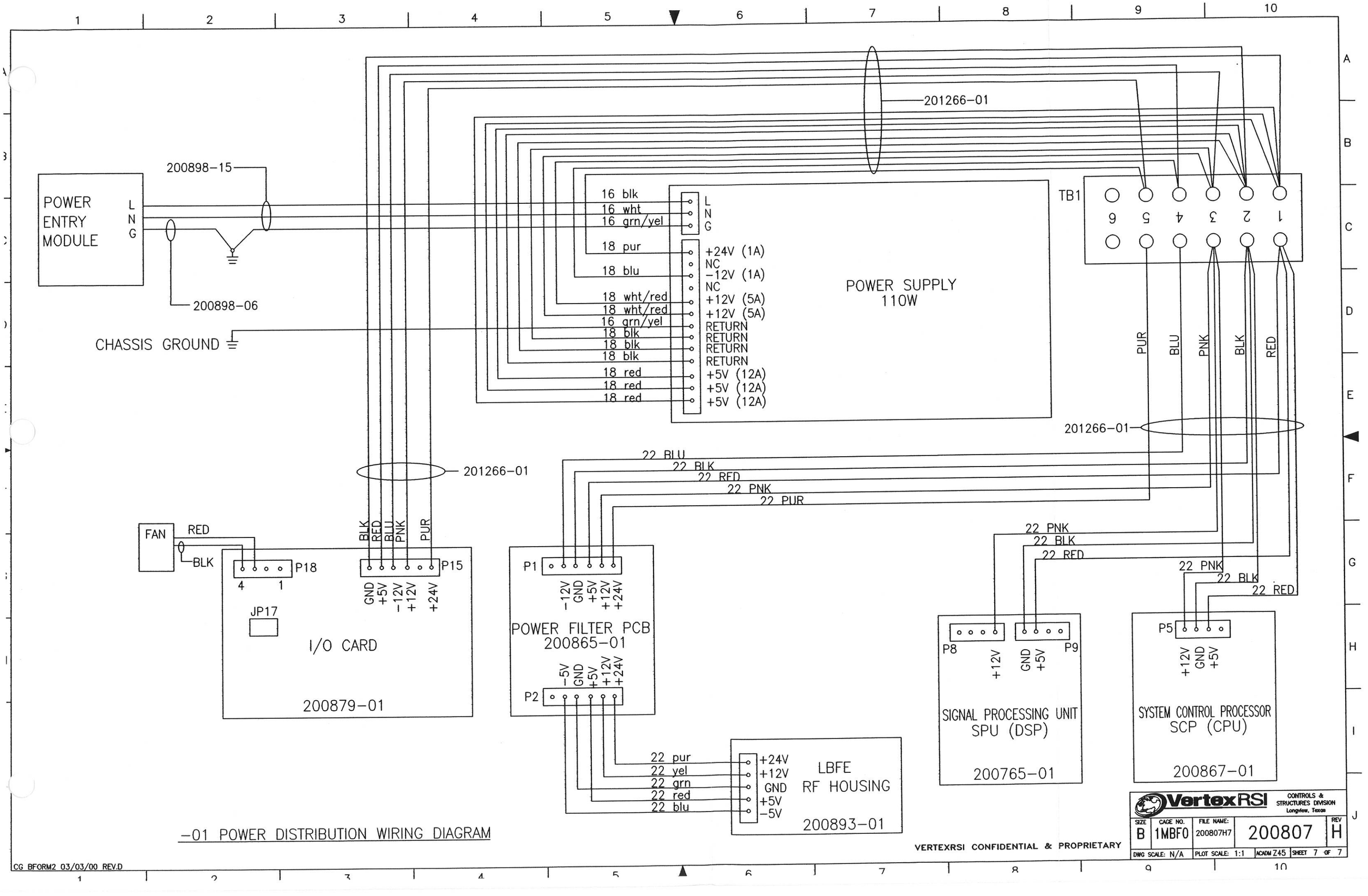
VertexRSI
CONTROLS & STRUCTURES DIVISION
Longview, Texas

SIZE	CAGE NO.	FILE NAME:		REV
B	1MBF0	200807H5	200807	H
DWG SCALE: N/A	PLOT SCALE: 1:1	ACADM Z45	SHEET 5 OF 7	



-01 RF CABLE ROUTING

VertexRSI	CONTROLS & STRUCTURES DIVISION Longview, Texas			
SIZE B	CAGE NO. 1MBF0	FILE NAME: 200807H6	200807	REV H
DWG SCALE: N/A	PLOT SCALE: 1:1	ACADM 2.45	SHEET 6 OF 7	



-01 POWER DISTRIBUTION WIRING DIAGRAM

APPENDIX A - TECHNICAL SUPPORT

If you have any questions or problems that are not addressed by the manual, there are several ways to contact our technical support team.

Prior to contacting VertexRSI, please navigate to STATUS\DISPLAY VERSION and have the DTR's Model, Serial, and corresponding software versions readily available. If the unit will not function, please consult the Model/Serial tag on the side of the unit for the proper unit identification information.

1. Phone us at (903) 295-1480.

2. Email us at ***support@vcsd.com.***

3. Make copies of the following Technical Inquiry form and fax us your questions at (903) 295-1479.

4. Contact us on our web site at ***www.vcsd.com.***

Vertex RSI™ A TriPoint Global Company **Technical Inquiry**	**FAX (903) 295-1479**	
CUSTOMER NAME:	SITE:	
CONTACT:	PHONE:	EXT:
FAX:	EMAIL:	

EQUIPMENT: *(INCLUDE MODEL, NAME, AND SERIAL NUMBER OF ALL PERTINENT EQUIPMENT)* **S/N:**

1. **Model:** _____
2. **Model:** _____
3. **Model:** _____
4. **Model:** _____

OTHER EQUIPMENT

TECHNICAL QUESTION/PROBLEM:

VCSD RESPONSE:

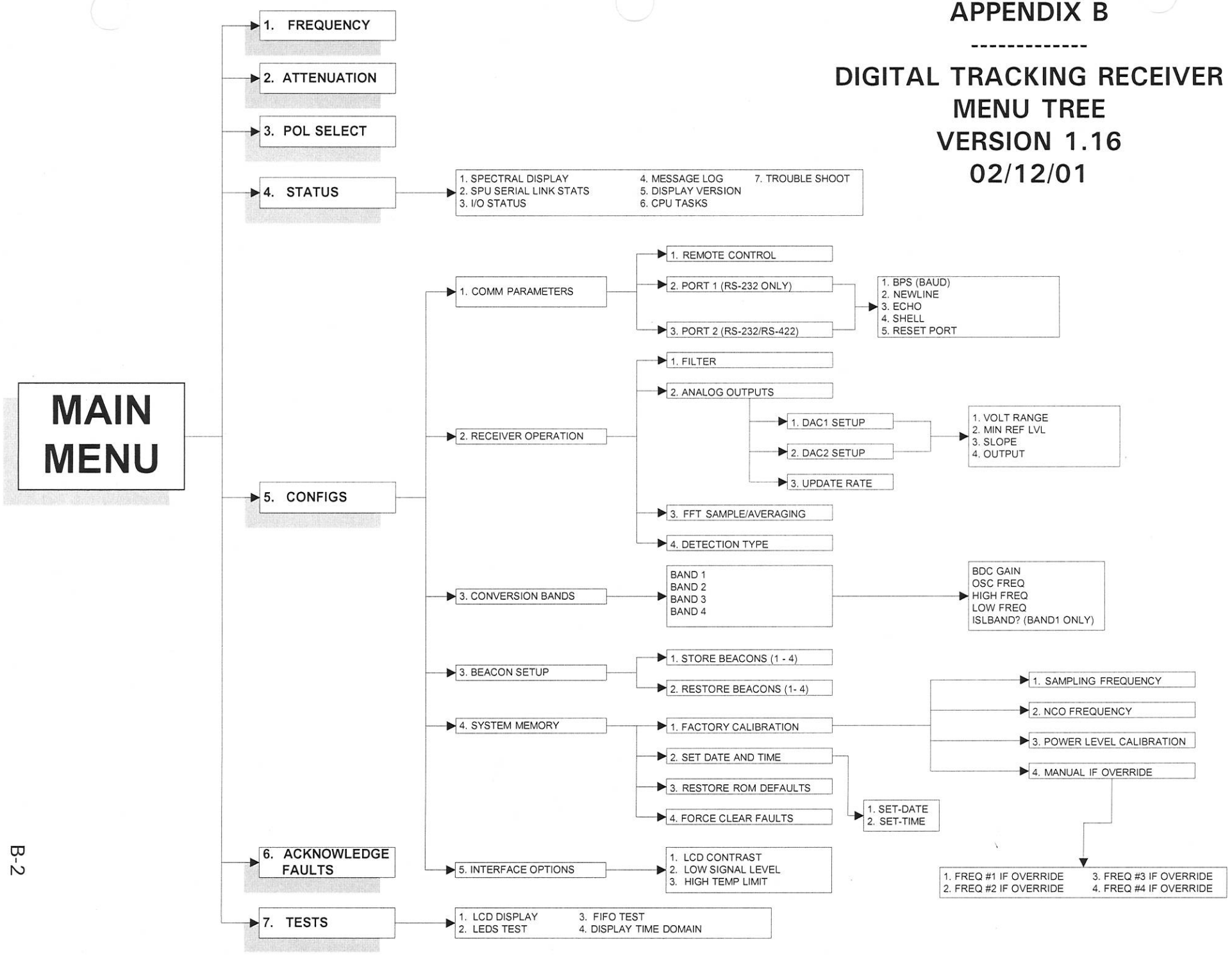
VCSD TROUBLESHOOTER	DATE	TIME	REF. NO.

APPENDIX B – MENU TREE

This Appendix contains the menu tree for the DTR.

APPENDIX B

DIGITAL TRACKING RECEIVER MENU TREE VERSION 1.16 02/12/01



Document # CG-6073

APPENDIX C

REMOTE M&C PROTOCOL FOR THE DIGITAL TRACKING RECEIVER

For Firmware Versions 1.18.1 and Later

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TABLE OF CONTENTS

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APPENDIX C
DTR REMOTE MONITOR AND CONTROL

1.0 INTRODUCTION

This appendix contains the Digital Tracking Receiver (DTR) Remote Monitor and Control (M&C) protocol applicable to version 1.16.51 and higher of the DTR firmware. The M&C interface is provided to assist in the setup of remote communications with the DTR.

The remote port communication parameters (bps, echo, newline) may be configured at the front panel of the DTR visual interface for the desired port. If you are unsure about your system configuration or cannot find the necessary information in this manual, please consult your VertexRSI representative.

2.0 OVERVIEW

The M&C shell (command line interface) is analogous to a typical computer operating system shell in MS-DOS or UNIX. A menu can be thought of as a "directory." The contents of a menu are menu items. Menu items are executed by choosing the command within the menu.

There are, generally speaking, four types of menu items:

1. Commands - executed to perform a function, such as changing the frequency.

2. Editable items (parameters) - either display or edit a parameter value.

3. Submenus - executed to change from the current menu to the desired submenu.

4. Read Only - Calculated or predefined status information.

3.0 GENERAL PROTOCOL

The general format for transactions being sent to and from the DTR M&C interface is described below.

Format for sending a command is:

command [arguments](CR).

Format for information returned is:

[data)] [(newline)(data)] ... [(newline)
(error message)]prompt

1. **command** - May be a Keyword, or menu item name or number. Items are numbered 0 to n-1, where n is the number of items in the menu. Note that some menu items may not be available depending on system configuration.

2. [arguments] - 0 or more space-separated fields which are actually arguments to the command. These are command-specific.

3. (CR) - ASCII carriage return (ASCII 13 decimal). Note that the DTR M&C expects only a carriage return; line feeds are not permitted.

4. (newline) - User-definable: either CR (ASCII 13 decimal) or CRLF: (ASCII 13 and ADCII10 decimal). If a command returns data as part of its action, then each line of data is preceded by a (newline), except for the first line.

6. (error message) - Error message from the preceding command. Depending on error status and user-definable options, there may or may not be an error message. If there is an error message, it is always preceded with a (newline) as defined previously. Error messages are described in detail in Section 4.1. prompt is "(newline)>", where '>' is ASCII 62 decimal.

Argument fields sent to the M&C shell must always be separated by at least one space (ASCII 32 decimal).

The command and each (if any) arguments are individual fields. Note that more than one command may be issued on the same command line, as long as the maximum input length of 80 characters is not exceeded.

3.1 Range Details

Sending a D argument to any editable item returns format information.

D Prints the format and/or limits required for editing.

I*lohi*	**Integer**: Range *lo* to *hi*, inclusive. Ex: POL-SELECT F I1 2
R*lohi*	**Real**: Range *lo* to *hi*, inclusive. Ex: FREQUENCY F R949.000 12750.000
Lmax...	Selection **List**: Range 0 to max, inclusive. Ex: CONFIGS COMM-PARAM REM-CONTROL F L3

3.2 Notations

3.2.1 Syntax Diagrams

This section discusses syntax diagrams used in this document.

1. | Choices or optional data are shown inside brackets and separated by the pipe "|" sign.

2. { } Text surrounded by curly brackets indicates a choice. The following command example indicates that you can enter either a or b:

   command {a | b}

3. [ ] Square brackets indicate optional data. The following command example indicates that argument_2 is optional:

   command argument1 [argument2]

4. < > Angle brackets indicate a single replaceable token. The following command example indicates that you must specify one name and one value separated by a colon with no intervening spaces:

   command <identifier name>:<identifier value>

5. ... Horizontal ellipses show repetition of the preceding item(s). The following command example indicates you can optionally specify more than one number:

   command number [...]

6. .. Indicates a range of argument values.

4.0 KEYWORDS

A keyword is a command that is always accessible on the command line, regardless of the current menu or system configuration. Unlike generic menu items, which are subject to change with firmware revisions, the keywords form the basis of the command-line interface, and thus will remain available for future revisions.

Keywords, like all other items entered on the command line, must be separated from other fields with at least one space. Most keywords do not accept arguments.

4.1 Status Requests

Status requests are obtained by polling the DTR for information. All status requests send by default only the information that has changed since the last request. Each request has an option to force transmission of all status information.

The recommended operating procedure for the remote computer is to get a full status update when the M&C software is launched, then periodically get status updates.

Status commands return their data as a string which may be parsed into one or more fields. A field contains data which is logically grouped together. A field may have sub-fields. An example of this is found in the S command in the "Monitor and Control Commands" Section. This keyword requests receiver status; response is bitmapped hex string, formatted with character separators for each field and fixed field widths as follows:

BbbCcEeeDddddddddVvvvAaaali

Where B = beacon, C = control, E = errors, D = frequency, V = voltage, A = attenuation, and I = RF input.

While the total length of a status update depends on the number of fields that have changed, the length of any data field (that is, a field without sub-fields) is always fixed.

5.0 DTR MENU TREE WITH MONITOR & CONTROL COMMANDS

The DTR listing shows all of the menu items, user editable parameters and executable commands. The listing also shows the M&C command that is equal to the menu item. Only the **MAIN MENU** items are shown in **bold** letters while all of the *OPTIONAL* items or menus that contain optional features and choices are *italicized*. All menu items with submenus or parameters below them are followed by three trailing periods...

DTR MAIN MENU SYSTEM

MAIN MENU	TYPE	PARENT MENU
FREQUENCY	**Data Editor**	**MAIN MENU**
ATTENUATION	**Data Editor**	**MAIN MENU**
POL SELECT	**Data Editor**	**MAIN MENU**
STATUS...	**Sub Menu**	**MAIN MENU**
SPECTRAL DISPLAY	Executable	**STATUS**
SPU SERIAL LINK STATS	Executable	**STATUS**
I/O STATUS	Executable	**STATUS**
FIFO STATUS	Executable	**STATUS**
MESSAGE LOG	Executable	**STATUS**
DISPLAY VERSION	Executable	**STATUS**
CPU TASKS	Executable	**STATUS**
TROUBLESHOOT	Executable	**STATUS**
CONFIGS...	**Sub Menu**	**MAIN MENU**
COMM PARAMETERS...	Sub-Menu	CONFIGS
REMOTE CONTROL	Data Editor	COMM-PARAM
PORT 1...	Sub Menu	COMM-PARAM
BPS (BAUD)	Data Editor	PORT 1
NEWLINE	Data Editor	PORT 1
ECHO	Data Editor	PORT 1
SHELL	Data Editor	PORT 1
RESET PORT	Executable	PORT 1
PORT 2...	Sub Menu	COMM-PARAM
BPS (BAUD)	Data Editor	PORT 2
NEWLINE	Data Editor	PORT 2
ECHO	Data Editor	PORT 2
SHELL	Data Editor	PORT 2
RESET PORT	Executable	PORT 1
RECEIVER OPERATION...	Sub Menu	CONFIGS
FILTERS	Data Editor	OPERATION
ANALOG OUTPUTS...	Sub Menu	OPERATION
DAC1 SETUP	Sub Menu	ANALOG-OUTPUTS
VOLTAGE RANGE	Data Editor	DAC1
MIN REF POWER LVL	Data Editor	DAC1
SLOPE	Data Editor	DAC1
OUTPUT	Data Editor	DAC1
DAC2 SETUP	Sub Menu	ANALOG-OUTPUTS
VOLTAGE RANGE	Data Editor	DAC2
MIN REF POWER LVL	Data Editor	DAC2
SLOPE	Data Editor	DAC2
OUTPUT	Data Editor	DAC2
UPDATE RATE	Data Editor	ANALOG-OUTPUTS
FFT SAMPLE AVERAGING	Data Editor	OPERATION
DETECTION	Data Editor	OPERATION

Continued on the next page

MAIN MENU	TYPE	PARENT MENU
CONFIGS...(CONTINUED)	**Sub Menu**	**MAIN MENU**
CONVERSION BANDS...(ONLY in units with BDC)	*Sub Menu*	*CONFIGS*
BAND 1...	*Sub Menu*	*BANDS*
BDC GAIN	Data Editor	BAND 1
OSC FREQ	Data Editor	BAND 1
HIGH FREQ	Data Editor	BAND 1
LOW FREQ	Data Editor	BAND 1
BAND 2...	*Sub Menu*	*BANDS*
BDC GAIN	Data Editor	BAND 2
OSC FREQ	Data Editor	BAND 2
HIGH FREQ	Data Editor	BAND 2
LOW FREQ	Data Editor	BAND 2
BAND 3...	*Sub Menu*	*BANDS*
BDC GAIN	Data Editor	BAND 3
OSC FREQ	Data Editor	BAND 3
HIGH FREQ	Data Editor	BAND 3
LOW FREQ	Data Editor	BAND 3
BAND 4...	*Sub Menu*	*BANDS*
BDC GAIN	Data Editor	BAND 4
OSC FREQ	Data Editor	BAND 4
HIGH FREQ	Data Editor	BAND 4
LOW FREQ	Data Editor	BAND 4
BEACON SETUP...(ONLY in Non-Monpulse units)	*Sub-Menu*	*CONFIGS*
STORE BEACONS...	*Sub-Menu*	*BEACONS*
STORE BEACON 1	Executable	STORE-BEACONS
STORE BEACON 2	Executable	STORE-BEACONS
STORE BEACON 3	Executable	STORE-BEACONS
STORE BEACON 4	Executable	STORE-BEACONS
RESTORE BEACONS...	*Sub-Menu*	*BEACONS*
RESTORE BEACON 1	Executable	RESTORE-BEACONS
RESTORE BEACON 2	Executable	RESTORE-BEACONS
RESTORE BEACON 3	Executable	RESTORE-BEACONS
RESTORE BEACON 4	Executable	RESTORE-BEACONS
SYSTEM MEMORY...	Sub Menu	CONFIGS
FACTORY CALIBRATION	Sub Menu	SYSTEM MEMORY
SAMPLING FREQUENCY	Data Editor	CALIBRATION
NCO FREQUENCY	Data Editor	CALIBRATION
POWER LEVEL CALIBRATION	Data Editor	CALIBRATION
MANUAL IF OVERRIDE...	Sub Menu	CALIBRATION
FREQ #1 IF OVERRIDE	Data Editor	IF OVERRIDE
FREQ #2 IF OVERRIDE	Data Editor	IF OVERRIDE
FREQ #3 IF OVERRIDE	Data Editor	IF OVERRIDE
FREQ #4 IF OVERRIDE	Data Editor	IF OVERRIDE
SET DATE AND TIME...	Sub Menu	MEMORY
SET-DATE	Data Editor	DATE&TIME
SET-TIME	Data Editor	DATE&TIME
RESTORE ROM DEFAULTS	Data Editor	MEMORY
FORCE CLEAR FAULTS	Executable	MEMORY
INTERFACE OPTIONS...	Sub-Menu	CONFIGS
LCD CONTRAST	Data Editor	UI-OPTIONS
LOW SIGNAL LEVEL	Data Editor	UI-OPTIONS
HIGH TEMP LIMIT	Data Editor	UI-OPTIONS
ACKNOWLEDGE FAULTS	**Executable**	**MAIN MENU**
TESTS...	**Sub Menu**	**MAIN MENU**
LCD DISPLAY	Executable	TESTS
LEDS TEST	Executable	TESTS
FIFO TEST	Executable	TESTS
DISPLAY TIME DOMAIN	Executable	TESTS

6.0 MONITOR AND CONTROL COMMANDS

ACKNOWLEDGE-FAULTS

Path: / ACKNOWLEDGE-FAULTS

Type: Executable

Syntax: ACKNOWLEDGE-FAULTS

Notes: ACKNOWLEDGE FAULTS clears current alarm conditions. The fault message remains displayed on the screen, but no longer causes an alarm and the summary fault contact closure is no longer asserted by this fault.

ANALOG OUTPUTS

Path: / OPERATION ANALOG-OUTPUTS

Type: Sub Menu

Syntax: ANALOG-OUTPUTS

Notes: The ANALOG OUTPUTS menu controls the Digital to Analog Converter (DAC) DC Voltage output Range, Minimum Reference Power Level, Slope and Update Rate to generate the tracking voltage.

ATTENUATION

Path: / ATTENUATION

Type: Data Editor

Syntax: ATTENUATION [= n] | [D]

Range: Real: 0.0 .. 50.0

Notes: ATTENUATION controls the lower end of the DAC voltage output, in conjunction with the parameters in the ANALOG OUTPUTS configuration menu.

BAND 1 *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-1

Type: Sub Menu

Syntax: BAND-1

Notes: The conversion parameters of the Block Downconverter to support this BAND must be defined here to provide conversion to L-Band frequency.

BAND 2 *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-2

Type: Sub Menu

Syntax: BAND-2

Notes: The conversion parameters of the Block Downconverter to support this BAND must be defined here to provide conversion to L-Band frequency.

BAND 3 *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-3

Type: Sub Menu

Syntax: BAND-3

Notes: The conversion parameters of the Block Downconverter to support this BAND must be defined here to provide conversion to L-Band frequency.

BAND 4 *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-4

Type: Sub Menu

Syntax: BAND-4

Notes: The conversion parameters of the Block Downconverter to support this BAND must be defined here to provide conversion to L-Band frequency.

BDC GAIN *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-1 BDC-GAIN

Type: Data Editor

Syntax: BDC-GAIN [= n] | [D]

Range: Real: 0.0 .. 31.0

Notes: The GAIN in dB of the Block Downconverter that supports this band. The typical range for this parameter is 12-14 when using BDCs as provided by VertexRSI. To optimally configure this parameter measure the BDC gain using a spectrum analyzer.

BDC GAIN *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-2 BDC-GAIN

Type: Data Editor

Syntax: BDC-GAIN [= n] | [D]

Range: Real: 0.0 .. 31.0

Notes: The GAIN in dB of the Block Downconverter that supports this band. The typical range for this parameter is 12-14 when using BDCs as provided by VertexRSI. To optimally configure this parameter measure the BDC gain using a spectrum analyzer.

BDC GAIN *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-3 BDC-GAIN

Type: Data Editor

Syntax: BDC-GAIN [= n] | [D]

Range: Real: 0.0 .. 31.0

Notes: The GAIN in dB of the Block Downconverter that supports this band. The typical range for this parameter is 12-14 when using BDCs as provided by VertexRSI. To optimally configure this parameter measure the BDC gain using a spectrum analyzer.

BDC GAIN *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-4 BDC-GAIN

Type: Data Editor

Syntax: BDC-GAIN [= n] | [D]

Range: Real: 0.0 .. 31.0

Notes: The GAIN in dB of the Block Downconverter that supports this band. The typical range for this parameter is 12-14 when using BDCs as provided by VertexRSI. To optimally configure this parameter measure the BDC gain using a spectrum analyzer.

BEACON SETUP

Path: / CONFIGS BEACONS

Type: Sub Menu

Syntax: BEACONS

Notes: A subset of DTR system parameters may be stored as BEACONS to provide parallel control via I/O INTERFACE #1. This provides support of legacy VertexRSI interfaces such as the 7134ACU.

BPS

Path: / CONFIGS COMM-PARAM PORT-1 BPS

Type: Data Editor

Syntax: BPS [= n] | [D]

Range:

Integer:	0 .. 6
0	1200
1	2400
2	4800
3	9600
4	19200
5	38400
6	57600

Notes: BPS refers to the bits per second transmitted/received by the port.

BPS

Path: / CONFIGS COMM-PARAM PORT-2 BPS

Type: Data Editor

Syntax: BPS [= n] | [D]

Range:

Integer:	0 .. 7
0	1200
1	2400
2	4800
3	9600
4	19200
5	38400
6	57600
7	115200

Notes: BPS refers to the bits per second transmitted/received by the port.

COMM PARAMETERS

Path: / CONFIGS COMM-PARAM

Type: Sub Menu

Syntax: COMM-PARAM

Notes: COMM PARAMETERS allow serial port configuration. BPS and SHELL may be set, as well as NEWLINE and ECHO, which only apply to ports set to M&C shell. Any change to communications parameters will cause the Port to RESET and the SHELL will restart.

CONFIGS

Path: / CONFIGS

Type: Sub Menu

Syntax: CONFIGS

Notes: The CONFIGS menu provides access to all configuration parameters; from serial port communications parameters to receiver operation parameters and user interface options.

CONVERSION BANDS *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS

Type: Sub Menu

Syntax: BANDS

Notes: CONVERSION BANDS describes the down converter setup. The frequency range of the DTR may be extended according to the Block Downconverters installed.

CPU TASKS

Path: / STATUS TASKS-DIAGS

Type: Executable

Syntax: TASKS-DIAGS

Notes: Displays diagnostics on the CPU tasks, including task number, name, shell type and activity.

DAC1-OUTPUT

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC1 DAC1-OUTPUT

Type: Sub Menu

Syntax: DAC1-OUTPUT

Range: Integer: 0 .. 1
0 Disabled
1 Enabled.

Notes: Enables or disables this DAC output.

DAC2-OUTPUT

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC2 DAC2-OUTPUT

Type: Sub Menu

Syntax: DAC2-OUTPUT

Range:

Integer:	0 .. 1
0	Disabled
1	Enabled.

Notes: Enables or Disables this DAC output.

DAC1 SETUP

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC1

Type: Sub Menu

Syntax: DAC1

Notes: Allows setup of DAC1 which provides an analog DC voltage proportional to signal level on pins 1 and 14 (+OUT, -OUT) of I/O Interface #1 on the back panel.

DAC2 SETUP

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC2

Type: Sub Menu

Syntax: DAC2

Notes: Allows setup of DAC2 which provides an analog DC voltage proportional to signal level on pins 3 and 16 (+AUX, -AUX) of I/O Interface #1 on the back panel.

DETECTION TYPE *(Only in Wideband Units)*

Path: / CONFIGS OPERATION DETECTION

Type: Data Editor

Syntax: DETECTION [= n] | [D]

Range:

Integer:	0 .. 1		
0	FFT SIGNAL	2	RMS POWER
1	FFT NOISE	3	RMS DENSITY

Notes: DETECTION selects how the DTR will report signal power. FFT SIGNAL is the default, used to track broad spectrum signals, using FFTs. FFT NOISE is a special mode used to track broad spectrum signals, using FFTs. RMS POWER will report a direct RMS power estimate, without using FFTs. RMS DENSITY will report direct RMS power density estimate, without using FFTs.

DIAGS (obsolete after v1.13 Now called STATUS)

Path: / DIAGS

Type: Sub Menu

Syntax: DIAGS

Notes: The DIAGS menu contains useful diagnostic tools. The SPECTRAL DISPLAY option is accessed from this menu, as are other tools, such as a status summary and the message log.

DISPLAY TIME DOMAIN

Path: / TESTS TIME-DOMAIN

Type: Executable

Syntax: TIME-DOMAIN

Notes: Provides a display of the sampled waveform, in time domain, of the received signal.

DISPLAY VERSION

Path: / STATUS VERSION

Type: Executable

Syntax: VERSION

Notes: DISPLAY VERSION displays firmware versions and configuration information. (P/N#, S/N #, and Release date)

ECHO

Path: / CONFIGS COMM-PARAM PORT-1 ECHO

Type: Data Editor

Syntax: ECHO [= n] | [D]

Range:

Integer:	0 .. 1
0	Disabled
1	Enabled

Notes: ECHO, when enabled, returns the received character to the port.

ECHO

Path: / CONFIGS COMM-PARAM PORT-2 ECHO

Type: Data Editor

Syntax: ECHO [= n] | [D]

Range: Integer: 0 .. 1
0 Disabled
1 Enabled

Notes: ECHO, when enabled, returns the received character to the terminal.

FACTORY CALIBRATION

Path: / CONFIGS MEMORY CALIBRATION

Type: Sub Menu

Syntax: CALIBRATION

Notes: Contains system parameters that are calibrated in factory and are NOT normally changed by the user. CHANGING THE PARAMETERS IN THIS MENU MAY DEGRADE THE PERFORMANCE OF THE DTR.

FFT SAMPLE AVERAGING

Path: / CONFIGS OPERATION AVERAGING

Type: Data Editor

Syntax: AVERAGING [= n] | [D]

Range: Real: 1 .. 2000

Notes: FFT SAMPLING AVERAGING determines how new FFT data is combined with previous data. Increasing AVERAGING smoothes the spectral curve and increases the stability of the display. Decreasing AVERAGING improves response time.

FIFO-STATUS (New in 1.16.51)

Path: / STATUS FIFO-STATUS

Type: Executable

Syntax: FIFO-STATUS

Notes: Displays counts of the following: Status Frames, Signal Frames, Spectrum Frames, Monopulse Frames, Missing Monopulse Frames, Unknown Frames, Total Frames. The Missing Monopulse Frames count is caused by requesting monopulse at a rate higher than the number of monpulse data frames being generated.

FIFO-TEST

Path: / TESTS FIFO-TEST

Type: Executable

Syntax: FIFO-TEST

Notes: This diagnostic displays a test pattern received from the SPU, in hexadecimal values. The pattern should be like below. In case of failure, a small "x" will precede those values that do no match.

R/C	A	B	C	D	E
1	0000	0001	1111	0002	2222
2	4444	0010	5555	0020	6666
3	8888	0100	9999	0200	AAAA
4	CCCC	1000	DDDD	2000	EEEE

FIFO TEST: PASSED

FILTER

Path: / CONFIGS OPERATION FILTER

Type: Data Editor

Syntax: FILTER [= n] | [D]

Range: Integer: 0 .. 3 (0 .. 11 w/*wideband option*)

Standard: 0-16kHz; 1-62.5kHz; 2-125kHz; 3-250kHz

Wideband: 0-16kHz; 1-32kHz; 2-62.5kHz; 3-125kHz; 4-250kHz; 5-500kHz; 6-1MHz; 7-2MHz; 8-4MHz; 9-8MHz; 10-12MHz; 11-16MHz

Notes: FILTER controls the bandwidth of the bandpass filter, centered around the receiver tuning frequency. A signal is detectable if it is visible on the spectral display (MAIN STATUS SPECTRAL DISPLAY). Note: A spectrum analyzer attached to the IF MONITOR port may be used to view the filter band. All filters are centered at 70MHz.

FORCE CLEAR FAULTS

Path: / CONFIGS MEMORY CLEAR-FAULTS

Type: Executable

Syntax: CLEAR-FAULTS

Notes: FORCE CLEAR FAULTS forces the system to clear all faults, Faults that are set periodically will appear again.

FREQ #1 IF OVERRIDE

Path: / CONFIGS MEMORY CALIBRATION IF-OVERRIDE F1OVERRIDE

Type: Data Editor

Syntax: F1OVERRIDE [= n] | [D]

Range Integer: 0 .. 15

0 – Automatic	4 – 829.6	8 – 836.0	12 – 842.4
1 – 824.8	5 – 831.2	9 – 837.6	13 – 844.0
2 – 826.4	6 – 832.8	10 – 839.2	14 – 845.6
3 – 828.0	7 – 834.4	11 – 840.8	15 – 847.2

Notes: Allows user selection of IF1 used by the L-Band front end for the current frequency. IF1 specifies an approximate center for the digital filter within a 25MHz analog filter centered at 836.5.

FREQ #2 IF OVERRIDE

Path: / CONFIGS MEMORY CALIBRATION IF-OVERRIDE F2OVERRIDE

Type: Data Editor

Syntax: F2OVERRIDE [= n] | [D]

Range: Integer: 0 .. 15

0 – Automatic	4 – 829.6	8 – 836.0	12 – 842.4
1 – 824.8	5 – 831.2	9 – 837.6	13 – 844.0
2 – 826.4	6 – 832.8	10 – 839.2	14 – 845.6
3 – 828.0	7 – 834.4	11 – 840.8	15 – 847.2

Notes: Allows user selection of IF1 used by the L-Band front end for the current frequency. IF1 specifies an approximate center for the digital filter within a 25MHz analog filter centered at 836.5.

FREQ #3 IF OVERRIDE

Path: / CONFIGS MEMORY CALIBRATION IF-OVERRIDE F3OVERRIDE

Type: Data Editor

Syntax: F3OVERRIDE [= n] | [D]

Range: Integer: 0 .. 15

0 – Automatic	4 – 829.6	8 – 836.0	12 – 842.4
1 – 824.8	5 – 831.2	9 – 837.6	13 – 844.0
2 – 826.4	6 – 832.8	10 – 839.2	14 – 845.6
3 – 828.0	7 – 834.4	11 – 840.8	15 – 847.2

Notes: Allows user selection of IF1 used by the L-Band front end for the current frequency. IF1 specifies an approximate center for the digital filter within a 25MHz analog filter centered at 836.5.

FREQ #4 IF OVERRIDE

Path: / CONFIGS MEMORY CALIBRATION IF-OVERRIDE F4OVERRIDE

Type: Data Editor

Syntax: F4OVERRIDE [= n] | [D]

Range: Integer: 0 .. 15

0 – Automatic	4 – 829.6	8 – 836.0	12 – 842.4
1 – 824.8	5 – 831.2	9 – 837.6	13 – 844.0
2 – 826.4	6 – 832.8	10 – 839.2	14 – 845.6
3 – 828.0	7 – 834.4	11 – 840.8	15 – 847.2

Notes: Allows user selection of IF1 used by the L-Band front end for the current frequency. IF1 specifies an approximate center for the digital filter within a 25MHz analog filter centered at 836.5.

FREQUENCY

Path: / FREQUENCY

Type: Data Editor

Syntax: FREQUENCY [= n] | [D]

Range: Real: 949.000 .. 12750.000

Notes: This is the FREQUENCY editor. The valid frequency range depends on the DTR's downconverter configuration.

HIGH FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-1 HIGH-FREQ

Type: Data Editor

Syntax: HIGH-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: HIGH end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2800MHz
C-band = 4200MHz
X-band = 7750MHz
Ku-lo-band = 11700MHz
Ku-hi-band = 12750MHz
Ka-A = 18100, Ka-B = 19200, Ka-C = 20200, Ka-D = 21200, Ka-E = 22300

HIGH FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-2 HIGH-FREQ

Type: Data Editor

Syntax: HIGH-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: HIGH end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2800MHz
C-band = 4200MHz
X-band = 7750MHz
Ku-lo-band = 11700MHz
Ku-hi-band = 12750MHz
Ka-A = 18100, Ka-B = 19200, Ka-C = 20200, Ka-D = 21200, Ka-E = 22300

HIGH FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-3 HIGH-FREQ

Type: Data Editor

Syntax: HIGH-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: HIGH end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2800MHz
C-band = 4200MHz
X-band = 7750MHz
Ku-lo-band = 11700MHz
Ku-hi-band = 12750MHz
Ka-A = 18100, Ka-B = 19200, Ka-C = 20200, Ka-D = 21200, Ka-E = 22300

HIGH FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-4 HIGH-FREQ

Type: Data Editor

Syntax: HIGH-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: HIGH end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2800MHz
C-band = 4200MHz
X-band = 7750MHz
Ku-lo-band = 11700MHz
Ku-hi-band = 12750MHz
Ka-A = 18100, Ka-B = 19200, Ka-C = 20200, Ka-D = 21200, Ka-E = 22300

HIGH TEMP LIMIT (New in 1.16.51)

Path: / CONFIGS UI-OPTIONS TEMP-LIMIT

Type: Executable

Syntax: TEMP-LIMIT

Range: 0 .. 140

Notes: This value, in degrees Fahrenheit, is used to trigger the TEMPERATURE ALARM fault. The default value is 120 degrees F.

INTERFACE OPTIONS

Path: / CONFIGS UI-OPTIONS

Type: Sub-Menu

Syntax: UI-OPTIONS

Notes: Allows control of options related to the DTR user interface.

I/O STATUS

Path: / STATUS I/O-STATUS

Type: Executable

Syntax: I/O-STATUS

Notes: Displays current I/O status info obtained from the I/O card.

IS-LBAND? (New in 1.16.51)

Path: / CONFIGS BANDS BAND-1

Type: Data Editor

Syntax: IS-LBAND

Notes: Changing IS-LBAND to YES configures BAND1 as L-Band. When set as YES, the BDC gain, OSC FREQ., and LOW FREQ and HIGH FREQ parameters are not editable. Only BAND1 can be configured as L-Band.

LCD DISPLAY

Path: / CONFIGS TESTS LCD-TEST

Type: Data Editor

Syntax: LCD-TEST

Notes: LCD DISPLAY tests every pixel of the LCD by drawing lines in two alternating patterns. The first pattern displays automatically; the second pattern will display after a key-press. Press any key to exit test.

LCD CONTRAST

Path: / CONFIGS UI-OPTIONS CONTRAST

Type: Data Editor

Syntax: CONTRAST [= n]

Range: Real: 0 .. 30

Notes: Use LCD Contrast to adjust the contrast of the LCD display. Choose a value between 0 (for least contrast) and 30 (for maximum contrast). Six is default value.

LEDS TEST

Path: / CONFIGS TESTS LEDS-TEST

Type: Executable

Syntax: LEDS-TEST

Notes: LEDS TEST blinks the top three status LED's four times. The Power LED does not blink.

LOW FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-1 LOW-FREQ

Type: Data Editor

Syntax: LOW-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: LOW end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2000MHz
C-band = 3400MHz
X-band = 7250MHz
Ku-lo-band = 10700MHz
Ku-hi-band = 11700MHz
Ka-A = 17000, Ka-B = 18100, Ka-C = 19200, Ka-D = 20200, Ka-E = 21200

LOW FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-2 LOW-FREQ

Type: Data Editor

Syntax: LOW-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: LOW end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2000MHz
C-band = 3400MHz
X-band = 7250MHz
Ku-lo-band = 10700MHz
Ku-hi-band = 11700MHz
Ka-A = 17000, Ka-B = 18100, Ka-C = 19200, Ka-D = 20200, Ka-E = 21200

LOW FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-3 LOW-FREQ

Type: Data Editor

Syntax: LOW-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: LOW end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2000MHz
C-band = 3400MHz
X-band = 7250MHz
Ku-lo-band = 10700MHz
Ku-hi-band = 11700MHz
Ka-A = 17000, Ka-B = 18100, Ka-C = 19200, Ka-D = 20200, Ka-E = 21200

LOW FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-4 LOW-FREQ

Type: Data Editor

Syntax: LOW-FREQ [= n] | [D]

Range: Real: 949.000 .. 13000.000

Notes: LOW end FREQUENCY of the BDC that supports this band. Typical configurations:
S-band = 2000MHz
C-band = 3400MHz
X-band = 7250MHz
Ku-lo-band = 10700MHz
Ku-hi-band = 11700MHz
Ka-A = 17000, Ka-B = 18100, Ka-C = 19200, Ka-D = 20200, Ka-E = 21200

LOW SIGNAL LEVEL

Path: / CONFIGS UI-OPTIONS LOW-SIGNAL-LEVEL

Type: Data Editor [= n] | [D]

Syntax: LOW-SIGNAL-LEVEL

Range: Real: -199.00 .. -1.00

Notes: This value, in dB, is used to trigger the low input signal fault.

MANUAL IF OVERRIDE

Path: / CONFIGS MEMORY CALIBRATION IF-OVERRIDE

Syntax: IF-OVERRIDE

Type: Sub Menu

Notes: The IF OVERRIDE menu allows the user to manually select the IF used by the L-Band front end. The DTR normally selects the optimal IF; this menu provides flexibility for special cases.

MESSAGE LOG

Path: / STATUS LOG

Type: Executable

Syntax: LOG

Notes: The MESSAGE LOG displays the most recent events recorded in system's message log. The latest message is at bottom of the screen and pressing SHIFT-PAGE scrolls the list to display previous messages.

MINIMUM REF LVL

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC1 DAC1-REF

Type: Data Editor

Syntax: REFERENCE [= n] | [D]

Range: Real: -150.0 .. 20.0

Notes: The MINIMUM REF POWER LVL is the minimum input power level reference which corresponds to minimum DAC voltage output.

MINIMUM REF LVL

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC2 DAC2-REF

Type: Data Editor

Syntax: REFERENCE [= n] | [D]

Range: Real: -150.0 .. 20.0

Notes: The MINIMUM REF POWER LVL is the minimum input power level reference which corresponds to minimum DAC voltage output.

NCO FREQUENCY

Path: / CONFIGS MEMORY CALIBRATION NCO

Type: Data Editor

Syntax: NCO [= n] | [D]

Range: Real: -6000.000 .. 99999.999

Notes: Adjusts the frequency of the Numerically Controlled Oscillator (NCO) on the SPU.

NEWLINE

Path: / CONFIGS COMM-PARAM PORT-1 NEWLINE

Type: Data Editor

Syntax: NEWLINE [= n] | [D]

Range: Integer: 0 .. 1
0 Disabled
1 Enabled

Notes: NEWLINE, when enabled, sends a carriage-return line-feed at the end of the command line. When disabled, only carriage return is sent.

NEWLINE

Path: / CONFIGS COMM-PARAM PORT-2 NEWLINE

Type: Data Editor

Syntax: NEWLINE [= n] | [D]

Range: Integer: 0 .. 1
0 Disabled
1 Enabled

Notes: NEWLINE, when enabled, sends a carriage-return line-feed at the end of the command line. When disabled, only carriage-return is sent.

OSC FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-1 OSC-FREQ

Type: Data Editor

Syntax: OSC-FREQ [= n] | [D]

Range: Real: 100.000 .. 15000.000

Notes: LOCAL OSCILLATOR of the BDC that supports this band. Typical configurations:
S-band = 3750MHz
C-band = 5150MHz
X-band = 6300MHz
Ku-lo-band = 9750MHz
Ku-hi-band = 10750MHz
Ka-A = 16500, Ka-B = 17150, Ka-C = 18250, Ka-D = 19250, Ka-E = 20250

OSC FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-2 OSC-FREQ

Type: Data Editor

Syntax: OSC-FREQ [= n] | [D]

Range: Real: 100.000 .. 15000.000

Notes: LOCAL OSCILLATOR of the BDC that supports this band. Typical configurations:
S-band = 3750MHz
C-band = 5150MHz
X-band = 6300MHz
Ku-lo-band = 9750MHz
Ku-hi-band = 10750MHz
Ka-A = 16500, Ka-B = 17150, Ka-C = 18250, Ka-D = 19250, Ka-E = 20250

OSC FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-3 OSC-FREQ

Type: Data Editor

Syntax: OSC-FREQ [= n] | [D]

Range: Real: 100.000 .. 15000.000

Notes: LOCAL OSCILLATOR of the BDC that supports this band. Typical configurations:
S-band = 3750MHz
C-band = 5150MHz
X-band = 6300MHz
Ku-lo-band = 9750MHz
Ku-hi-band = 10750MHz
Ka-A = 16500, Ka-B = 17150, Ka-C = 18250, Ka-D = 19250, Ka-E = 20250

OSC FREQ *(OPTIONAL-Depending on RF Range)*

Path: / CONFIGS BANDS BAND-4 OSC-FREQ

Type: Data Editor

Syntax: OSC-FREQ [= n] | [D]

Range: Real: 100.000 .. 15000.000

Notes: LOCAL OSCILLATOR of the BDC that supports this band. Typical configurations:
S-band = 3750MHz
C-band = 5150MHz
X-band = 6300MHz
Ku-lo-band = 9750MHz
Ku-hi-band = 10750MHz
Ka-A = 16500, Ka-B = 17150, Ka-C = 18250, Ka-D = 19250, Ka-E = 20250

POL SELECT

Path: / POL SELECT

Type: Data Editor

Syntax: POL-SELECT [= n] | [D]

Range: Integer: 1 .. 2
1 Pol 1
2 Pol 2

Notes: POL SELECT selects which POL input will be used for tracking. This setting is used to control an RF switch internal to the DTR, and may also be used to control an external switch using I/O Interface #1 on the back panel. GPIO 6 and 7 become active based on the POL SELECT setting. Pins 11,24 represent the POL1 state and pins 11,25 represent the POL2 state. These pin groups are connected to dry relay contacts (1Amp max current).

PORT 1

Path: / CONFIGS COMM-PARAM PORT-1

Type: Sub Menu

Syntax: PORT-1

Notes: PORT 1 is an RS-232 (only) port used for remote M&C communications. The data parameters are set in factory to: 8 data bits, 1 stop bit, no parity. Port 1 is available on the back panel as a 9-pin D subminiature socket connector with the following electrical pinout: pin 2 = RX (from DCE); pin 3 = TX (from DTE); pin 5 = Signal Ground. The other pins are not connected.

PORT 2

Path: / CONFIGS COMM-PARAM PORT-2

Type: Sub Menu

Syntax: PORT-2

Notes: PORT 2 is used for M&C operation and allows RS-232 and RS-422 connections. . The data parameters are set in factory to: 8 Data bits, 1 Stop bit, No Parity. PORT 2 is available on the back panel as a 9 pin D subminiature socket connector. The RS-232 electrical pinout is: pin 2 = RX (from DCE); pin 3 = TX (from DTE); pin 5 = Signal Ground; pin 7 = RTS (from DTE); pin 8 = CTS (from DCE); The RS-422 electrical pinout is: pin 1 = TX + ; pin 4 = RX + ; pin 6 = TX-; pin 9 = RX-. Notice that these two pinouts coexist on the same 9 pin connector without conflict.

POWER LEVEL CALIBRATION

Path: / CONFIGS MEMORY CALIBRATION CALIBRATION

Type: Data Editor

Syntax: CALIBRATION [= n] | [D]

Range: Real: -99.99 .. 99.99

Notes: POWER LEVEL CALIBRATION adjusts the calibration value used to calculate the signal power measurement reported by the DTR (shown on the front display in dBm). This parameter should NOT be modified under normal cirumstances.

RECEIVER OPERATION

Path: / CONFIGS OPERATION

Type: Sub Menu

Syntax: OPERATION

Notes: RECEIVER OPERATION configures how the Signal Processing Unit (SPU) will process the signal.

REMOTE CONTROL

Path: / CONFIGS COM-PARAM REM-CONTROL

Type: Data Editor

Syntax: REM-CONTROL [= n] | [D]

Range: Integer: 0 .. 3
0 I/O INTF #1
1 PORT 1
2 PORT 2
3 PORT 3

Notes: REMOTE CONTROL selects which port on back panel is in control when the DTR is in REMOTE mode. For remote M&C communications select PORT1 or 2, which support serial protocols. To control the DTR via discrete digital I/O select I/O INTF #1, which will allow a remote device (such as 7134ACU) to select a BEACON using a cable connected to I/O INTERFACE #1 on the back panel and the STORE/RESTORE BEACONS menus. The pinout of I/O INTERFACE # 1 includes: Pins 5,18, GPIO 0, = Beacon 1 Input; Pins 6,19, GPIO 1, = Beacon 2 Input; Pins 7,20, GPIO 2, = Beacon 3 Input; Pins 8,21, GPIO 3, = Beacon 4 Input.

RESET PORT

Path: / CONFIGS COMM-PARAM PORT-1 RESET-PORT

Type: Executable

Syntax: RESET-PORT

Notes: RESET-PORT resets the given port. The electrical interface is initialized and the shell (if any) that was running on it is restarted.

RESET PORT

Path: / CONFIGS COMM-PARAM PORT-2 RESET-PORT

Type: Executable

Syntax: RESET-PORT

Notes: RESET-PORT resets the given port. The electrical interface is initialized and the shell (if any) that was running on it is restarted.

RESTORE BEACONS

Path: / CONFIGS BEACONS RESTORE-BEACONS

Type: Sub Menu

Syntax: RESTORE-BEACONS

Notes: Executing each item in this menu will restore values previously stored as a BEACON state: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

RESTORE BEACON1

Path: / CONFIGS BEACONS RESTORE-BEACONS RESTORE-BEACON1

Type: Executable

Syntax: RESTORE-BEACON1

Notes: Executing each item in this menu will restore values previously stored as a BEACON state for the following parameters: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

RESTORE BEACON2

Path: / CONFIGS BEACONS RESTORE-BEACONS RESTORE-BEACON2

Type: Executable

Syntax: RESTORE-BEACON2

Notes: Executing each item in this menu will restore values previously stored as a BEACON state for the following parameters: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

RESTORE BEACON3

Path: / CONFIGS BEACONS RESTORE-BEACONS RESTORE-BEACON3

Type: Executable

Syntax: RESTORE-BEACON3

Notes: Executing each item in this menu will restore values previously stored as a BEACON state for the following parameters: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

RESTORE BEACON4

Path: / CONFIGS BEACONS RESTORE-BEACONS RESTORE-BEACON4

Type: Executable

Syntax: RESTORE-BEACON4

Notes: Executing each item in this menu will restore values previously stored as a BEACON state for the following parameters: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

RESTORE ROM DEFAULTS

Path: / CONFIGS MEMORY RESTORE-TO-ROM-DEFAULTS

Type: Data Editor

Syntax: RESTORE-TO-ROM-DEFAULTS [= n] | [D]

Range: Integer: 0 .. 1
0 No
1 Yes

Notes: Selecting YES and pressing ENTER restores all DTR parameters to factory ROM defaults. If this is done, the front panel (not the whole DTR) will reset.

SAMPLING FREQUENCY

Path: / CONFIGS MEMORY CALIBRATION SAMPLING

Type: Data Editor

Syntax: SAMPLING [= n] | [D]

Range: Real: 63990.000 .. 64010.000

Notes: SAMPLING FREQUENCY compensates for the oscillator's slight deviation from 64MHz. Entering the actual oscillator frequency to within 1Hz maximizes the receiver's performance.

SET DATE AND TIME

Path: / CONFIGS MEMORY DATE&TIME

Type: Sub Menu

Syntax: DATE&TIME

Notes: The SET DATE and TIME menu contains editors for setting the date and time. The port used to set the date or time with (local or remote) must be the one in control.

SET DATE

Path: / CONFIGS MEMORY DATE&TIME SET-DATE

Type: Data Editor

Syntax: SET-DATE [= n] | [D]

Range: Integer: 1011980 .. 12312079 (Must be a valid date)

Notes: Changing this changes the current date. Under the menu tree shell the format is MMDDYYYY and all fields must be set.

SET TIME

Path: / CONFIGS MEMORY DATE&TIME SET-TIME

Type: Data Editor

Syntax: SET-TIME [= n] | [D]

Range: Integer: 000000 to 235959 (Must be a valid time)

Notes: Changing this changes the current time (in 24 hour format). Under the menu tree shell the format is HHMMSS and all fields must be set.

SHELL

Path: / CONFIGS COMM-PARAM PORT-1 SHELL

Type: Data Editor

Syntax: SHELL [= n] | [D]

Range: Integer: 0 .. 3

0	Disabled
1	M&C Shell
2	Message Printer
3	Data Reader

Notes: SHELL determines the communications protocol used on this serial port. M&C Shell: provides monitor and control protocol support including status polling and system configuration capability. Message Printer is a diagnostic tool which may be used to record system events, when connected to a terminal program or a serial printer.

SHELL

Path: / CONFIGS COMM-PARAM PORT-2 SHELL

Type: Data Editor

Syntax: SHELL [= n] | [D]

Range: Integer: 0 .. 2
0 No Shell
1 M&C Shell
2 Message Printer
3 Data Reader

Notes: SHELL determines the communications protocol used on this serial port. M&C Shell: provides monitor and control protocol support including status polling and system configuration capability. Message Printer is a diagnostic tool which may be used to record system events, when connected to a terminal program or a serial printer

SLOPE

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC1 DAC1-SLOPE

Type: Data Editor

Syntax: DAC1-SLOPE [= n] | [D]

Range: Real: 0.001 .. 1.000 (volts/dB)

Notes: SLOPE controls the rate of change of the DC output voltage with respect to a 1 dB change in signal power level.

SLOPE

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC2 DAC2-SLOPE

Type: Data Editor

Syntax: DAC2-SLOPE [= n] | [D]

Range: Real: 0.001 .. 1.000 (volts/dB)

Notes: SLOPE controls the rate of change of the DC output voltage with respect to a 1 dB change in signal power level.

SPECTRAL DISPLAY

Path: / STATUS SPECTRAL-DISPLAY

Type: Executable

Syntax: SPECTRAL-DISPLAY

Notes: SPECTRAL DISPLAY plots the received signal's frequency components in a graphical manner similar to a spectrum analyzer. Use the spin knob to adjust frequency. Soft keys A/B change the step size, while soft keys C/D change vertical scale.

SPU SERIAL LINK STATS

Path: / STATUS SPU-DIAG

Type: Executable

Syntax: SPU-DIAG

Notes: Displays the SPU RS422 serial link statistics separated by destination (MCU and DSP): Timeouts – the CPU did not get a response within 100mSec. Errors – unexpected responses that do not match the internal protocol. % of Total – indicates the percentage of errors plus timeouts versus the total number of commands. Linklosses – counts the number of failures to establish communication with the MCU or DSP processors. Total – sum total of commands sent.

STATUS (In previous versions, was DIAGS) (New in 1.16.51)

Path: / STATUS

Type: Sub Menu

Syntax: STATUS

Notes: The STATUS menu contains useful diagnostic tools. The SPECTRAL DISPLAY option is accessed from this menu, as are other tools, such as a I/O status and the message log.

STORE BEACONS

Path: / CONFIGS BEACONS STORE-BEACONS

Type: Sub Menu

Syntax: STORE-BEACONS

Notes: Executing each item in this menu will store CURRENT values of the following parameters as a BEACON state: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

STORE BEACON1

Path: / CONFIGS BEACONS STORE-BEACONS STORE-BEACON1

Type: Executable

Syntax: STORE-BEACON1

Notes: Executing each item in this menu will store CURRENT values of the following parameters in a BEACON state: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

STORE BEACON2

Path: / CONFIGS BEACONS STORE-BEACONS STORE-BEACON2

Type: Executable

Syntax: STORE-BEACON2

Notes: Executing each item in this menu will store CURRENT values of the following parameters in a BEACON state: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

STORE BEACON3

Path: / CONFIGS BEACONS STORE-BEACONS STORE-BEACON3

Type: Executable

Syntax: STORE-BEACON3

Notes: Executing each item in this menu will store CURRENT values of the following parameters in a BEACON state: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

STORE BEACON4

Path: / CONFIGS BEACONS STORE-BEACONS STORE-BEACON4

Type: Executable

Syntax: STORE-BEACON4

Notes: Executing each item in this menu will store CURRENT values of the following parameters in a BEACON state: FREQUENCY, POL-SELECT, ATTENUATION, FILTER, SLOPE, VOLTAGE RANGE AND MINIMUM POWER REF LEVEL.

SYSTEM MEMORY

Path: / CONFIGS MEMORY

Type: Sub Menu

Syntax: MEMORY

Notes: The MEMORY menu contains commands relating to the storage of system parameters that are stored in nonvolatile RAM (NVRAM).

TESTS

Path: / TESTS

Type: Sub Menu

Syntax: TESTS

Notes: The TESTS menu provides system integrity tests. These tests are primarily intended for VertexRSI factory testing. USE OF SOME TESTS MAY OBSCURE REAL TIME DATE, AND OTHERS MAY TEMPORARILY AFFECT THE PERFORMANCE OF THIS RECEIVER.

TROUBLESHOOT

Path: / STATUS TROUBLESHOOT

Type: Executable

Syntax: TROUBLESHOOT

Notes: This is a diagnostic tool to provide online help information on the current faults.

VOLTAGE RANGE

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC1 DAC1-RANGE

Type: Data Editor

Syntax: DAC1-RANGE [= n] | [D]

Range:

Integer:	0 .. 2
0	0 to +10
1	-10 to +10
2	-5 to +5

Notes: The DC VOLTAGE RANGE of the Digital to Analog Converter. Used to represent the signal level as a tracking voltage.

VOLTAGE RANGE

Path: / CONFIGS OPERATION ANALOG-OUTPUTS DAC2 DAC2-RANGE

Type: Data Editor

Syntax: DAC2-RANGE [= n] | [D]

Range:

Integer:	0 .. 2
0	0 to +10
1	-10 to +10
2	-5 to +5

Notes: The DC VOLTAGE RANGE of the Digital to Analog Converter. Used to represent the signal level as a tracking voltage.

6.1 Keyword Commands

/

Path: Keyword

Type: Executable

Syntax: /

Notes: This keyword returns to the top of the menu tree.

\

Path: Keyword

Type: Executable

Syntax: \

Notes: This keyword is a comment character. Rest of line is ignored.

..

Path: Keyword

Type: Executable

Syntax: ..

Notes: This keyword moves up to the parent menu of the current menu in the menu tree.

?

Path: Keyword

Type: Executable

Syntax: ?

Notes: Aliases: "HELP", "help", and "?". The command interpreter is case sensitive. Most items are in caps. If a keyword or item number follows, then its help is displayed. Type KEYS in followed by carriage-return for a list of keywords. LS lists non-keyword menu items.

C#

Path: Keyword

Type: Executable

Syntax: C#

Notes: TRL EMULATION MODE keyword. This keyword requests receiver port in use; response is port #.

DATE

Path: Keyword

Type: Executable

Syntax: DATE

Notes: This keyword displays the current date.

DOWNLOAD-PARAMS

Path: Keyword

Type: Executable

Syntax: DOWNLOAD-PARAMS

Notes: This keyword sends all the system parameters to the M&C terminal. Designed to allow text file captures of all system parameters.

EXIT

Path: Keyword

Type: Executable

Syntax: EXIT

Notes: This keyword exits and restarts the current menu tree shell.

F

Path: Keyword

Type: Executable

Syntax: F [0] | [n]

Range: Hexmask - 0..FF

Notes: F displays a hex bitmap for each fault table specified in the mask. The mask is supplied in hex. Use a mask of 0 to display all fault bitmaps.

FINDEX

Path: Keyword

Type: Executable

Syntax: FINDEX

Notes: This keyword displays version of images in FLASH

FLASH

Path: Keyword

Type: Executable

Syntax: FLASH n

Range: Integer: 0 .. 3

Notes: This keyword uploads a software update using XMODEM (CRC) and programs it into the given bank of flash memory. Where n = flash bank to program, must be 0 thru 3)

FREQUENCY?

Path: Keyword

Type: Executable

Syntax: FREQUENCY?

Notes: This keyword displays current frequency in megahertz.

G

Path: Keyword

Type: Executable

Syntax: G ("!" Optional)

Notes: This is a global system update. The ! after the G forces transmission of all status information. The default is to only transmit information that has changed since the last G command. The port does not need to be in control.

Typical response: Fhhhhhhhh

F Fault status (summarized). The hex mask indicated which fault tables have faults that just changed. On a "G!", all fault tables are indicated to have change in faults. This hex mask can be used as the argument for the "F" keyword.

help

Path: Keyword

Type: Executable

Syntax: help

Notes: Aliases: "HELP" and "?". The command interpreter is case-sensitive. Most items are in caps. If a keyword or item number follows, then its help is displayed. Type KEYS in followed by carriage-return for a list of keywords. LS lists non-keyword menu items.

HELP

Path: Keyword

Type: Executable

Syntax: HELP

Note: The command interpreter is case-sensitive. Most items are in caps.

Aliases: "help" and "?". Help by itself displays this text. If a keyword or item number follows, then its help is displayed. Type is KEYS followed by carriage-return for a list of keywords. LS lists non-keyword menu items.

KEYS

Path: Keyword

Type: Executable

Syntax: KEYS

Notes: This keyword lists the available keywords along with the help screen for each keyword.

KEYS-HELPS

Path: Keyword

Type: Executable

Syntax: KEYS-HELPS

Notes: This keyword lists the available keywords along with the help screen for each keyword.

LIST-FAULTS

Path: Keyword

Type: Executable

Syntax: LIST-FAULTS

Notes: Lists all fault names along with their LCD text names, and their current status. This report is in verbose ASCII format, for readability. For periodic status polling, us the F keyword (HEX bitmapped fault report).

LS

Path: Keyword

Type: Executable

Syntax: LS

Notes: Keywords are not listed. Use KEYS to see the keyword list.

LS (Lists) lists all items in the current menu in the form "n" type "title" [= value]. Where n = item's menu index [0, (# of items in menu) –1]. Type = 'X' (executable), 'M' (menu), 'E' (editable). If 'E', then value is also printed with '=' between item title and value. Note: keywords are not listed. Use KEYS to see the keyword list.

MC

Path: Keyword

Type: Executable

Syntax: MC

Notes: MC (Messages Clear) clears the message log.

MD

Path: Keyword

Type: Executable

Syntax: MD

Notes: MD (Messages Display) dumps the message log to the terminal.

MDR

Path: Keyword

Type: Executable

Syntax: MDR

Notes: MDR (Messages Display-Reversed) dumps the message log to the terminal. MDR, in contrast with MD (Messages Display), dumps the message lines in reverse, with the newest line first, and the oldest line last.

MTREE

Path: Keyword

Type: Executable

Syntax: MTREE

Notes: MTREE (Menu Tree) lists the entire Menu Tree.

MTREE-HELPS

Path: Keyword

Type: Executable

Syntax: MTREE-HELPS

Notes: This keyword lists the entire Menu Tree along with the help screens and menu tree shell name for each item.

N

Path: Keyword

Type: Executable

Syntax: N

Notes: TRL EMULATION MODE keyword. This keyword requests status update, since last N or S.

POWER

Path: Keyword

Type: Executable

Syntax: POWER

Notes: This keyword displays current power level in dBm.

RESTORE-ROM-DEFAULTS

Path: Keyword

Type: Executable

Syntax: RESTORE-ROM-DEFAULTS

Notes: This keyword resets the DTR parameters to ROM defaults.

S

Path: Keyword

Type: Executable

Syntax: S

Notes: TRL EMULATION MODE keyword. This keyword requests receiver status; response is bitmapped hex string, formatted with character separators for each field and fixed field widths as follows:

BbbCcEeeFffffffffVvvvvAaaali

B = beacon: indicates which beacon is selected, supports beacons 1-4
C = control: indicates which port is control (0, 1 or 2)
E = errors: hex 80 indicates Summary Fault, hex 00 indicates no faults
D = frequency: standard DTR frequencies are 950000 - 2050000 KHz
V = voltage: voltage level in thousands of volts, 0 to 9.999
A = attenuation: current attenuation setting, 0 - 50.0 dB
I = RF input: 1 or 2 representing current POL select setting.

SPU-FREQUENCY?

Path: Keyword

Type: Executable

Syntax: SPU-FREQUENCY?

Notes: This keyword displays SPU frequency in megahertz.

TIME

Path: Keyword

Type: Executable

Syntax: TIME

Notes: This keyword displays the current time.

VERSION

Path: Keyword

Type: Executable

Syntax: VERSION

Notes: This keyword displays the version and configuration information of the DTR.

WHO

Path: Keyword

Type: Executable

Syntax: WHO

Notes: This keywords displays which port is being used by the current terminal, and which port is the one that has control of the DTR.

X1

Path: Keyword

Type: Executable

Syntax: X1

Notes: TRL EMULATION MODE keyword. This keyword is used by the VertexRSI ACU to resync the TRL shell. On the DTR it is used to enter TRL EMULATION MODE. When executed, the current shell goes into TRL EMULATION MODE. To get out of TRL EMULATION MODE, use the EXIT keyword.

7.0 RS-485 Protocol for DTR Multi-drop bus

For M&C systems that need to communicate over RS-485, there are additional requirements and restrictions in the DTR M&C protocol. The M&C is the only shell offered on the RS-485 bus. The command line format is different since multiple devices can be present on the multi-drop RS-485 bus. Since the bus is half duplex and is shared, the set of M&C menu items and keywords is restricted to those items that do not require interactive (full duplex) features, and do not hold the bus for longer than is necessary or desirable. Multiple DTR units can be monitored and controlled on the same bus, as well as equipment whose protocol can co-exist with the RS-485 protocol format described here.

Message Format

Format of multi-drop serial bus shell messages is:

`<stx> <direction> <addr> <text> <etx>`

`<stx>` is the ASCII start of text (`$02`) character

`<direction>` is `$5` on commands sent to the DTR. `<direction>` is `$4` on replies sent from the DTR.

`<addr>` is the address of the device to whom this message is sent

`<text>` is the body of the command or response (may be null if there is no response)

`<etx>` is the ASCII end of text (`$03`) character

Note: `<stx>` is Ctrl-B
`<etx>` is Ctrl-C
`<$4>` is Ctrl-D
`<$5>` is Ctrl-E

Examples:

To send a "/ 0" to unit with address of 1.
`<stx><$5>1/ 0<etx>`
Response would be something like:
`<stx><$4>0 2000.000<etx>`

To send a "WHO" to unit with address of 1.
`<stx><$5>1WHO<etx>`
Response would be:
`<stx><$4>0<cr>3 (3 in control)<etx>`

To change frequency of unit 1 (already at /):
`<stx><$5><$D>10 = 1999.8<etx>`
Response would be:
`<stx><$4>0<etx>`

To send a "/ 0" to unit with address of 4.
`<stx><$5>4/ 0<etx>`
Response would be something like:
`<stx><$4>0 2000.000<etx>`

Note: The first '0' in the response is the master address.

Restrictions

Normally multiple commands in the MT M&C shell can be queued up on one line. In the RS-485 shell, commands can be queued, but not after any command that has a response. Only one command with a response can be on a line, and it must be the last command on the line.

Menu items disabled for the RS-485 shell

/ STATUS LOG
/ STATUS TASKS-DIAG
/ STATUS TROUBLESHOOT
/ TESTS FIFO-TEST

Keywords disabled for the RS-485 shell

LIST-FAULTS
FLASH
HELP
?
help
MTREE
MTREE-HELPS
KEYS
KEYS-HELPS
EXIT
MD
MDR
MC
LS
FINDEX
RESTORE-ROM-DEFAULTS
DOWNLOAD-PARAMS
SPU-FREQUENCY?
X1
S
N
C#
?Y
?V
?W

Added Menu Items

/ CONFIGS COMM-PARAM PORT-3
/ CONFIGS COMM-PARAM PORT-3 BPS
/ CONFIGS COMM-PARAM PORT-3 SHELL
/ CONFIGS COMM-PARAM PORT-3 MASTER-ADDRESS
/ CONFIGS COMM-PARAM PORT-3 SLAVE-ADDRESS
/ CONFIGS COMM-PARAM PORT-3 ADDRESS-OFFSET
/ CONFIGS COMM-PARAM PORT-3 RESET-PORT
/ CONFIGS COMM-PARAM REM-CONTROL *(modified) Port-3 added*

Added Menu Items:

SHELL

Path: / CONFIGS COMM-PARAM PORT-3 SHELL

Type: Data Editor

Syntax: SHELL [= n] | [D]

Range: Integer: 0 .. 1
0 Disabled
1 M&C Shell

Notes: SHELL determines the communications protocol used on this serial port. M&C Shell: provides monitor and control protocol support including status polling and system configuration capability.

PORT 3

Path: / CONFIGS COMM-PARAM PORT-3

Type: Sub Menu

Syntax: PORT-3

Notes: PORT 3 is used for M&C communications on a multi-drop half-duplex 485 bus. This menu controls the BPS, SHELL, and bus addressing parameters of this PORT. Notice that the data parameters are set in factory to: 8 Data bits, 1 Stop bit, No Parity. PORT 3 is available on the back panel as a 9 pin D subminiature socket connector.

The RS-485 electrical pinout is:

Pin 7 = Cable Shield
Pin 1 = RxD/TxD +
Pin 6 = RxD/TxD –

MASTER ADDRESS

Path: / CONFIGS COMM-PARAM PORT-3 MASTER-ADDRESS

Type: Data Editor

Syntax: MASTER-ADDRESS

Range: Integer: 0 .. 31

Notes: MASTER ADDRESS is the address of the master (controlling) device on the multi-drop RS-485 bus. There are a maximum on 32 addresses, ranging from 0 to 31. On the bus, the actual ASCII value used for addressing is the address assigned here plus the value of the parameter ADDRESS OFFSET.

SLAVE ADDRESS

Path: / CONFIGS COMM-PARAM PORT-3 SLAVE-ADDRESS

Type: Data Editor

Syntax: SLAVE-ADDRESS

Range: Integer: 0 .. 31

Notes: SLAVE ADDRESS is the address of this unit (a slave, controlled) on the multi-drop RS-485 bus. There are a maximum on 32 addresses, ranging from 0 to 31. On the bus, the actual ASCII value used for addressing is the address assigned here plus the value of the parameter ADDRESS OFFSET.

ADDRESS OFFSET

Path: / CONFIGS COMM-PARAM PORT-3 ADDRESS-OFFSET

Type: Data Editor

Syntax: ADDRESS-OFFSET

Range: Integer: 0 .. 224

Notes: ADDRESS-OFFSET is the offset added to the multi-drop bus address of a device to determine the ASCII value needed to be used on the bus.

Example:

ADDRESS-OFFSET is 48 (ASCII for '0')
MASTER-ADDRESS is '0'
SLAVE-ADDRESS is '1'

In the above example the ASCII value on the RS-485 multi-drop bus would be 48 (ASCII for '0') for the master, and 49 (ASCII for '1') for the slave.

APPENDIX D – ACRONYMS & ABBREVIATIONS

The following is a list of acronyms and abbreviations that are used by VertexRSI and may appear in this manual.

A/D.....Analog to Digital
A.....Amperes
AC.....Alternating Current
ACS.....Antenna Control System
ACU.....Antenna Control Unit
A/D.....Analog-to-Digital
ADU.....Antenna Drive Unit
AGC.....Automatic Gain Control
AOS.....Acquisition of Star
ASCII.....American Standard Code for Information Interchange
ASSY.....Assembly
AST.....Adaptive Steptrack
AUX.....Auxiliary
AZ.....Azimuth

BCD.....Binary Coded Decimal
BDC.....Block Down Converter
BIT.....Built-In Test
bps.....Bits Per Second (Baud)
BW.....Bandwidth

C/No.....Carrier Relative to Noise
CCW.....Counterclockwise
CFE.....Customer-Furnished Equipment
COM.....Common
CPU.....Central Processing Unit
CR.....Carriage return
CRLF.....Carriage return/line feed
CTS.....Clear to Send
CW.....Clockwise

DAC.....Digital to Analog Converter
dB.....Decibel
dBHz.....Decibel Hertz
dBm.....Decibel referred to 1 milliwatt
DC.....Direct Current
DCE.....Data Communications Equipment
deg.....Degrees
DMM.....Digital Multimeter
DOS.....Disk Operating System
DSP.....Digital Signal Processor
DTE.....Data Terminating Equipment
DTR.....Digital Tracking Receiver

EEPROM ..... Electrically Erasable Programmable Read Only Memory
EIA ..... Electronic Industries Association
EIC ..... Encoder Input Circuit
EL ..... Elevation
EPROM ..... Erasable Programmable Read-Only Memory
E STOP ..... Emergency stop

FFT ..... Fast Fourier Transform
FIFO ..... First In First Out
FIR ..... Finite Impulse Response
FLT ..... Fault
FSM ..... Finite State Machine
FWD ..... Forward

GHz ..... Gigahertz
GND ..... ground
GPIO ..... General Purpose Input Output

HB ..... High Byte
HHMMSS ..... Hours Minutes Seconds (e.g. 120030)
HP ..... horsepower
Hz ..... Hertz

I/O ..... Input/Output
IC ..... Integrated Circuit
ICCL ..... Inter-Component Communication Link
IEC ..... International Electrotechnical Commission
IEE ..... Institute of Electrical Engineers
IEEE ..... Institute of Electrical and Electronic Engineers
IF ..... Intermediate Frequency
ISIO ..... Intelligent Serial Input/Output

km ..... Kilometer

LB ..... Low Byte
LCD ..... Liquid Crystal Display
LED ..... Light-Emitting Diode
LNA ..... Low Noise Amplifier
LOS ..... Loss of Signal (Loss of Star)
LSB ..... Least Significant Bit
LSI ..... Large Scale Integration
LT ..... Long-term

M ..... Meter
M&C ..... Monitor and Control
mA ..... Milliamperes
mb ..... Multibody (propagator)
MCU ..... Microcontroller Unit
MHz ..... Megahertz
MMDDYYYY ..... Month Day Year (e.g. 01012010)
ms ..... Millisecond

N/A	Not applicable
NEC	National Electrical Code
NEMA	National Electrical Manufactures Association
NORAD	North American Air Defense Command
NVRAM	Nonvolatile Read-Only Memory
O&M	Operations and Maintenance
OPT	Orbit Prediction Tracking
PC	Printed circuit
PCB	Printed-Circuit Board
PH	Phase
PLL	Phase-Locked Loop
PMCU	Portable Maintenance Control Unit
POL	Polarization
p-p	Peak-to-peak
PROG	Program
PROM	Programmable Read-Only Memory
RAM	Random Access Memory
RC	Resistance-capacitance
RDC	Resolver-to-Digital Converter
REV	Reverse
RF	Radio Frequency
RFI	Radio Frequency Interference
RMS	Root mean square
ROM	Read-Only Memory
rpm	Revolutions per minute
RTS	Request to Send
SCP	System Control Processor
sec	Second
SHLD	Shield
SPST	Single-Pole Single-Throw
SPU	Signal Processing Unit
ST	Short-term
STD	Standard
SUM_FLT	Summary Fault
2b	Two-body (propagator)
TBT	Tracking Band Translator
TBU	Test Bed Unit
TEE	True Equinox and Equator
TT&C	Telemetry, Tracking, and Control
UTC	Coordinated Universal Time
V	Volts
VAC	Volts AC
VDC	Volts DC
VSWR	Voltage Standing-Wave Ratio