RackSat series
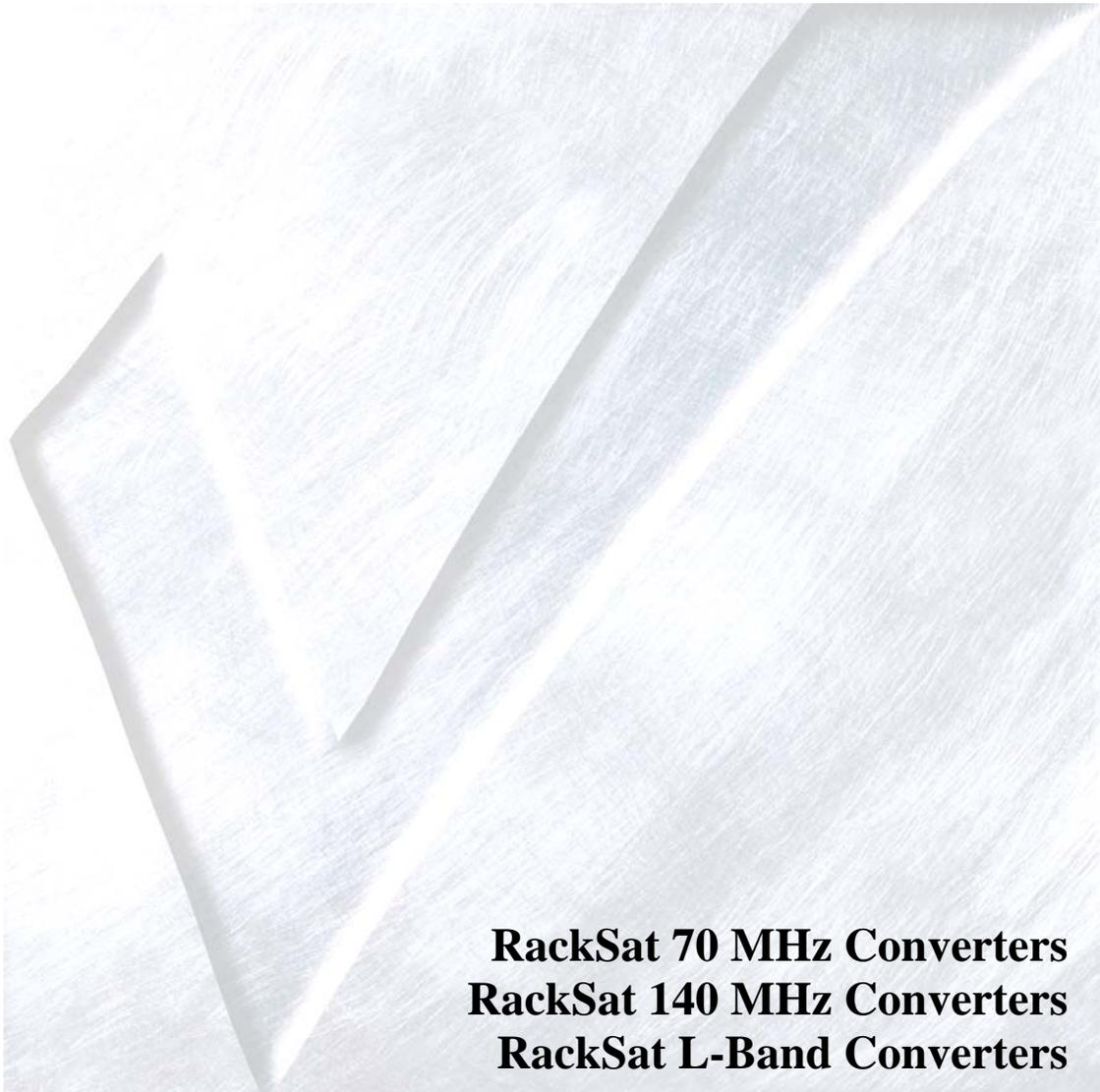
RackSat Converter
Operating Manual

RackSat 70 MHz Converters
RackSat 140 MHz Converters
RackSat L-Band Converters

You have just received a RackSat Converter, a *cost-effective* product with no compromise on *quality* and *reliability*. This product should provide tireless performance in any reasonable operating environment.

We at AnaCom have taken great care to provide a convenient, easy-to-use product in a single package. Should a situation arise beyond the operator's control, just give us a telephone call. Many situations can be diagnosed and solved by AnaCom's trained customer-service personnel over the phone.

If you have any questions, require technical assistance or training please call AnaCom directly at (408) 519-2062 or FAX to us at (408) 519.2063. You can also send e-mail to techsupport@anacominc.com and one of our engineers will contact you.

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Operating Manual
for the
RackSat Converter

Table of Contents

Introduction

The AnaCom RackSat Converter has all of the familiar features of AnaCom's outdoor converters in a compact, rack-mountable form. Ideally suited for SCPC, MCPC, DAMA, and VoIP applications and designed to interface with an appropriate modem which may be used in a wide variety of communication networks.

AnaCom RackSat Converters are available in either C-band or Ku-band configurations. Each converter includes either an RF up or down-converter, as well as a universal power supply, and full Monitor & Control functions The different models are:

L-Band C and Ku RackSat Converters

Model number	Converter	LO Frequency
33632	L-EC Up Converter	4900
33633	L-SEC Up Converter	4900
33634	L-LMI/EC Up Converter	4775
33635	L-Ku Up Converter	13050
33636	L-SEKU Up Converter	12800
33639	EC-L Down Converter	5150
33640	SEC-L Down Converter	5150
33641	LMI/EC-L Down Converter	5150
33642	Ku1-L Down Converter	10000
33643	Ku2-L Down Converter	10500
33644	Ku3-L Down Converter	11250

70/140 MHz C and Ku-band RackSat Converters

Model number	Converter
33540	70-EC Up Converter
33542	70-SEC Up Converter
33545	70-Ku Up Converter
33547	70-SEKu Up Converter
33541	70-EC Down Converter
33543	70-SEC Down Converter
33546	70-Ku/SEKu Down Converter (10950 - 12750 input frequency)
33548	70-WEKu Down Converter (10700 - 12750 input frequency)

Additional models are available for PC, RC, XC, Extended, and Super Extended bands

The RackSat Converters' synthesizers are locked to an oven controlled, high-stability crystal oscillator (OCXO) and can provide 1 MHz frequency selection step sizes over the entire available bandwidth (70/140 MHz versions).

Typical Operating Parameters - 70/140 MHz RackSat Converter

		C-Band family		
C-Band UPCONVERTER CHARACTERISTICS	1 dB COMPRESSION POINT	8 dBm		
	TX NOMINAL GAIN	30 dB		
	TX GAIN RANGE	+6 / -20 dB variable in 1 dB steps via M&C		
	TX LEVEL FLATNESS	+/- 1.5 dBp-p max / 500 MHz		
	TX GAIN OVER TEMPERATURE	+/- 1.5 dB max		
	TX INPUT IF FREQUENCY	52 to 88 MHz (100 to 180 MHz optional)		
	TX INPUT IF IMPEDANCE	50 ohms (75 ohms optional)		
	TX INPUT IF LEVEL	-30 dBm for nominal output with nominal gain		
	TX OUTPUT FREQUENCY	EC = 5.850 to 6.425 GHz SEC = 5.850 to 6.725 GHz PC = 6.425 to 6.725 GHz RC = 5.975 to 6.475 GHz XC = 6.725 to 7.025 GHz		
	TX FREQUENCY STEP SIZE	1 MHz (XC Band 500 KHz step size)		
	TX PHASE NOISE	-60 dBc/Hz max @ 100Hz -70 dBc/Hz max @ 1KHz -80 dBc/Hz max @ 10KHz -90 dBc/Hz max @ 100KHz		
	SPURIOUS	-65 dBc max out of band		
C-Band DOWNCONVERTER	RX INPUT FREQUENCY	EC = 3.625 to 4.200 GHz SEC = 3.400 to 4.200 GHz PC = 3.400 to 3.640 GHz RC = 3.650 to 4.150 GHz XC = 4.500 to 4.800 GHz		
	RX FREQUENCY STEP SIZE	1 MHz (XC Band 500 KHz step size)		
	RX OUTPUT FREQUENCY	52 to 88 MHz (100 to 180 MHz optional)		
	RX GAIN	85 to 100 dB in 1dB steps via M&C		
	RX OUTPUT IMPEDENCE	50 ohms (75 ohms optional)		

		Ku-Band family		
Ku-Band UPCONVERTER CHARACTERISTICS	1 dB COMPRESSION POINT	4 dBm		
	TX NOMINAL GAIN	30 dB		
	TX GAIN RANGE	+6 / -20 dB variable in 1 dB steps via M&C		
	TX LEVEL FLATNESS	+/-1.5 dBp-p max / 500 MHz		
	TX GAIN OVER TEMPERATURE	+/- 1.5 dB max		
	TX INPUT IF FREQUENCY	52 to 88 MHz (100 to 180 MHz optional)		
	TX INPUT IF IMPEDANCE	50 ohms (75 ohms optional)		
	TX INPUT IF LEVEL	-30 dBm for rated output with nominal gain		
	TX OUTPUT FREQUENCY	Ku = 14.0 to 14.50 GHz Eku = 13.75 to 14.25 GHz SEKu = 13.75 to 14.50 GHz		
	TX PHASE NOISE	-60 dBc/Hz max @ 100Hz -70 dBc/Hz max @ 1KHz -80 dBc/Hz max @ 10KHz -90 dBc/Hz max @ 100KHz		
	SPURIOUS	-65 dBc max out of band		
Ku-Band DOWNCONVERTER	RX INPUT FREQUENCY	10.95 - 12.75 GHz		
	RX OUTPUT FREQUENCY	52 to 88 MHz (100 to 180 MHz optional)		
	RX GAIN	85 to 100 dB in 1dB steps via M&C		
	RX OUTPUT IMPEDENCE	50 ohms (75 ohms optional)		

ENVIRONMENTAL	TEMPERATURE	-10 to +55ºC operational -50 to +75ºC storage		
	HUMIDITY	95% at 45C		
	ALTITUDE	6500 meters (21,325 ft)		
	VIBRATION	1.0 g random operational, 2.5 g random survival		
	SHOCK	10 g operational, 40 g survival		

POWER & DIMENSIONS	TYPICAL POWER CONSUMPTION	50 VA		
	PRIME POWER RECOMMENDATION	110/220 VAC		
	WEIGHT	9 lbs. / 4 kg.		
	UNIT SIZE:	19" x 13.875" x 1.719" (48.26 x 35.24 x 43.66) [1U]		

*all specifications subject to change

Typical Operating Parameters - L-Band RackSat Converter

		EC-Band	SEC-Band	LMI-EC Band
C-Band UPCONVERTER CHARACTERISTICS	1 dB COMPRESSION POINT	8 dBm		
	TX NOMINAL GAIN	25 dB		
	TX GAIN RANGE	13 dB variable in 1 dB steps via M&C		
	TX LEVEL FLATNESS	+/- 2 dBp-p max / 500 MHz		
	TX GAIN OVER TEMPERATURE	+/- 2dB max		
	TX INPUT IF FREQUENCY	950 to 1550 MHz	950 to 1700 MHz	950 to 1550 MHz
	TX INPUT IF IMPEDANCE	50 ohms (75 ohms optional)		
	TX INPUT IF LEVEL	-25 dBm typical		
	TX L.O. FREQUENCY	4900 MHz		4775 MHz
	TX OUTPUT FREQUENCY	5.850 to 6.425 GHz	5.850 to 6.725 GHz	5.725 to 6.425 GHz
	TX PHASE NOISE	-60 dBc/Hz max @ 100Hz -80 dBc/Hz max @ 10KHz		-70 dBc/Hz max @ 1KHz -90 dBc/Hz max @ 100KHz
	SPURIOUS	-55 dBc max out of band		
C-Band DOWNCONVERTER	RX INPUT FREQUENCY	3.625 to 4.200 GHz	3.400 to 4.200 GHz	3.375 to 3.950 GHz
	RX L.O. FREQUENCY	5150 MHz		
	RX GAIN	20 dB typical		
	RX OUTPUT IMPEDENCE	50 ohms (75 ohms optional)		

		Ku-Band	SEKU-Band
Ku-Band UPCONVERTER CHARACTERISTICS	1 dB COMPRESSION POINT	4 dBm	
	TX NOMINAL GAIN	25 dB	
	TX GAIN RANGE	13 dB variable in 1 dB steps via M&C	
	TX LEVEL FLATNESS	+/- 2 dBp-p max / 500 MHz	
	TX GAIN OVER TEMPERATURE	+/- 2dB max	
	TX INPUT IF FREQUENCY	950 to 1450 MHz	950 to 1700 MHz
	TX INPUT IF IMPEDANCE	50 ohms (75 ohms optional)	
	TX INPUT IF LEVEL	-25 dBm typical	
	TX L.O. FREQUENCY	13050 MHz	12800 MHz
	TX OUTPUT FREQUENCY	14.0 to 14.50 GHz	13.75 to 14.50 GHz
	TX PHASE NOISE	-60 dBc/Hz max @ 100Hz -80 dBc/Hz max @ 10KHz	-70 dBc/Hz max @ 1KHz -90 dBc/Hz max @ 100KHz
	SPURIOUS	-55 dBc max out of band	

ENVIRONMENTAL	TEMPERATURE	-10 to +55ºC operational -50 to +75ºC storage
	HUMIDITY	95% at 45C
	ALTITUDE	6500 meters (21,325 ft)
	VIBRATION	1.0 g random operational, 2.5 g random survival
	SHOCK	10 g operational, 40 g survival

POWER & DIMENSIONS	TYPICAL POWER CONSUMPTION	80 VA
	PRIME POWER RECOMMENDATION	110/220 VAC
	WEIGHT	9 lbs. / 4 kg.
	UNIT SIZE:	19" x 13.875" x 1.719" (48.26 x 35.24 x 43.66) [1U]

*all specifications subject to change

Installation

Unpacking

Check to make sure that the RackSat Converter has not suffered any damage in shipment. Compare contents of the crate to ensure items received match those listed on the packing slip. Retain all shipping containers for future use.

Safety Precautions

General

WARNING !	*Observe normal safety precautions when operating this equipment.*

Power Requirements

The RackSat Converter requires 110 VAC or 220 VAC at 50 or 60 Hz through a circuit breaker. To assure uninterrupted service, some method of back-up AC power is recommended. Installing surge arrestors and AC power line filters clean up power line interference and/or voltage variations.

   NOTE: AC TRANSIENTS AND SURGES MAY CAUSE DATA TRANSMISSION ERRORS AND LOSS OF SYNCHRONIZATION IN THE RACKSAT CONVERTER SYNTHESIZERS AND/OR THE EXTERNAL MODEM EQUIPMENT.

Mounting

Use the included hardware to attach the RackSat Converter to a standard 19-inch rack. The RackSat Converter requires a 1U space for mounting.

Carefully lift the unit onto the shelf or brackets and place it into the rack. The mounting holes on the sides of the front panel should match the holes in the rack.
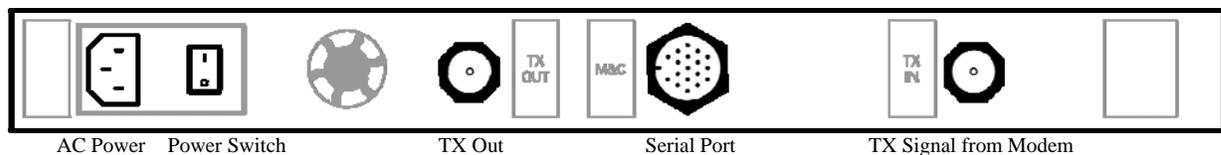
Cable Connections

1. *AC Power*

Attach the AC input cable to the connector on the RackSat Converter, shown in Figure 4. Make sure the power switch is OFF before connecting the rest of the cables.

2. *Transmitter Feed*

Connect a section of coaxial cable between the SSPA input port and the RackSat Converter's TX Out port. Note that cable loss at the RF frequency must be taken into account when setting TX gain.

3. *Modem*

Attach a coaxial cable with male N-connectors between the RackSat Converter's TX IF input and the modulator IF OUTPUT.

| AC Power | Power Switch | | TX Out | Serial Port | TX Signal from Modem |

RackSat Converter rear connections

Final Check

Recheck all bolts and cabling.

After all other connections have been made (TX IF, TX output, and grounding), connect the AC power cord to an active outlet.

Operation

WARNING !	*RackSat Converters will produce RF output power the moment a modulator is connected and provides input.*

Frequency Programming

The operating frequency for 70/140 MHz converters is determined by programming a specific channel number into the synthesizer. This must be done via the M&C with either a channel number (see Appendix) or by entering the desired operating frequency. Note that the operating frequency assumes the IF is centered exactly at 70 (or 140) MHz. Any offset from that center frequency must be accounted for in calculating the RF frequency as shown below.

Transmit operating frequency for C-Band frequencies for the 70 MHz RackSat Up-Converter is calculated with the following formula:

f_{TX} = TX IF_{IN} +5925MHz - 70 MHz + TX channel number

(where TX IF_{IN} ranges over 52 MHz to 88 MHz)

Transmit operating frequency for Ku-Band frequencies for the 70 MHz RackSat Up-Converter is calculated with the following formula:

f_{TX} = TX IF_{IN} +14000Mhz - 70 MHz + TX channel number

(where TX IF_{IN} ranges over 52 MHz to 88 MHz)

With L band IF, the RF frequency is determined only by the modem frequency plus the converter L.O. frequency. With L band IF, there is no need to enter an RF frequency or channel number. By default, all L band modems operate on channel 1.

Transmit operating frequency for standard C-Band frequencies for the L2C RackSat Converter is calculated with the following formula:

f_{TX} = TX IF_{IN} + 4900 MHz   (where TX IF_{IN} ranges over 950 MHz to 1750 MHz)

Or, for the LMI-Band:

f_{TX} = TX IF_{IN} + 4775 MHz   (where TX IF_{IN} ranges over 950 MHz to 1550 MHz)

Transmit operating frequency for standard Ku-Band frequencies for the L2K RackSat Converter is calculated with the following formula:

f_{TX} = TX IF_{IN} + 12800 MHz   (where TX IF_{IN} ranges over 950 MHz to 1450 MHz)

or for extended Ku band:

f_{TX} = TX IF_{IN} + 13500 MHz   (where TX IF_{IN} ranges over 950 MHz to 1700 MHz)

Transmit Power Adjustment

Maintaining proper output power is vital for maximizing signal-to-noise ratios over the radio path. Low power levels produce noisy signals; excessive power robs downlink strength from other stations sharing the transponder.

Adjust the modulator output level to attain the desired output power level. Use a calibrated watt meter on the output of the RackSat Converter for this task.

When transmitting multiple carriers, run the output power with an output level back-off sufficient to meet the spectral density mask requirements.

Maintenance

RackSat Converters are designed for a minimum of maintenance. Periodic scheduled maintenance is not required.

Monitor and Control

All RackSat Converters include an extensive Monitor and Control circuit (M&C). This circuit uses an advanced ARM-9 microprocessor to set the gain control, set the proper synthesizer frequency, and monitor various digital and analog test points 10 times every second to insure proper and reliable operation.

LED Indicators

Two LEDs are mounted on the front panel to give a quick summary of the operation:

1. A green LED is used to indicate that power is active, and that the microprocessor is alive and well. This is indicated by flashing the green LED once per second. Note: This flashing feature can be turned off by a user command if desired.

2. A red LED is used as a summary alarm indicator. Any alarm in the converter that would indicate abnormal operation will cause the red LED to flash once a second.

Alarm Relay Closure

A mechanical relay is used in the RackSat Converter for alarm indication. The red LED mounted on the RackSat Converter is illuminated whenever a problem exists and the relay has closed.
The alarm relay is a form C relay, and it defaults to the alarm state when power is off.

Monitored Values

The following internal points are monitored and can result in Alarm closure if out of range:

- Unit temperature
- -5V DC supply
- +5V DC supply
- Main +13V DC supply
- Synthesizer Lock detect
- Synthesizer AFC voltage
- Local Oscillator (synthesizer) frequency (if L band IF)
- RF input or output frequency (if 70/140MHz IF)
- Conversion gain in dB
- Internal temperature
- Input IF power level from the modem

M&C Connections

RS232 is available at any time on the 18 pin M&C connector on the rear panel. This is a simple three wire interface using pins 16, 17, and 18. Use Supervisor software to make this connection and communicate with the RackSat Converter. Alternatively, you can use any terminal program if you set the terminal to 1200 baud, no parity, 8 data bits, and 1 stop bit. RS232 is always available even if RS485 or Ethernet connection is active at the same time.

RS485 is available if pin 12 of the M&C connector is grounded. RS485 works the same as RS232, but can be used for much longer physical connections than RS232. Again, Supervisor software is recommended, but any terminal program can also be used.

Ethernet is available if pin 12 of the M&C connector is NOT grounded. Ethernet can also work well with Supervisor software, or via a Telnet connection. Initial IP address for the Rack_Mount Converter is set to 0.0.0.0 at the factory. Normal DHCP function will set the address if your network has this feature. If not, Supervisor will find the unit and assign an IP address automatically. In addition, you can assign your own IP address via the RS232 port if desired.

18-Pin M&C Circular Connector

Note dimple next to Pin 1
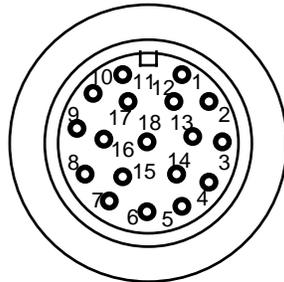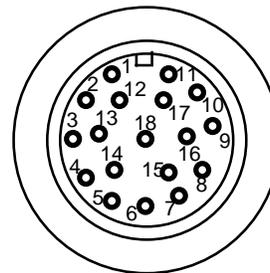
Cable End View   *Cable Wire View*

Pin	Signal	Description
4	NO	Alarm Normally Open
5	NC	Alarm Normally Closed
6	C	Alarm Common
7	P13V	+13V CD Power
8	TX+	RS485 or Ethernet TX+
9	TX-	RS485 or Ethernet TX-
10	RX+	RS485
11	RX-	RS485
12	485*	Ground to enable RS485 or open for Ethernet
13	Mute	Ground to turn off the TX output
14	E	Ethernet RX+
15	E	Ethernet RX-
16	RXD	RS232 RX
17	TXD	RS232 TX
18	Ground	

The *Cable End View* refers to looking into the end of the connecting cable; the *Cable Wire View* refers to looking into the connector on the RackSat Converter.

LIMITED WARRANTY

If this product should fail due to defects in materials or workmanship, AnaCom, Inc., will, at its sole option, repair or replace it with new or rebuilt parts free of charge for a period of two (2) years from the date of shipment from the AnaCom factory. This warranty covers only failures due to defects in materials and workmanship that occurs during the period of the warranty. It does not cover damage that occurs during shipment, failure caused by operation of the product outside the published electrical or environmental specifications, or malfunctions caused by misuse of the product. Expendable components are not covered under this warranty.

In order for the customer to exercise their rights to repairs under the warranty, the customer must first contact AnaCom to obtain a repair authorization number (RMA). If it is necessary to return the product for repair, the customer is responsible for paying the cost of shipping it to AnaCom. AnaCom will pay the cost of shipping the product back to the customer when the repairs are completed. All import duties, customs fees, taxes of any kind, or any related fees are the sole responsibility of the customer.

Spare parts, repairs, or replacements are warranted to be free from defects in material or workmanship for ninety (90) days or the remainder of the limited warranty period, whichever is longer.

There are no express or implied warranties except as listed above. In no event shall AnaCom be liable for special, incidental, or consequential damages arising from the use of this product, or arising out of any breach of this warranty. All express and implied warranties, including the warranties of merchantability and fitness for a particular purpose, are limited to the applicable warranty period set forth above. No employee or representative of AnaCom is authorized to modify this warranty or AnaCom's standard warranty for any product.

Non-warranty repair service is available from AnaCom for a nominal charge. Non-warranty repair service can be obtained by contacting AnaCom and requesting a return authorization number (RMA), as described above. The customer is responsible for paying the cost of the shipping to and from AnaCom for any non-warranty repairs. Non-warranty repair service will be available for any AnaCom product for a minimum of five years from the date of its first shipment from AnaCom's factory.

Appendix A. M&C Command Set

The transceiver will not respond to any command until a carriage return has been entered, terminating the command input. Multiple commands may be entered before a carriage return, using "**;**" as a delimiter.

Example:
```
TXCHAN 54; RXCHAN 36; SAVE
```

will set the transmit channel to 54, the receive channel to 36 and save these changes to a FLASH EEPROM. A transceiver response to user input can also be delimited in similar fashion.

If a command is not recognized, an error message is returned. For example, if "foo <cr>" is entered, the following is returned: ??????? foo

Alphabetical Listing of M & C Commands

M & C Commands

`ALARMS`

This command returns a list of raised alarms for the given transceiver. The possible alarms are: WARMING, FANERR, OSLOCK, TXLOCK, RXLOCK, UCMUTE, PATEMP, TXOUT, P12V, PA, N5V, OSLPLL, TXPLL, RXPLL, P5V, LNCV, PROMERR and RXOUT.

If there are no alarms then "`ALARMS  CLEAR`" is returned. Status of all individual alarms is evaluated ten times a second.

Alarms are categorized as **MAJOR** and **MINOR**, major alarms cause the external red LED on the transceiver to begin flashing. If there are no alarms, the status of the transceiver is CLEAR.

MAJOR ALARMS

OSLOCK	raised when the OFFSET PLL has lost lock
TXLOCK	raised when the TX PLL has lost lock
RXLOCK	raised when the RX PLL has lost lock
UCMUTE	raised when the hardware mute circuit on the M & C board is active (this includes external TX shutdown)
PATEMP	when the heat sink temperature exceeds approx 85°C
PA	raised when any active power amplifier voltage drops too low
N5V	raised when the -5 volt supply drops too far
LNCV	raised when the LNC supply voltage drops too far
RXOUT	raised when the RX IF output power becomes too low
PROMERR	raised if a write or erase operation in the PROM fails

MINOR

WARMING	when the warm-up software function is active upon reset or power cycling (power turn on)
FANERR	raised when fan current becomes too low (if a fan is installed)
TXOUT	raised when PA output is deemed by software to be too high
P12V	the primary 13V supply drops below a specified level
P5V	the 5V supply on the M & C board drops below a specified level
OSLOOP	OS VCXO voltage exceeds a specified range –may still be locked
TXLOOP	UC VCXO voltage exceeds a specified range –may still be locked
RXLOOP	DC VCXO voltage exceeds a specified range –may still be locked

There are alarm conditions which can shutdown the PA stage: WARMING and OSLOCK, TXLOCK, PATEMP, and N5V. When these alarms are active, the PA stage is shutdown via the supply lines which feed it. This may cause the PA alarm to be raised as well. The WARMUP alarm may be disabled with the `WARMUP` command.

ALARM_MODE [NORMAL | PROTECTION]

There are two modes for alarm relay operation: Normal and Protection. In the NORMAL mode, the relays operate as MAJOR and MINOR relays as described above. In PROTECTION mode, the relays become redefined as TX and RX summary fault relays. The relay normally called MAJOR becomes the TX relay and the relay normally called MINOR becomes the RX relay.

In normal operation, the MAJOR relay is energized so that a power fault causes the relay to relax and thus provide an alarm contact closure. The MINOR relay is normally not energized (non-alarm state). During PROTECTION operation, both relays are normally energized (no alarms). Therefore, the RX relay has reverse definition of its contacts (NO and NC) for PROTECTION operation compared to its NORMAL operation.

BAUDRATE [300 | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600]

This command sets the baudrate of the serial channel the user is presently connected to. Both serial ports have been programmed for 8 bits, no parity and 1 stop bit. These parameters are not user changeable.

CLEAR_PASSWORD PASSWORD

This command will clear an existing password. Note that the password must be given in order for it to be cleared.

CLS

In terminal mode, 25 line feeds are sent to the terminal, effectively clearing the screen. In VT52 and VT100 modes, CLS refreshes the display.

CRLF [ON | OFF]

This command is only relevant to dumb-terminal mode. It sets (or returns) carriage-return/line-feed status. "CRLF ON" will command the M & C computer to insert a line-feed in display output following a carriage return. This can be necessary to make some terminal displays operate properly. In other cases this would be redundant.

DTE

DTE0 [COMMAND]

DTE1 [COMMAND]

These commands return a string of data regarding the specified serial port. If no port is specified then the present serial port is used.

Using DTE0 and DTE1 it is possible to change some of the serial port parameters for the serial port other than the one the operator is presently connected to. This could be especially useful for baud rate. Example of operator input from a terminal attached to serial port 0:

```
dte1 baudrate 19200
```

The valid commands which can be used in this fashion for the opposing serial port are BAUDRATE, TERMTYPE, ECHO, CRLF, MODEM_MODE, PC_MODE, and TERMINAL_MODE.

See the explanations for those commands elsewhere in this appendix.

ECHO [ON | OFF]

This command is only relevant in dumb-terminal mode. It sets (or returns) character echo mode. For example, if the operator is running a terminal emulation program on his PC with local echo disabled, type

        ECHO ON

to enable echo back from the M & C computer. If the terminal is displaying doubled up characters, use ECHO OFF.

EXTREF [ON | OFF]

If ON, the ODU is programmed to accept an optional external 10MHz frequency reference source. If one is not present, a new alarm, EXTREF is raised. When an external reference signal appears while the EXTREF alarm is raised, the alarm will be dropped.

If OFF is given, then the internal source is used regardless of whether the optional reference source switch is indicating an external source is present or not.

The default setting is EXTREF OFF.

INFO

Returns information about software and hardware revision numbers.

LABEL [TEXT]

This command erases or [sets] an alphanumeric string up to 32 characters long that the user can use to "title" or describe the purpose of the given ODU.

LOCK PASSWORD

With this command most M & C functions will be locked and further user access will be denied until the UNLOCK command is given. Those commands which remain user accessible are: UNLOCK, CLS, ALARMS, and LIST.

If a password has been established with the SET_PASSWORD command then that password must be used with the LOCK command. If there is no established password (if CLEAR_PASSWORD has been used, for instance), then M & C functions will be locked; but they can be unlocked without a password.   There are two solutions to the problem of having a locked unit and/or a forgotten password:
    1. The unit can be reset using the internal DIP switches. See Appendix D.
    2. If the unit is attached to a modem, and presently accessible remotely,
        telephone ANACOM.

MODE

This command returns either MODEM_MODE or PC_MODE. Example: MODE might return MODE MODEM_MODE when the user is connected to the unit via a phone line and a Hayes compatible modem.

MODEM_MODE

This command is used to tell the M & C computer that a Hayes compatible modem is attached to the serial port. The way this would be used is a user would enter this command from a PC using a null modem cable, then disconnect the PC and attach a modem directly to the port via a modem cable. RX, TX, DCD and signal GND lines must be properly connected.

Once MODEM_MODE is activated, the M&C computer will no longer display dumb terminal display updates or generate packets in packet mode until the DATA-

CARRIER_DETECT line becomes active, indicating the modem is off-hook and connected to another modem.

MODEM_STRING [TEXT]

When the M & C computer is in modem mode it will periodically send a Hayes compatible initialization string of up to 40 characters to the modem to make sure it is properly configured. The user can get [set] this string via this command. The default string as part of factory settings is:

MODEM_STRING AT S0=1 &C1 &S0 \Q0 E0

MSG TEXT

This command allows an operator connected to one serial port to send an ASCII message to someone connected to the other port. A message received will appear on the other operator's screen prefixed with the prompt MESSAGE>.

OFFSET   [TXGAIN | RXGAIN]   [number]

This command gets [sets] a floating point offset for TX or RX calibration tables. The valid arguments are: TXGAIN, RXGAIN.

The default values for these offsets is 0. Example usage:

OFFSET TXGAIN 2

The result of this is that the output would be 2 dB greater than what would otherwise be transmitted. In other words, the TX gain range would be shifted down by two decibels. If a TXGAIN of 72 dB were requested, the calibration data interpolation would be done internally with the value of 74 dB. If the user measures the TX gain with a power meter and finds that gain is high by 1.5 dB, then he might enter:

OFFSET TXGAIN −1.5

PC_MODE

This is the converse of MODEM_MODE. At any time, the user may type PC_MODE and the M & C computer will again behave as if a PC or network is directly attached to the serial port rather than a modem.

PORT_TO_PORT   [ON|OFF]

This command sets (gets) the status of the port_to_port function. When active on, then function re-transmits all serial port data from COM0 to COM1 and also from COM1 to COM0 regardless of data content. If the M & C interprets data as a legitimate command then the command is acted on. Otherwise the data is ignored by the M & C. When ON, the M & C does not issue ??????? when data is received which does not conform to a proper command.

WARNING: When this function is ON, the M & C will not automatically change baudrate to 1200 when the external data is changed to 1200.

REFRESH

This command refreshes the RF hardware to presently chosen receive and transmit channels and gain settings.

RESET

This command resets the M & C computer. Power-on time will reset to zero. Warning: RESET will shut down the transceiver momentarily.

RXCHAN [number | INC | DEC]

This command gets [sets] the receive channel number. See Appendix E for channel frequency information. *NOTE: Channel 0 is not a valid selection.*

RXGAIN [number]

This command gets [sets] receiver gain. The acceptable range is a two or three digit integer between 85 and 100 (dB).

SAVE

This command saves present M & C operating parameters to a FLASH EEPROM.

SET_PASSWORD PASSWORD PASSWORD

The M & C computer supports password control of M & C functions. One potential use of this feature would be for leaving an ODU connected to a modem on an open telephone line. A valid password must be an alphanumeric string with no imbedded blanks, and between four and eight characters long inclusive. It must be given twice to ensure accuracy.

An existing password must first be cleared before setting a new password. This is done with the CLEAR_PASSWORD command.

TERMTYPE [TTY | VT52 | VT100] (OLD UNITS,OBSOLETE)

This command is only relevant to dumb-terminal mode. It sets (or returns) the terminal emulation mode.

TTY Terminal Mode: this is a basic 80 character by 25 line ASCII "dumb" terminal mode.

VT52 Mode: This is a standard terminal emulation, more intelligent than TTY.

VT100 Mode: This in an enhanced communications terminal emulator with a fixed display window.

There are some control characters that will be filtered by the terminal driver when the

M & C computer is in terminal mode. These control characters will be ignored in packet mode.

CTRL-E: This will erase the screen, similar to the CLS command.

CTRL-R: This repeats execution of the last Carriage return terminated command.

CTRL-Q: refer to the description of CTRL-S.

CTRL-S: Periodic screen updates will be squelched until the user has finished entering present command or hits CTRL-Q.

CTRL-BS: (Backspace) The present input command will be erased

TX   [ON | OFF]
TXREQ   [ON | OFF]
TXREQUEST [ON | OFF]

This command requests activation of the transmitter. This is done by enabling the PA supply voltages. TXREQ ON will indicate the operator's desire to begin transmission. With no argument TXREQ simply return its present state as ON or OFF. Note that the unit will be shipped with TXREQ set to OFF.

Exactly when are we "ON AIR?" The answer is when TXREQ is ON, the hardware alarm TXMUTE is clear, and the transmitter is not software inhibited to allow the crystal reference oscillator time to warm-up at power-on. See the WARMUP command for details.

TXCHAN [number]

 This command gets [sets] the transmit channel number. The acceptable range depends upon model type. See Appendix E for channel frequency information. *Channel 0 is not a valid selection.*

TXFREQ [number]

 This command gets [sets] the transmit channel number. The acceptable range depends upon model type. The [number] is the actual transmit frequency output with TXIF at 70 MHz [or 140 MHz].

TXGAIN [number | INC | DEC]

 This command gets [sets] or returns the transmit power amplifier gain. The acceptable range of the number is dependent upon model.

UNLOCK PASSWORD

 This command will unlock M & C functions for user access.

UTIMER [NUMBER]

 This command is only relevant to dumb-terminal mode. It sets (or returns) the number of seconds between automatic display updates. Note that changing baud rate will automatically revert to a default appropriate for that particular baudrate.

WARMUP [ON | OFF | CANCEL]

 Upon transceiver power-up, a 5 minute period will pass to allow the reference oscillator crystal oven sufficient warm up time. The unit is shipped with this flag set OFF, but can be changed by the user. Because there is no way for the M & C computer to know how long it has been off the air, a reset or momentary loss of power will cause a warm-up countdown to occur when the feature is in use. WARMUP CANCEL will terminate a warm-up countdown and immediately enable the transmitter.

TXD; TXDAC [NUMBER]

 This command bypasses the transmit numerical gain compensation by the M&C. It will issue [number] 1 to 255 to the TX gain control element. This is for troubleshooting use only and transceiver should not be left in this mode as the numerical compensation (temp. + freq.) would be disabled.

RXD; RXDAC [NUMBER]

 This command bypasses the receive numerical gain compensation by the M&C. It will issue [number] 0 to 255 to the RX gain control element. This is for troubleshooting use only and transceiver should not be left in this mode as the numerical compensation (temp. + freq.) would be disabled

Appendix B. Alarm List

The RackSat Converter features sophisticated internal monitoring. If an abnormal condition occurs, a description of the abnormality is sent to the operator's console.

These alarms are divided into two categories: major alarms and minor alarms. When a TX major alarm condition is detected, the transmitter is immediately pulled OFF the air. An advisory message is sent to the operator and the red ALARM LED begins flashing. Most major alarms are generated directly by hardware detectors inside the unit. Minor alarms do not disable the transmitter or light the LED, but still cause an advisory message on the serial port. Most minor alarms are generated by M & C software routines that look for out of tolerance conditions.

MAJOR ALARMS

OSLOCK	the OS PLL is not locked
TXLOCK	the TX PLL is not locked
RXLOCK	the RX PLL is not locked
PATEMP	the PA heat sink temperature becomes excessive
N5V	the –5 volt supply is out of tolerance
LNCV	the LNC supply voltage is too low
PROMERR	the M & C PROM checksum fails
RXOUT	the RX output noise floor becomes too low
-	external power loss

MINOR ALARMS

WARMING	the warm-up software function is enabled upon reset or power-up
TXMUTE	when the TX is disabled (internally by alarms or externally)
P12V	the primary +13V supply is too low
P5V	the +5V supply on the M&C board is too low
OSLPLL	OS VCO voltage is out of range — can still be locked
TXPLL	UC VCO voltage is out of range — can still be locked
RXPLL	DC VCO voltage is out of range — can still be locked

ALARMS THAT TURN OFF TRANSMITTER

WARMING	software settable to mute the TX during the warmup period, or not
PATEMP	PA temperature is excessive. Automatically resets when cooler
TXMUTE	when the TX is disabled (internally by alarms or externally)
OSLOCK	OS PLL is not locked
UCLOCK	UC PLL is not locked
N5V	the –5V supply failed. Probable PA damage if PA is not shut down.

For situations when the ALARM_MODE is set to PROTECTION, the alarm relays are re-defined as TX and RX alarm relays instead of MAJOR and MINOR. The M & C software still considers the alarms as either major or minor and will communicate alarms via the serial ports and the front panel red LED as major or minor.

In PROTECTION mode, the alarm relays will engage based on the following alarm list:

TX ALARMS
OSLOCK	the OS PLL fails to lock
TXLOCK	the TX PLL fails to lock
PATEMP	the PA temperature is too high
N5V	the –5V supply is out of tolerance
-	EXTERNAL POWER LOSS

RX ALARMS
LNCV	LNC voltage too low
OSLOCK	OS PLL is not locked
RXLOCK	RX PLL is not locked
RXOUT	RX output noise floor is too low (low gain)
-	external power loss

Appendix C. Satellite Channel Listings

EC-Band
For channels 1 to 501
RX MHz = 3699+(channel)

SEC Band
For channels -75 to -1
RX MHz = 3700+(channel)
TX MHz = 5925+(channel)

For channels 1 to 801
RX MHz = 3699+(channel)
TX MHz = 5924+(channel)

XC Band
For channels 1 to 601
RX MHz = 4499.5+(channel/2)
TX MHz = 6724.5+(channel/2)

PC Band
For channels 1 to 501
RX MHz = 3499+(channel)
TX MHz = 6424+(channel)

RC Band
For channels 1 to 501
RX MHz = 3649+(channel)
TX MHz = 5974+(channel)

LMC Band
For channels -75 to -1
RX MHz = 3450+(channel)
TX MHz = 5775+(channel)

For channels 1 to 501
RX MHz = 3449+(channel)
TX MHz = 5774+(channel)

Ku-Band
For channels 1 to 501
TX MHz = 13999+(channel)

EKU-Band
For channels -250 to -1
TX MHz = 14000+(channel)

For channels 1 to 251
TX MHz = 13999+(channel)

SEKU-Band
For channels -250 to -1
TX MHz = 14000+(channel)

For channels 1 to 501
TX MHz = 13999+(channel)

Ku-Band, EKU-Band, SEKU-Band
For channels 1 to 1801
RX MHz = 10949+(channel)