SFC2900A

Synthesized Frequency Upconverter

Installation and Operation Manual

TM108
Revision 1.2

Radyne Inc. • 3138 E. Elwood St. • Phoenix, AZ 85034 •(602) 437-9620 • Fax: (602) 437-4811 • www.radn.com

RADYNE

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WP

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Before a warranty repair can be accomplished, a Repair Authorization must be received. It is at this time that Radyne Inc. will authorize the product or part to be returned to the Radyne Inc. facility or if field repair will be accomplished. The Repair Authorization may be requested in writing or by calling:

Radyne Inc.

3138 E. Elwood St.
Phoenix, Arizona 85034 (USA)
ATTN: Customer Support
Phone: (602) 437-9620
Fax: (602) 437-4811

Any product returned to Radyne Inc. for examination must be sent prepaid via the means of transportation indicated as acceptable to Radyne Inc. Return Authorization Number must be clearly marked on the shipping label. Returned products or parts should be carefully packaged in the original container, if possible, and unless otherwise indicated, shipped to the above address.

Non-Warranty Repair

When a product is returned for any reason, Customer and its shipping agency shall be responsible for all damage resulting from improper packing and handling, and for loss in transit, not withstanding any defect or nonconformity in the product. By returning a product, the owner grants Radyne Inc. permission to open and disassemble the product as required for evaluation. In all cases, Radyne Inc. has sole responsibility for determining the cause and nature of failure, and Radyne Inc.'s determination with regard thereto shall be final.

Preface

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This manual provides installation and operation information for the Radyne SFC2900A Synthesized Frequency Upconverter. This is a technical document intended for use by engineers, technicians, and operators responsible for the operation and maintenance of the SFC2900A.

Conventions

Whenever the information within this manual instructs the operator to press a pushbutton switch or keypad key on the Front Panel, the pushbutton or key label will be shown enclosed in "less than" (<) and "greater than" (>) brackets. For example, the Reset Alarms Pushbutton will be shown as <RESET ALARMS>, while a command that calls for the entry of a ‘7’ followed by ‘ENTER’ Key will be represented as <7,ENTER>.

Cautions and Warnings

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

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

A note icon identifies information for the proper operation of your equipment, including helpful hints, shortcuts, or important reminders.

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Record of Revisions

Revision Level	Date	Reason for Change
1.0	9-28-04	Initial Release
1.1	4-27-05	Revised gain.
1.2	2-27-06	Revised Section 4.4.2.4 and Appendix B

Comments or Suggestions Concerning this Manual

Comments or suggestions regarding the content and design of this manual are appreciated. To submit comments, please contact the Radyne Inc. Customer Service Department.

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Introduction

1

1.0 Description

This manual discusses the Radyne ComStream Corporation SFC2900A Synthesized Frequency Upconverter (Figure 1-1). It is a high-quality, rack-mounted satellite upconverter that is intended for use in medium to large earth station installations where multiple carrier uplinks need to be established.

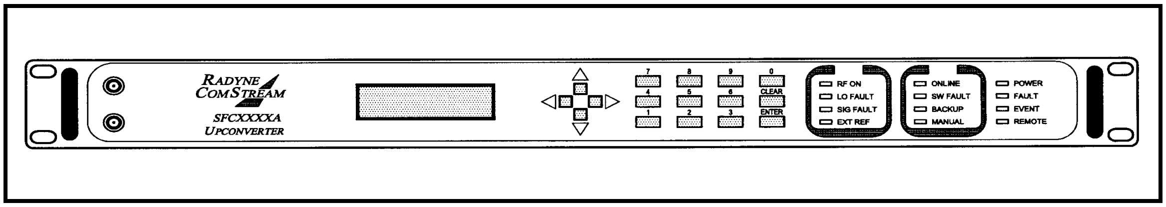

Figure 1-1. SFC2900A Upconverter Front Panel

The SFC2900A Upconverter is a Ka-Band, 125 kHz resolution synthesized satellite upconverter capable of converting either a 36 MHz bandwidth, 70 MHz IF input or optionally a 72 MHz bandwidth, 140 MHz input to a Ka-Band uplink in the range of 28000 - 31000 MHz in bands.

All of the configuration, monitor, and control functions are available at the front panel. Operating parameters such as frequency, channel, gain, and gain offset can be readily set and changed at the front panel. Additionally, all functions can be accessed with a terminal or personal computer via a serial link (RS-232, RS-485, or Ethernet) for complete remote monitoring and control (M&C) capability. Extensive fault monitoring with masking capability, along with time and date stamped event storage is available.

The units monitor local oscillator (LO) phase-locked loop faults in the converter at all times during operation. If a fault is detected, the converter immediately goes into the Standby Mode.

The RF Hardware consists of a broadband synthesizer, a fixed frequency phase locked oscillator, and the first and second converter modules. The broadband synthesizer provides the synthesized local oscillator for the conversion from L-Band to RF output. The first mixer converts the 70 or 140 MHz IF input to L-Band. A fixed frequency IFLO performs this frequency conversion.

A 20 dB gain control attenuator at the RF output controls the power out of the converter. This attenuator is capable of 0.2 dB resolution through a software linear interpolation of 1 dB calibration values.

The SFC2900A Upconverter has been designed to provide performance that meets or exceeds all industry standards in effect today for satellite communications earth station frequency converter equipment found worldwide. In addition to providing robust performance, the SFC2900A Upconverter is loaded with features that will provide ease of integration and operation.

Installation

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2.0 Installation Requirements

SFC2900A Upconverter is a designed to be installed within any standard 19 inch equipment cabinet or rack, and requires 1 Rack Unit (RU) mounting space (1.75 inches, 4.44 cm) vertically and 19 inches (48.26 cm) of depth. Including cabling, a minimum of 20 inches (50.8 cm) of rack depth is required. The power connection is located on the left, and cabling enters from the center and right when viewed from the rear of the unit. Data and control cabling can enter from either side. The unit can be placed on a table or suitable stable surface if required.

! CAUTION!!

Before initially applying power to the unit, it is a good idea to disconnect the transmit output from the operating station equipment. This is especially true if the current SFC2900A Upconverter configuration settings are unknown, where incorrect setting could disrupt existing communications traffic.

! WARNING!!

There are no user-serviceable parts or configuration settings located inside the SFC2900A Upconverter Chassis. There is a potential shock hazard internally at the power supply module. DO NOT open the SFC2900A Chassis under any circumstances.

2.1 Unpacking

The SFC2900A Upconverter was carefully packaged to avoid damage and should arrive complete with the following items for proper installation:

SFC2900A Upconverter Unit
Power Cord, 6 foot with applicable AC Connector (for North America)
Installation and Operation Manual

2.2 Removal and Assembly

SFC2900A Upconverter is a shipped fully assembled and do not require removal of the covers for any purpose in installation.

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

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

2.3 Mounting Considerations

When mounted in an equipment rack, adequate ventilation must be provided. The ambient temperature in the rack should be between 10°C and 35°C, and held constant for best equipment operation. The air available to the rack should be clean and relatively dry.

2.4 Initial Power-Up

Turn the unit 'ON' by placing the rear panel switch (above the power entry connector) to the 'ON' position. Upon initial and subsequent power-ups, the SFC2900A Upconverter will test itself and several of its components before beginning its main Monitor & Control Program. The Event Buffer LED will illuminate and the unit will log setup events upon power-up. This allows the user to tell if there was an accidental power failure or if the power was manually cycled for any reason while the unit was left unattended. These events can be cleared after setup. If any failure is detected, an Alarm LED will illuminate.

Theory of Operation

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3.0 Theory of Operation

The SFC2900A Upconverter has been designed to minimize the amount of hardware in the system while maximizing performance. Spurious performance in the Upconverter is critical and in particular, LO related spurious In-Band is nonexistent.

The SFC2900A Upconverter is a double conversion microwave Upconverter. The basic block diagram is shown in Figure 3-1.

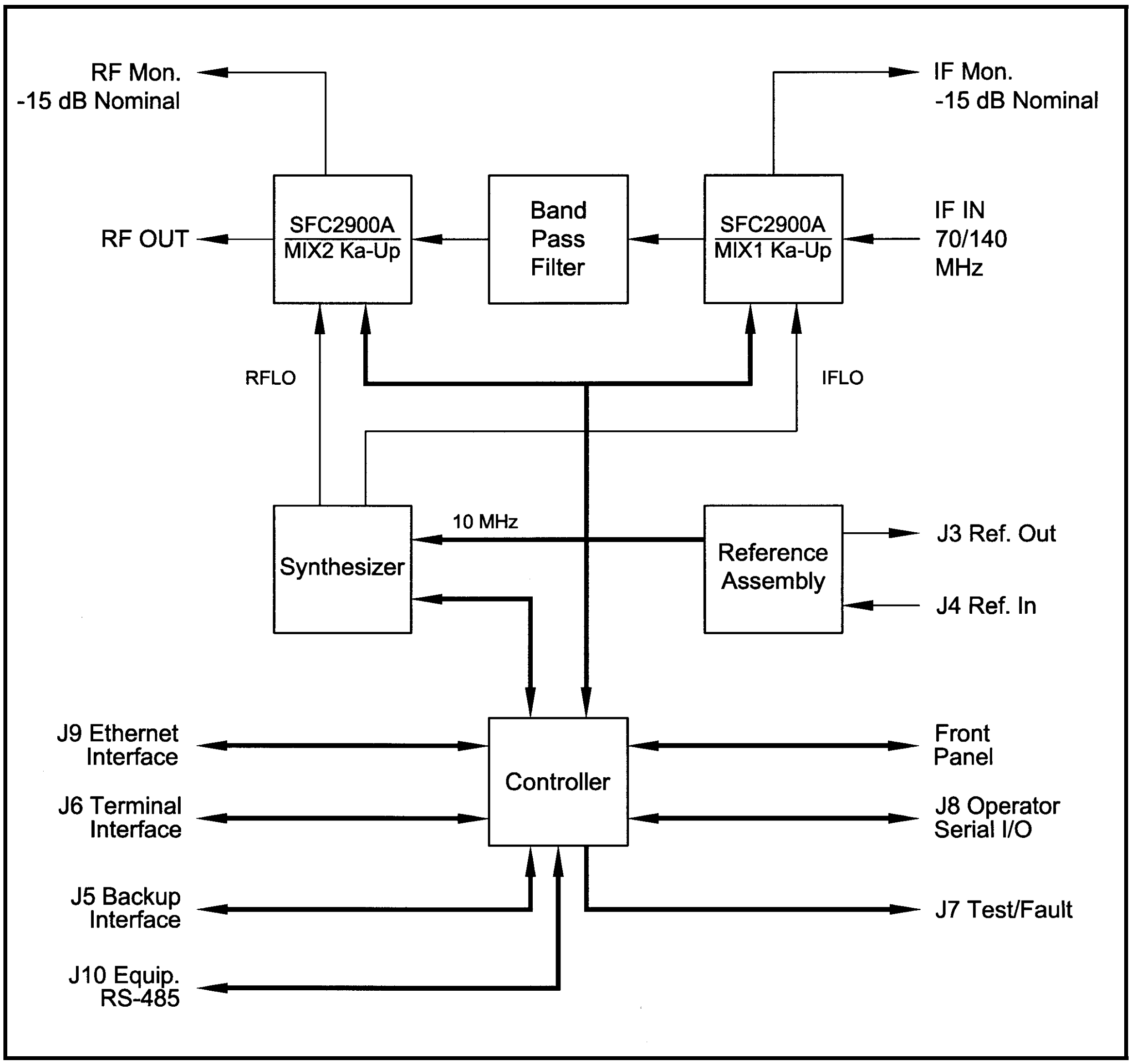

Figure 3-1. SFC2900A Upconverter Block Diagram

User Interfaces

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4.0 User Interfaces

There are four User Interfaces available for the SFC2900A Upconverter. These are:

- Front Panel
- Remote Port
- Terminal Port
- Ethernet Port

4.1 Front Panel User Interface

The Front Panel of the SFC2900A Upconverter allows for complete monitor and control (including but not limited to operation, calibration, and testing) of all parameters and functions via Monitoring Ports, a Keypad, LCD Display and Status LEDs.

The front panel layout is shown in Figure 4-1, showing the location and labeling of the front panel. The front panel is divided into four functional areas: Monitoring Ports, LCD Display, Cursor Control Arrows, Numeric Keypad, and LED Indicators. Each is described below. Table 4-1 lists each of these areas. They are further described below.

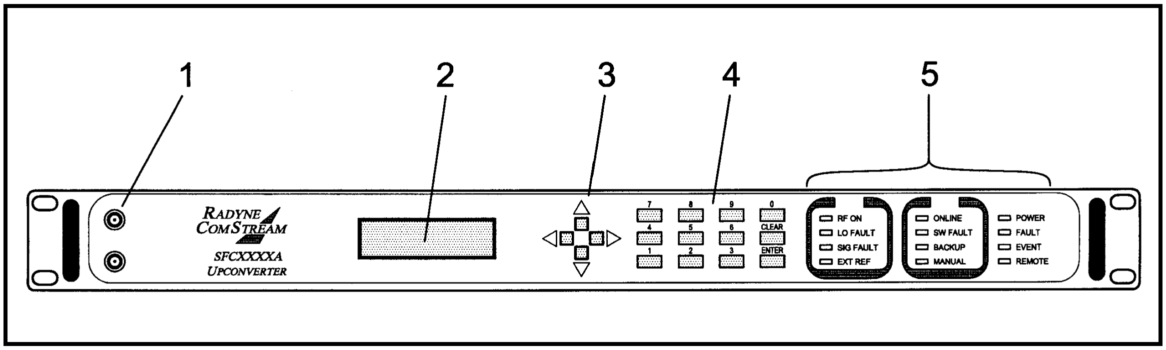


Figure 4-1. SFC2900A Upconverter Front Panel Controls and Indicators

Table 4-1. Front Panel User Interface		
Item No.	**Description**	**Function**
1	Monitoring Ports	Allow monitoring of the RF and IF Signals.
2	LCD Display	Displays SFC2900A Upconverter operating parameters and configuration data.
3	Cursor Control Arrows	Controls the left, right, up, and down motion of the cursor in the LCD Display window.
4	Numeric Keypad	Allows entry of numeric data and Clear and Enter Function Keys.
5	LED Indicators	Displays SFC2900A Upconverter operating status.

4.1.1 Monitoring Ports

Refer to Section 5.12.

4.1.2 LCD Display

The front panel display is a 2 line by 16-character LCD display. The display is lighted and the brightness can be set to increase when the front panel is currently in use. The LCD display automatically dims after a period of inactivity. The display has two distinct fields showing current information. The upper field shows the current parameter being monitored, such as 'FREQUENCY (GHz)' or 'CHNL GAIN (dB)'. The lower field shows the current value of that parameter. The LCD display is a single entry window into the large matrix of parameters that can be monitored and set from the front panel.

4.1.3 Cursor Control Arrows

Table 4-2. Cursor Control Arrow Keys

Key	Function
Left/Right Arrow Keys (→), (←)	The Left/Right Arrow Keys are used to move through the Menu structure. The Left/Right Arrow Keys are also used to move the cursor to a specific digit in a number field. No changes in the values or status can be executed from the left/right cursor movement.
Up/Down Arrow Keys (↑), (↓)	The Down Arrow Key is used to move from a Menu screen to the selections or submenus beneath that Menu. The Up Arrow does the reverse, moving from a submenu or selection to a higher-level Menu. The Up/Down Arrow Keys are also used to change the value of some parameters. Some Menu items, such as SYSTEM<CONTROL MODE, contain a list of possible settings. The Arrow Keys are used to scroll through the list until the desired setting is displayed. Similarly, these keys toggle the ± sign of any signed parameters. <ENTER> is then used to execute the selection. For numerical parameters, such as CONVERTER<FREQUENCY(GHz), the Arrow Keys can be used to scroll through the possible values of each particular digit. The Left/Right Keys are used to move the cursor to the desired digit. To execute a change, <ENTER> must be pressed.

4.1.4 Front Panel Keypad

The front panel keypad consists of two areas: a 10-key numeric entry with 2 additional keys for the ‘Enter’ and ‘Clear’ function. The second area is a set of ‘Arrow’ or ‘Cursor’ keys (↑), (↓), (→), (←), used to navigate the parameter currently being monitored or controlled. Table 4-3 describes the key functions available at the front panel.

Table 4-3. Front Panel Keypad	
Key	**Function**
0 to 9	The Number Keys are used to change numeric values in the value field of the LCD display.
CLEAR	If pressed before <ENTER> during a parameter change, the CLEAR Key will cause that parameter to return to its original value.
ENTER	The Enter Key will cause changes to Frequency, Status, and other operator-selected parameters to be executed. It also causes the status of the converter to be saved into non-volatile memory.

4.1.5 LED Indicators

There are twelve (12) LEDs on the SFC2900A Upconverter Front Panel to indicate the operation status (refer to Table 4-3).

Table 4-3. Front Panel LED Indicators		
LED	**Color**	**Function**
POWER	Green	When illuminated, indicates the presence of primary power and that the On/Off Switch located on the rear of the chassis is in the On Position.
FAULT	Red	When illuminated, Indicates a common fault (internal hardware).
EVENT	Yellow	When illuminated, indicates that an event (may be a fault or startup sequence) has occurred and is stored in the Event Buffer along with a date/time stamp.
REMOTE	Green	When illuminated, indicates that the converter is in Remote Mode. In this mode, the unit settings can only be modified and controlled via a remote interface.
ONLINE	Green	When illuminated, indicates that the converter is online (no faults).
SW FAULT	Red	No Function
BACKUP	Yellow	No Function
MANUAL	Yellow	No Function
RF ON	Green	When illuminated, indicates that the converter RF Output is turned on.
LO FAULT	Red	If the Synthesized LO or IFLO System of the converter indicates an out-of-lock condition, the LO Fault LED will illuminate. At this time, the Summary Fault Relay Contacts will latch. If the LO Fault was due to an Intermittent Fault Condition, the LO Fault will flash at one-second intervals, and fault checked may be reset.
SIG FAULT	Yellow	Signal Faults are used in switch configuration to indicate switch status (when in the Backup Mode).
EXT REF	Yellow	This LED illuminates when an external 10 MHz reference signal has been applied to the converter. A LO fault may occur when the external reference is applied or removed. This indicates that a change in the reference has occurred. This fault can be cleared with a soft reset.

4.2 Front Panel Control Screen Menus

The complete set of SFC2900A Upconverter Front Panel Control Screens are contained within the following Main Menus:

4.2.1 Main Menus

Converter Menu Options and Parameters

Switch Menu Options and Parameters

Monitor Menu Options and Parameters

Alarms Menu Options and Parameters

System Menu Options and Parameters

Test Menu Options and Parameters

4.2.2 Converter Menu Options and Parameters

FREQUENCY (GHz):

{28000 - 29000 MHz} Ka-Band, Plan A
{29000 - 30250 MHz} Ka-Band, Plan B
{30000 - 31000 MHz} Ka-Band, Plan C
Sets the RF output frequency. The available range depends upon the Converter model.

CHNL GAIN (dB):

{+5.0 to +30.0}
Sets the Channel Gain in 0.2 dB steps.

CARRIER CNTRL:

{ON, OFF}
Allows the user to turn the carrier on/off.

INPUT ATTEN:

{0 - 30}
Sets the input attenuation in 0.2 dB steps.

CURRENT CHNNL:

{01 – 30}
Selects the current channel of the unit. Each channel allows entering of an independent set of parameters (Frequency, Gain, etc.). For example, Channel 1 Frequency might be set to 28 GHz and Channel 2 could be set to 29 GHz. Any of the other parameters could be different as well. The advantage is that by changing the channel number, a completely different setup can be achieved.

4.2.3 Monitor Menu Options and Parameters

REFERENCE: **{INTERNAL, EXTERNAL}**
Indicates the reference source of the unit. The SFC2900A Upconverter will detect a valid external reference source when it is connected to J4 on the rear panel and automatically select 'External'. Likewise, when no signal (or a signal not meeting the Reference input specification) is connected to J4, the unit will switch to the 'Internal'. The process is completely automatic, and it is independent of M&C control.

MON VOLTAGES:

RF DETECTOR V: RF detection not used on Ka-Band model.

IF DETECTOR V: Monitors the voltage of the IF Detector.

DAC ATTEN V: Monitors the voltage of the Output Attenuator DAC.

VCC1 VOLTAGE: Displays the voltage of the Controller PCB Microprocessor +5V.

+9V VOLTAGE: Displays the voltage of the System Supply +9V.

+15V VOLTAGE: Displays the voltage of the System Supply +15V.

- 15V VOLTAGE: Displays the voltage of the System Supply -15V.

MON DACS:

MIXER DAC VAL: Displays the decimal value written to the RF Attenuation DAC. This value is not under user control.

MIXER DAC VOL: Displays the expected voltage output of the RF Attenuation DAC.

REF DAC VALUE: Displays the decimal value written to the VCO Reference Control DAC. This value is entered by the user in the TEST\REF OFFSET Menu, and cannot be changed from this Menu.

REFDAC VOLTAGE: Displays the expected voltage output of the VCO Reference Control DAC.

EVENT BUFF The Event Buffer stores any faults that occur, including start up procedures, along with a time/date stamp.

PRESS CLR TO ERASE EVENTS: Pressing the <CLEAR> when this screen is displayed will erase all of the events currently stored in the Event Buffer.

4.2.4 Alarms Menu Options and Parameters

For the alarms listed below, the PASS/FAIL displayed is only an indicator and cannot be changed by the user. The MASK/UNMASKED Field, however, does allow user input. Masking an alarm will cause it to be ignored by the unit if that alarm fails. The LCD will display FAIL, but the unit will otherwise not respond to the Fault. This function can aid in troubleshooting system problems.

ACTIVE ALRMS:

MAJOR:

LO FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Reports an alarm when the Synthesizer Module indicates an unlocked condition.

SIGNAL FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Reports a failure when there is an IF Detect Fault.

MINOR:

RF DTECT FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a failure if the internal block converter bias voltage fails.

IF DTECT FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a failure when the detected IF signal falls below a fixed threshold.

COMMON:

CPLD FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a fault if the Controller PCB Microprocessor reads back an unexpected value from the CPLD. This is a check performed on system power up.

FPGA FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a fault if the Controller PCB microprocessor reads back an unexpected value from the FPGA. This is also a check performed on system power up.

EEPROM FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a fault if the Controller PCB microprocessor reads back an unexpected value from the EEPROM. This is checked on system power-up, but is also monitored during normal operation.

REFERENCE ACT: **{PASS, FAIL/UNMASKED, MASKED}**
A failure indicates that there is no signal connected to the External Reference input on the back panel. In this condition, the Converter uses the internal reference oscillator.

VCC1 FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a fault if the +5V Supply Voltage of the Controller PCB Microprocessor is outside a fixed range.

+9V FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a fault if the +9V System Supply Voltage is outside a fixed range.

+15V FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a fault if the +15V System Supply Voltage is outside a fixed range.

- 15V FAULT: **{PASS, FAIL/UNMASKED, MASKED}**
Indicates a fault if the -15V System Supply Voltage is outside a fixed range.

LATCHED ALRM: The Latched Alarm Menu structure is identical to the Active Alarms. However, if any alarm is triggered it will be Latched. For example, if an External Reference is disconnected from the rear panel, an LO Fault will be reported while the LO regains lock. After the LO recovers, even though the Active Alarm no longer reports the alarm, the Latched Alarm will still display <FAIL>. In other words, the alarm was latched.

CLEAR ALARMS (ENT = Y,CLR = N): Pressing <ENTER> will clear all of the Latched Alarms currently stored.

4.2.5 System Menu Options and Parameters

CONTROL MODE: **{FT PANEL, TERMINAL, COMPUTER, ETHERNET}**
Sets the Control Mode of the Upconverter.

DATE: Allows the user to enter the date in DD/MM/YY format.

TIME: Allows the user to enter the time in HH:MM:SS format.

FRONT PANEL:

LEVEL: **{OFF, LOW, MID, HIGH}**
Allows the user to set the backlight intensity of the LCD display.

TIMEOUT: **{00 - 99}**
Allows the user to set the length of inactive time (in seconds) after which the display's backlight shuts off automatically. Entering 00 allows the backlight to remain on continuously.

KEY CLICK: **{OFF, ON}**
Allows the user turn an audible key click on/off.

TERMINAL:

TERM. BAUD:	**{2400, 9600, 19200}** Allows the user to set the baud rate for terminal port communication.
EMULATION:	**{ADDS VP, VT100, WYSE 50}** Allows the user to set the terminal emulation mode.
ECHO MODE:	**{OFF, ON}** Allows the user to control whether the input at the terminal is echoed back.

REMOTE PORT:

REMOTE PRTOCOL:	**{ASCII, RLLP}** Allows the user to set the remote port communication protocol.
REMOTE ADDR:	**{32 - 255 RLLP, 1 – 255 ASCII}** Allows the user to set the communication address of the remote port.
REMOTE BAUD:	**{2400, 9600, 19200}** Allows the user to set the baud rate for remote port communication.
ECHO MODE:	**{OFF, ON}** Allows the user to control whether the input at the terminal is echoed back. Only valid in Remote ASCII Mode.
REMOTE LINE:	**{RS-232, RS-485}** Sets the interface type of the remote port.

HW/FW CONFIG:

FIRMWARE:	**FW/XXXX - - Version Y.YY** Displays the revision number of the installed M&C Firmware (where XXXX is the firmware number and Y.YY is the version). **FW/XXXX - - 19DEC2002** Displays the revision number and release date of the installed M&C Firmware.
CPLD VERSION:	**{x.x}** Displays version number of installed CPLD Firmware.
FPGA VERSION:	**{x.x}** Displays version number of installed FPGA firmware.

HARDWARE:

CONVRTR CONFIG: **{STAND ALONE}**
No function for Ka-Band.

CONVERTER ID: **{0 - 255}**
Always set to 255 for a stand-alone configuration.

CONVERTER TYPE: **{UPCONVERTER}**
Indicates that the unit is an Upconverter.

CONVERTER BAND: **{KA-BAND}**
Indicates that the unit is a Ka-Band Converter.

FREQUENCY TYPE: **{70 MHz, 140 MHz}**
Indicates the IF type of the Converter.

SYNTHESIZER: **{MFS-12.75, MFS-13.25, MFS-13.75}**
Displays the model number of the unit's installed synthesizer. The frequency range of each model is given below:

Model	IF LO Frequency	Frequency Range	
		Low	High
MFS 12_75	2430 MHz	12.75 GHz	13.30 GHz
MFS 13_25	2430 MHz	13.25 GHz	13.875 GHz
MFS 13_75	2430 MHz	13.75 GHz	14.25 GHz

DEBUG MODE: Password protected. Enables additional Menus for debugging purposes.

LOAD DEFAULT: Password protected. Configures the Converter with a set of default parameters. Refer to Section 4.5 for actual default settings.

SNMP DEFAULT: Password protected. Configures the Converter SNMP (Ethernet Interface) settings to default values.

4.2.6 Test Menu Options and Parameters

REF OFFSET: **{0000 - 4095}**
The REF OFFSET field of the Test Menu allows the operator to adjust the frequency of the 10 MHz High Stability Internal Reference and vary the output of the Synthesized RF LO by $\pm$ 50 parts per billion (ppb). One part per billion represents a change of 1 Hz per GHz (1 billion Hz) of output frequency. Thus, each unit of ppb will allow a change in accuracy of the converter of 1×10^{-9}.

The exact frequency of the LO Output can be calculated from the displayed frequency on the converter front panel as follows:

LO = (Tx Freq. - 2500 MHz)/2

The RF Monitor output can be measured with a frequency counter of known calibration.

The stability of the 10 MHz Reference is related to the temperature of a 10 MHz crystal inside the unit. A proportionally controlled oven around the crystal maintains the temperature in the oven to 0.1°C. In addition, the precise temperature that the oven maintains has been determined empirically for each crystal during manufacturing. As long as the ambient temperature stays within limits (0 - 50°C) the reference will maintain stability of greater than 1 x 10^{-8} (refer to Figure 4-2).

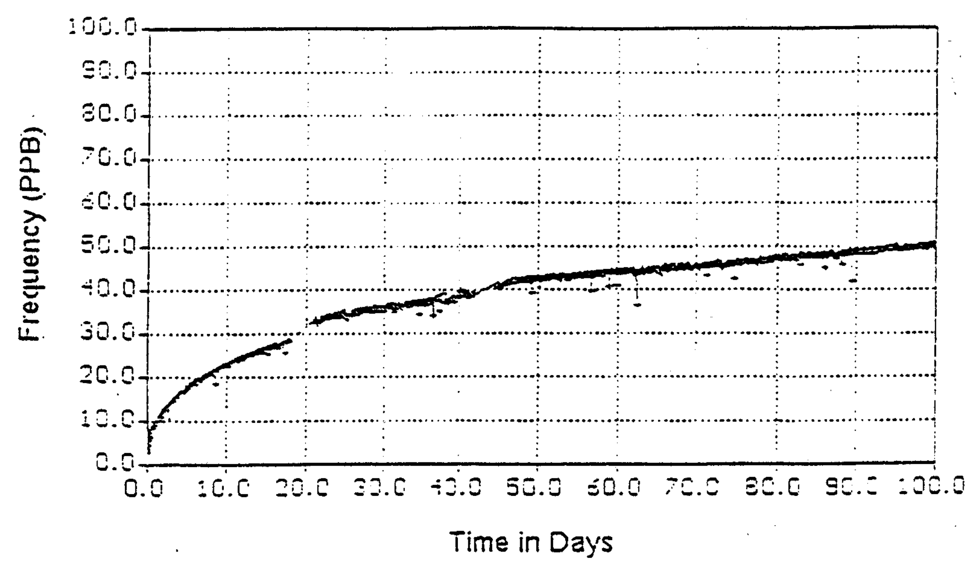


Figure 4-2. Typical Reference Aging vs. Time

Long-term stability of the reference is affected by factors other than temperature. Over days and months, the frequency of the reference will drift at a rate specified as aging. Typical aging rates of 1 to 5 parts in 10^{-10} per day are typical in a crystal that has been stabilized for a few weeks. The first month of operation for any crystal is a time where drift due to aging can be excessive.
The typical aging curve provides insight into the exponential decay in aging rate for a 10 MHz Reference. Converters shipped from the factory have had their reference oscillator aged for a minimum of 30 days and in addition, the aging rate has been verified in the final week to within tolerance. However, converters that have been in storage or powered off for a period of several weeks will exhibit a phenomenon whereby the aging curve return to the slope shown for zero days of aging.

This aging reset in not well understood but the manufacturers of crystals believe it to be related to a gradual relaxation of the molecular makeup of the quartz substrates and the conductive films deposited on the quartz.

The rule of thumb when checking the frequency accuracy of the converter is to make sure that the crystal has stabilized before attempting any adjustment. For units that have been in storage or shipment for more than a week, allow several days of operation before verifying the accuracy. For this reason, converters shipped from Radyne ComStream Corporation are typically powered-up until the final day before shipment. In addition, the accuracy and aging rate are verified immediately prior to shipment.

For a converter that has been powered-up for several months, the operator can assume an aging rate of several ppb per month. If the aging rate has been established, the station operator can make calculated adjustments from the reference offset Menu at timed intervals.

LED TEST: **{OFF, ON}**
Allows the user to test the function of all front panel LEDs. All of the LEDs will cycle on and off except the Power LED, which is always lit when power is on.

4.3 Examples: Changing Parameters from the Front Panel

4.3.1 Changing Frequency: Numeric Keypad

NOTE

For this example, it is assumed that the Frequency is currently set to 29100 MHz.

1. Upon powering up, the Initializing Screen can be seen on the Front Panel LCD Display for several seconds. This screen indicates the current revision of firmware. Next displayed is one of the following Boot Up Screens.

```
SFC2900A
KA-BAND UP        ←→
```

2. Press and release the Right Arrow Key once. The CONVERTER Menu is displayed.

```
CONVERTER        ↓
(menu)          ←→
```

3. Press and release the Left Arrow Key six (6) times. Notice that the Menu field "wraps" around and ends up at the CONVERTER Screen again.

4. Press and release the Down Arrow Key. The FREQUENCY (GHz) Screen is displayed.

```
FREQUENCY(GHz)   ↓
29.100000       ←→
```

5. Press and release <ENTER> once. The cursor appears at the lower left corner of the LCD Display.

6. Press and release the Right Arrow Key until the cursor is at the digit to the right of the decimal point. Press and release <2> on the numeric Keypad. The “2” digit now appears at that position and the cursor moves one location to the right.

7. Press and release <ENTER> once. Query “Turn RF Back On?” is displayed. Press <ENTER> again. The frequency field now displays "29.100000".

4.3.2 Changing Frequency: Up/Down Arrow Keys

1. Upon powering up, the Boot-Up Screen is shown in the LCD display.

2. Press and release the Right Arrow Key once. The CONVERTER Menu is displayed.

3. Press and release the Down Arrow Key. The FREQUENCY (GHz) Screen is displayed.

4. Press and release <ENTER> once. The cursor appears at the lower left corner of the LCD display.

5. Press and release the Right Arrow Key until the cursor is at the digit to the right of the decimal point. Press the Up Arrow Key until the display shows "29.900". The cursor is still visible and flashing over the number "9", to the right of the decimal point.

6. Press and release <ENTER> once. Query “Turn RF Back On?” is displayed. Press <ENTER> again. The frequency field now displays "29.900000".

```
FREQUENCY(GHz)   ↓
29.900000       ←→
```

7. Press and release <ENTER> once. The cursor appears at the lower left corner of the LCD Display.

8. Press and release the Right Arrow Key until the cursor is at the digit to the right of the decimal point. Press the Down Arrow Key until the display shows "29.100000". The cursor is still visible and flashing over the number "1", to the right of the decimal point.

9. Press and release <ENTER> once. Query “Turn RF Back On?” is displayed. Press <ENTER> again. The frequency field now displays "29.100000".

4.3.3 Changing Control Mode to 'TERMINAL'

1. Upon powering up, the Boot-Up Screen is shown in the LCD display.

2. Continue pressing and releasing the Left Arrow Key until the SYSTEM Menu is displayed.

3. Press and release the Down Arrow Key. The CONTROL MODE screen is displayed.

```
CONTROL MODE        ↑
COMPUTER           ←→
```

4. Press and release <ENTER> once. The cursor appears at the lower left corner of the LCD Display.

5. Press and release the Up Arrow Key until the bottom field displays "TERMINAL".

6. Press and release <ENTER> once. The cursor is no longer visible, and the selection has now been changed to "TERMINAL".

```
CONTROL MODE        ↑
TERMINAL           ←→
```

4.3.4 Changing Control Mode Back to 'FT PANEL'

1. Upon powering up, the Boot-Up Screen is shown in the LCD display.

2. Press and release the Right Arrow Key until the SYSTEM Menu is displayed.

3. Press and release the Down Arrow Key. The CONTROL MODE Screen is displayed.

4. Press and release <ENTER> once. The cursor appears at the lower left corner of the LCD Display.

5. Press and release the Up Arrow Key until the bottom field displays "FT PANEL".

6. Press and release <ENTER> once. The cursor is no longer visible, and the selection has now been changed to "FT PANEL".

```
CONTROL MODE        ↑
FT PANEL           ←→
```

4.4 Remote Port User Interfaces

The SFC2900A Upconverter Operator Serial Port allows a remote operator to control the converter. Through the serial protocols (ASCII and RLLP) described below, the remote operator can control gain, frequency, calibration, status, and fault isolation. The connector on the rear panel labeled J8, OPERATOR SERIAL I/O (DB-9 Female) is the physical port used for these protocols. It can be configured as either a RS-232 or RS-485 interface. If RS-232 is selected, an adaptor is needed between the converter connector J8 and the remote controller. See Section 5.9 for detailed pinout information. The port is factory-set to communicate as the DCE (Data Communications Equipment) with the following settings:

9600 baud
8 data bits
1 start bit
1 stop bit
no parity

The serial protocol is designed to provide DTE-to-DCE Point-to-Point Communications. The converter is wired as the DCE to provide an interface to a dumb terminal (DTE) without a null modem connection. Because the serial protocol uses unique addressable commands, the converters are capable of providing multipoint communications between a number of converters and a customer-supplied serial interface. The typical multipoint communications configurations include full-and half-duplex RS-485. In addition, a multipoint RS-232 interface is also possible.

The theory of operation for multipoint requires that the M&C Computer Transmit Port be connected in parallel to all of the Receive Data Ports of the various converters. Likewise, the transmit ports of the various converters must all be connected in parallel and tied to the Receive Data Port of the M&C Computer. To prevent any one Converter Transmit Port from acting as a low impedance, thus hanging the bus, each transmit port of each converter remains in a high impedance state until asked by the M&C computer to transmit.

To prevent data collisions from all the converters responding at once, each converter must be software configured for ‘echo off’ in the Configuration Menu. If the converters are being linked to a dumb terminal, the echo should be turned on locally.

4.4.1 ASCII Serial Protocol

The ASCII serial protocol serves as a ‘wrapper’ for the M&C data.

4.4.1.1 ASCII Command Structure

This serial command structure uses an ASCII character string format that enables serial control through the use of a ‘dumb terminal.’ To differentiate a proper command string from noise, all serial commands have a header followed by the specific command characters, followed by numeric values where required, and are terminated by a character return <cr>. The basic command structure is as follows:

@{Unit Address/}{Command}{Numerical Value(s)}<cr>

Refer to Appendix A for Remote ASCII Commends.

4.4.2 RLLP Serial Protocol

The Radyne ComStream Link Level Protocol (RLLP) is an alternative serial protocol used in conjunction with the remote port.

4.4.2.1 RLLP Protocol Structure

CAUTION!!

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

Before creating any software based on the information contained in this document, contact the Radyne ComStream Corporation Customer Service Department (602-437-9620) to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control software used in satellite earth station equipment such as modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex multi-drop control buses that conform to EIA Standard RS-485.

Each piece of earth station equipment on a control bus has a unique physical address, which is assigned during station setup/configuration or prior to shipment. Valid decimal addresses on one control bus range from 032 - 255 for a total of up to 224 devices per bus. Address 255 of each control bus is usually reserved for the M&C computer.

4.4.2.2 RLLP Protocol Wrapper

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

S1	***S2***	B_0	B_1	B_2	B_3	B_4	B_5	B_6	B_7	***S1***	***S2, etc.***

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

The COMMSPEC developed for use with the Radyne ComStream Link Level Protocol (RLLP) organizes the actual monitor and control data within a shell, or "protocol wrapper", that surrounds the data. The format and structure of the COMMSPEC message exchanges are described herein. Decimal numbers have no suffix; hexadecimal numbers end with a lower case h suffix and binary values have a lower case b suffix. Thus, 22 = 16h = 000010110b. The principal elements of a data frame, in order of occurrence, are summarized as follows:

<SYN> - the message format header character, or ASCII sync character, that defines the beginning of a message. The <SYN> character value is always 16h.

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

<SOURCE ID> - the Source Identifier defines the message originator's multidrop address. Note that all nodes on a given control bus have a unique address that must be defined.

<DESTINATION ID> - The Destination Identifier specifies the multidrop address of the device(s) to which the message is sent.

<FRAME SEQUENCE NUMBER> - The FSN is a tag with a value from 0 - 255 that is sent with each message. It assures sequential information framing and correct equipment acknowledgment and data transfers.

<OPCODE> - The Operation Code field contains a number that identifies the message type associated with the data that follows it. Acknowledgment and error codes are returned in this field. This field is 2 Bytes for the SFC2900A protocol.

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

<CHECKSUM> - The checksum is the modulo 256 sum of all preceding message bytes, excluding the <SYN> character. The checksum determines the presence or absence of errors within the message. In a message block with the following parameters, the checksum is computed as shown below in Table 4-4.

Table 4-4. Checksum Calculation Example

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

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

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

Since the only concern is the modulo 256 (modulo 100h) equivalent (values that can be represented by a single 8-bit byte), the checksum is 05h.

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

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

773/256 = 3 with a remainder of 5. This remainder is the checksum for the frame.

5 (decimal) = 05h = 0101b = <CHECKSUM>

4.4.2.3 Frame Description and Bus Handshaking

In a Monitor and Control environment, every message frame on a control bus port executes as a packet in a loop beginning with a wait-for-SYN-character mode. The remaining message format header information is then loaded, either by the M&C computer or by a subordinate piece of equipment requesting access to the bus. Data is processed in accordance with the OPCODE, and the checksum for the frame is calculated. If the anticipated checksum does not match then the wait-for-SYN mode goes back into effect. If the OPCODE resides within a command message, it defines the class of action that denotes an instruction that is specific to the device type, and is a prefix to the DATA field if data is required. If the OPCODE resides within a query message packet, then it defines the query code, and can serve as a prefix to query code DATA.

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

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

To reiterate, valid equipment responses to a message require the FSN tag in the command packet. This serves as part of the handshake/acknowledge routine. If a valid response message is absent, then the command is re-transmitted with the same FSN. For a repeat of the same command involving iterative processes (such as increasing or decreasing transmit power level), the FSN is incremented after each message packet. When the FSN value reaches 255, it overflows and begins again at zero.

The full handshake/acknowledgment involves a reversal of source and destination ID codes in the next message frame, followed by a response code in the <OPCODE> field of the message packet from the equipment under control.

4.4.2.4 Global Response Operational Codes

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

Table 4-5. Response OPCODES

RESPONSE OPCODE DESCRIPTION	OPCODE
Good Message	0000h
Bad Parameter	00FFh
Bad Opcode	00FEh
Bad Checksum	00FDh
Command Not Allowed in LOCAL Mode	00FCh
Command Not Allowed in AUTO Mode	00FBh
Bad Destination	00FAh
Unable to Process Command	00F9h
Packet Too Long	00F8h

The following response error codes are specific to the SFC2900A Upconverter :

SFC2900A Response Error Code Descriptions	OPCODE
REMOTE_ERROR_CONTROL_MODE	0203h
REMOTE_ERROR_BAD_PARAMETER	0204h
REMOTE_ERROR_INVALID_TIME	0205h
REMOTE_ERROR_INVALID_DATE	0206h
REMOTE_ERROR_RANGE	0220h
REMOTE_ERROR_RANGE_LO	0221h
REMOTE_ERROR_RANGE_HI	0222h
REMOTE_ERROR_PRIME_NOTPRESENT	0223h
REMOTE_ERROR_PRIME_NOTLEARNED	0224h
REMOTE_ERROR_PRIME_NOTASSIGNED_A_BACKUP	0225h
REMOTE_ERROR_BACKUP_IN_MANUAL_MODE	0226h
REMOTE_ERROR_BACKUP_IN_AUTOMATIC_MODE	0227h
REMOTE_ERROR_IS_DOWN_CONVERTER	0228h
REMOTE_ERROR_IS_UP_CONVERTER	0229h

REMOTE_ERROR_IS_C_BAND_CONVERTER	022Ah
REMOTE_ERROR_IS_KU_BAND_CONVERTER	022Bh
REMOTE_ERROR_IS_KA_BAND_CONVERTER	022Ch
REMOTE_ERROR_INCOMPATIBILE_BAND	022Dh
REMOTE_ERROR_INCOMPATIBILE_TYPE	022Eh
REMOTE_ERROR_CHAIN_CARD_NOTPRESENT	022Fh
REMOTE_ERROR_INVALID_ENTRY	0240h
REMOTE_ERROR_INVALID_FREQUENCY	0241h
REMOTE_ERROR_INVALID_FREQUENCY_STEP	0242h
REMOTE_ERROR_INVALID_PRIME	0243h
REMOTE_ERROR_INVALID_COMPENSATION	0244h
REMOTE_ERROR_INVALID_PRIORITY	0245h
REMOTE_ERROR_INVALID_CHANNEL	0246h
REMOTE_ERROR_INVALID_GAIN	0247h

4.4.2.5 Collision Avoidance

When properly implemented, the physical and logical devices and ID addressing scheme of the COMMSPEC normally precludes message packet contention on the control bus. The importance of designating unique IDs for each device during station configuration cannot be overemphasized. One pitfall, which is often overlooked, concerns multi-drop override IDs. All too often, multiple devices of the same type are assigned in a direct-linked "single-thread" configuration accessible to the M&C computer directly. For example, if two converters with different addresses DESTINATION IDs are linked to the same control bus at the same hierarchical level, both will attempt to respond to the M&C computer when the computer generates a multi-drop override ID of 1. If their actual setup parameters, status, or internal timing differs, they will both attempt to respond to the override simultaneously with different information, or asynchronously in their respective message packets and response packets, causing a collision on the serial control bus.

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

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

Table 4-6. Broadcast IDs

Directly-Addressed Equipment	Multi-Drop Override ID
Broadcast all directly-linked devices	00
DMD-3000/4000, 4500 or 5000 Mod Section, DMD15	01
DMD-3000/4000, 4500 or 5000 Demod Section, DMD15	02
RCU-340 1:1 Switch	03
RCS-780 1:N Switch	04
RMUX-340 Cross-Connect Multiplexer	05
CDS-780 Clock Distribution System	06
SOM-340 Second Order Multiplexer	07
DMD-4500/5000 Modulator Section	08
DMD-4500/5000 Demodulator Section	09
RCU-5000 M:N Switch	10
DMD15 Modulator	20
DMD15 Demodulator	21
DMD15 Modem	22
DVB3030 Video Modulator, DM240	23
Reserved for future equipment types	24 – 31

The following multi-drop override IDs are device-type specific, with the exception of "BROADCAST". These are summarized in Table 4-6 with ID values expressed in decimal notation:

Multi-drop override ID 01 can be used interchangeably to broadcast a message to a DMD-3000/4000 modem, a DMD-4500/5000, a DMD15 modem, or a DVB3030. Radyne ComStream Corporation recommends that the multi-drop override IDs be issued only during system configuration as a bus test tool by experienced programmers, and that they not be included in run-time software. It is also advantageous to consider the use of multiple bus systems where warranted by a moderate to large equipment complement.

Therefore, if a DMD15 Modulator is queried for its equipment type identifier, it will return a "20" and DMD15 Demodulator will return a "21". A DMD15 Modem will also return an "22". A DVB3030 Video Modulator will return a “23.”

4.4.2.6 Software Compatibility

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

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

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

When Radyne ComStream equipment is queried for bulk information (Query Mod, Query Demod, etc.) it responds by sending back two blocks of data; a Non-Volatile Section (parameters that can be modified by the user) and a Volatile Section (status information). It also returns a count value that indicates the size of the Non-Volatile Section. This count is used by M&C developers to index into the start of the Volatile Section.

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

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

4.4.2.7 RLLP Summary

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

During transmission, the protocol wrapper surrounds the actual data to form information packets. Each transmitted packet is subject to time out and frame sequence control parameters, after which the packet sender waits for the receiver to convey its response. Once a receiver verifies that a packet sent to it is in the correct sequence relative to the previously received packet, it computes a local checksum on all information within the packet excluding the <SYN> character and the <CHECKSUM> fields. If this checksum matches the packet <CHECKSUM>, the receiver processes the packet and responds to the packet sender with a valid response (acknowledgment) packet.

The response packet is therefore either an acknowledgment that the message was received correctly. If the sender receives a valid acknowledgment (response) packet from the receiver, the <FSN> increments and the next packet is transmitted as required by the sender.

If an acknowledgment (response) packet is lost, corrupted, or not issued due to an error and is thereby not returned to the sender, the sender re-transmits the original information packet; but with the same <FSN>. When the intended receiver detects a duplicate packet, the packet is acknowledged with a response packet and internally discarded to preclude undesired repetitive executions. If the M&C computer sends a command packet and the corresponding response packet is lost due to a system or internal error, the computer times out and re-transmits the same command packet with the same <FSN> to the same receiver and waits once again for an acknowledgment.

Refer to Appendix B for Remote RLLP.

4.5 Terminal Port User Interface

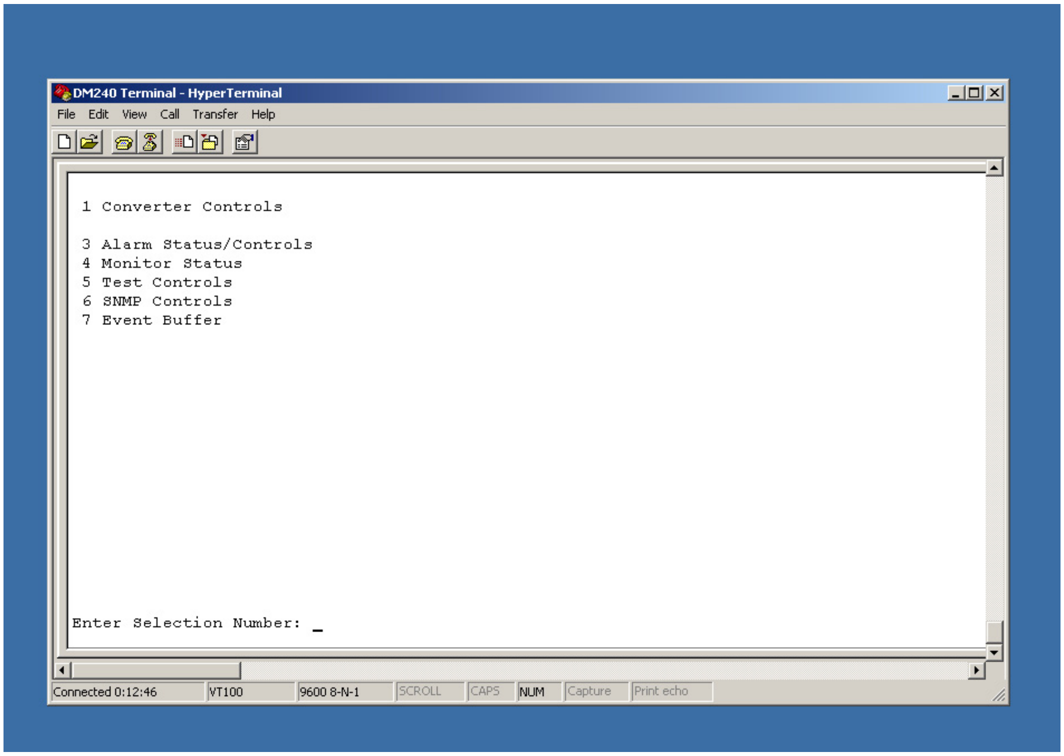
The Terminal Port allows for complete control and monitoring of all Upconverter parameters and functions via an RS-232 Serial Interface. Terminal Mode' can be entered from the front panel by selecting 'System' and then 'Control Mode' followed by 'Terminal.' The default settings for the terminal are as follows:

VT100
9600 baud
8 data bits
no parity
1 stop bit

These settings can be changed at the front panel by using the *System*>*Terminal*> Menu.

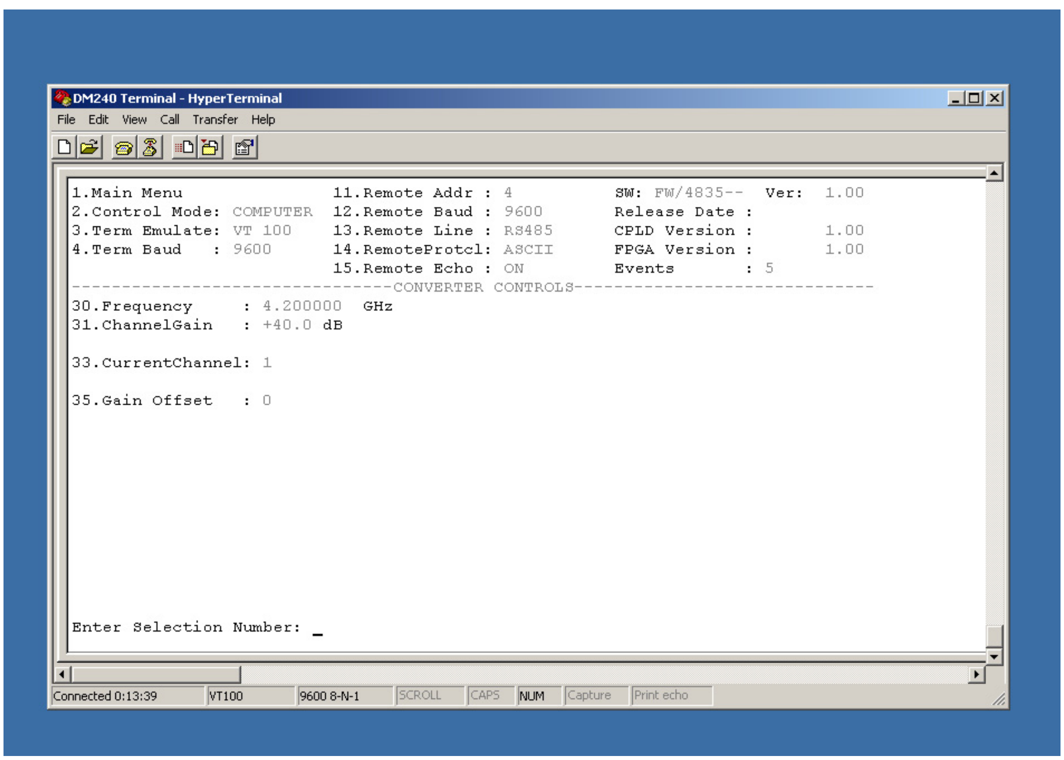
The Terminal Control Mode is Menu-driven and the allowable values for each item number will be shown. To change an item, type in its number followed by <ENTER>. If the parameter to be changed requires a numeric value, enter the number followed by <ENTER> If the parameter is non-numeric, press <SPACE> to cycle through the list of available entries. Note that the items that do not have ID numbers are Status only and cannot be changed. Unless otherwise indicated, all terminal Menu items shown below are identical to those described in Section 4.1.6 (LCD Display Menus) above.

4.5.1 Terminal Main Menu

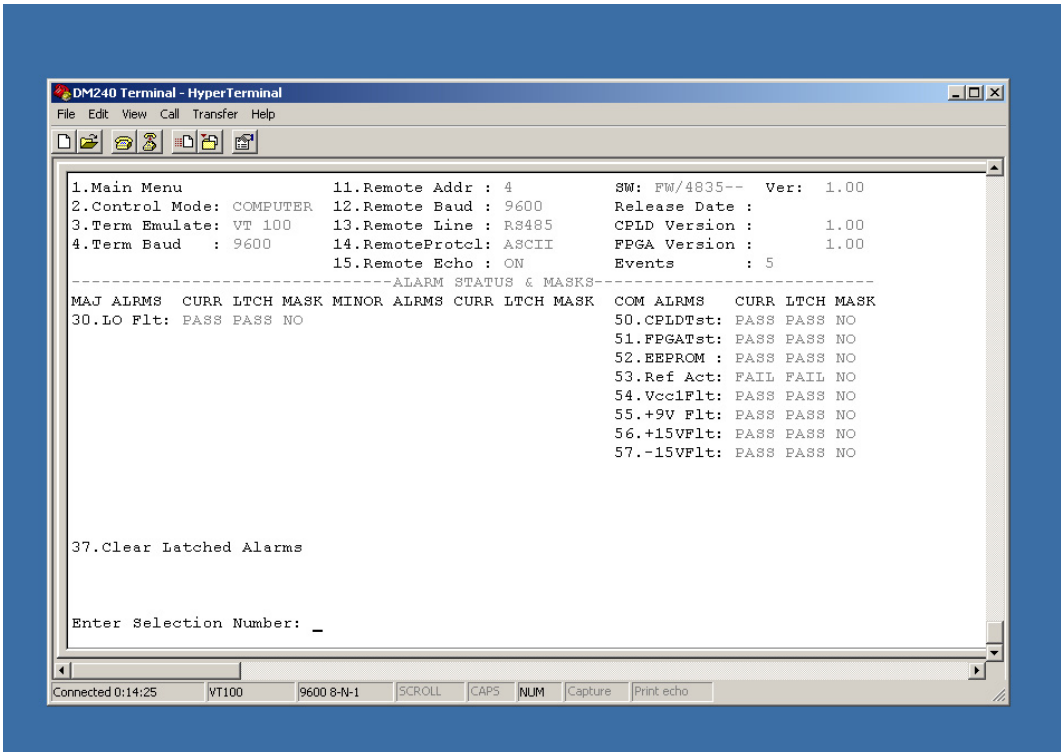


Menu is available only for a backup converter.

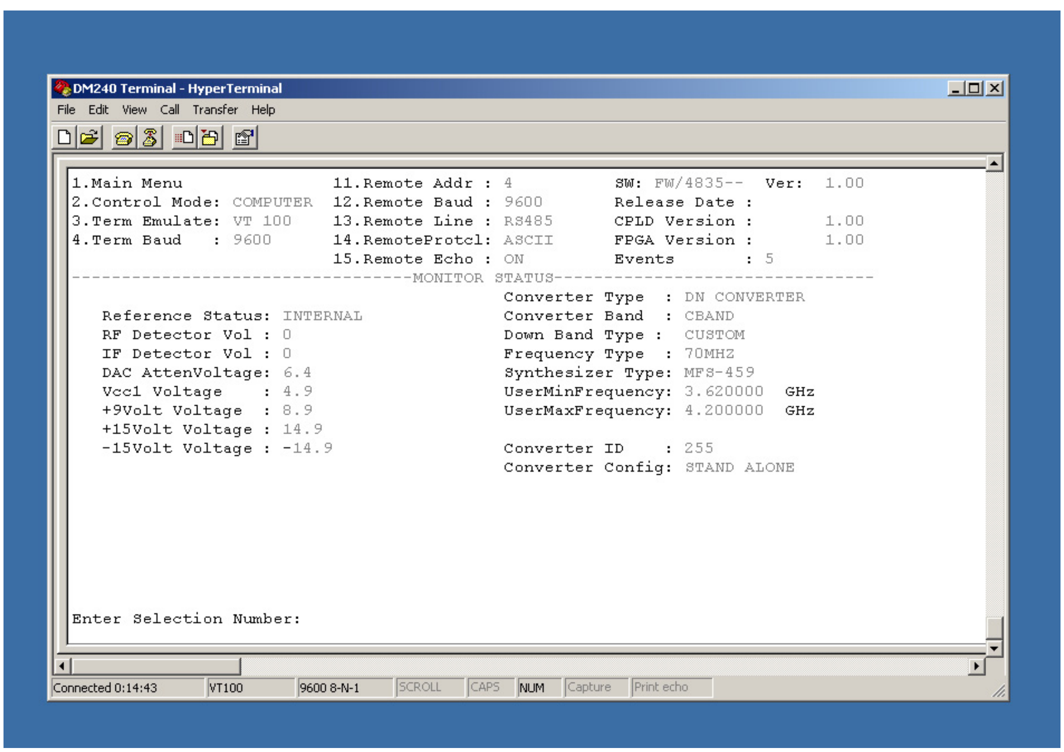
4.5.2 Terminal Converter Controls Menu



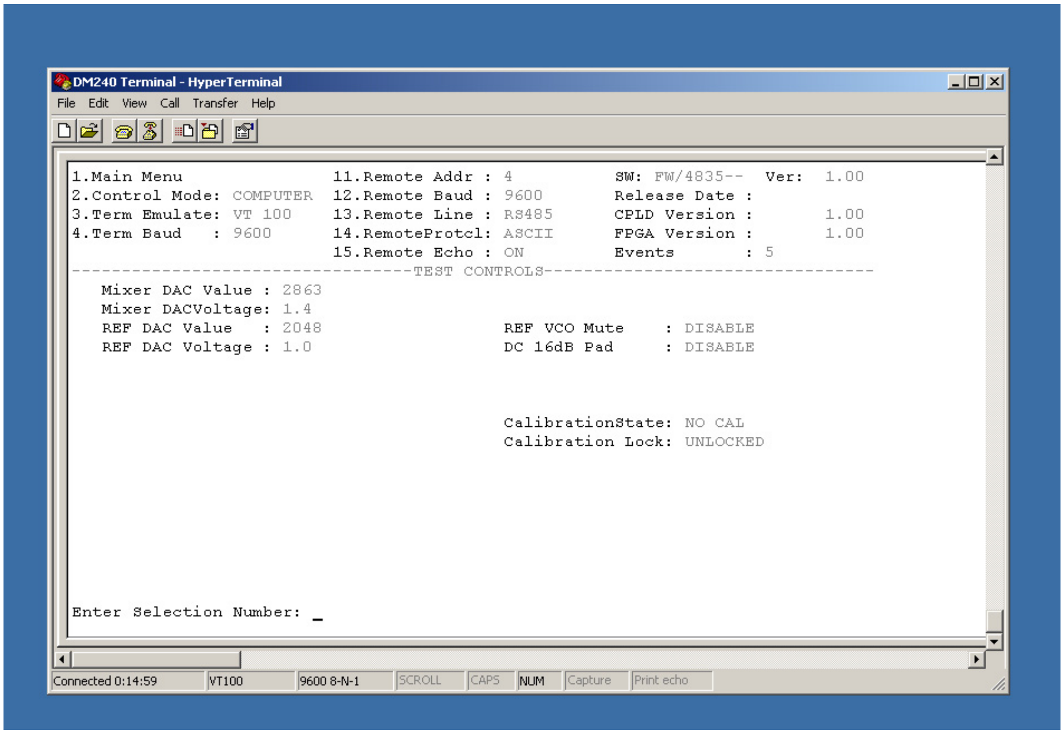
4.5.3 Terminal Alarm Status & Masks Menu



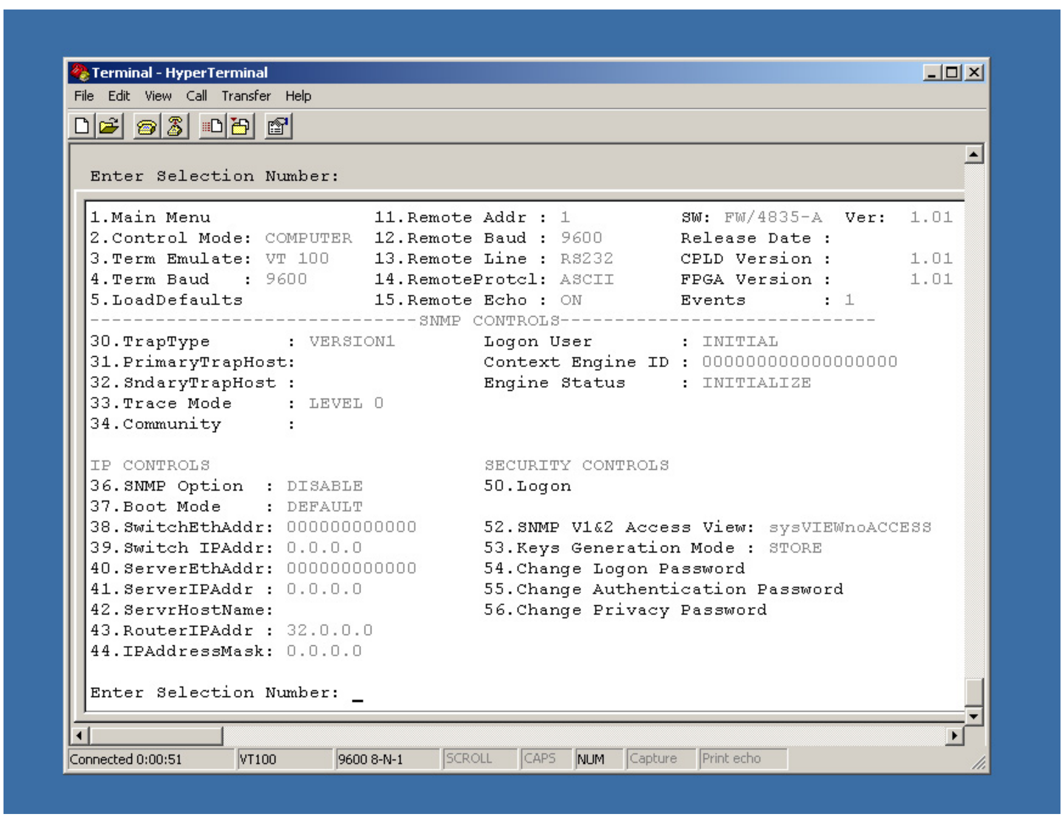
4.5.4 Terminal Monitor Status Menu



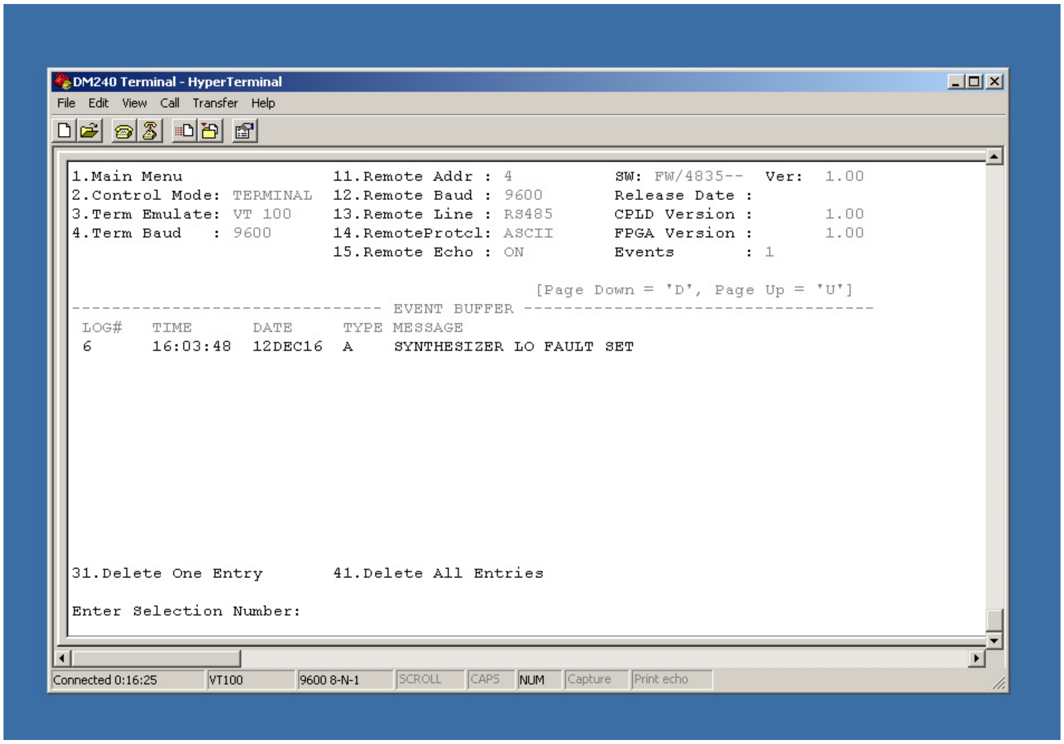
4.5.5 Terminal Test Controls Menu



4.5.6 SNMP Controls Menu



4.5.7 Terminal Event Buffer Menu



4.6 Ethernet Port User Interface

The Ethernet Port allows for complete control and monitoring of all Upconverter parameters and functions via a 10 Base-T or 100 Base-T Ethernet connection.

4.6.1 Ethernet Port Configuration

4.6.1.1 Connecting the Terminal

1. Connect a computer serial port (or dumb terminal port) to the SFC2900A Upconverter Terminal Connector (J6) on the rear of the unit.

2. Verify that the emulation software is set to the following:

   VT100
   9600 baud
   8 data bits
   no parity
   1 stop bit

   Modify the Upconverter selection, if necessary, to match the settings (Front Panel Menu: *System>Terminal*>).

4.6.1.2 SNMP Option

1. From the Main Menu, select ‘6’ for SNMP Control. Verify that Selection 36, SNMP Option is enabled. The SFC2900A Upconverter SNMP Option is enabled at the factory if purchased by the user. Please contact the Radyne ComStream Customer Service Department if the SNMP feature is not available.

4.6.2 Network Configuration

4.6.2.1 Terminal Screens

1. The SNMP main setup screen is Menu 6. on the Terminal Main Menu screen.

2. The SNMP Configuration can be monitored and controlled via a full screen presentation of current settings and status. The <Esc> Key redraws the entire screen and aborts input any time. The Spacebar refreshes the status area and is used to scroll through selection when in user input mode.

3. To modify an item, the user simply presses its terminal selection followed by <ENTER>. The modem responds by presenting the options available and requesting input. If the input is multiple choices, the user is prompted to use the Spacebar to scroll to the desired selection and then press <ENTER>. An input can be aborted at any time by pressing <Esc>. Invalid input keys cause an error message to be displayed on the terminal. Some input or display status only appears when the user has the right access levels.

4.6.2.2 Logging on and Passwords

There are several available logon users each setup with a default password. The user must be logged on in order to view or change some settings. There are 3 levels of access rights in the SFC2900A Upconverter. These are:

Initial Access: The default when no user is logged on.

Viewer Access: Allows its user to modify its own logon and authentication passwords.

Operator Access: All other SNMP and security selections can only be accessed.

Listed in the table below are the available user names and corresponding default passwords:

Security User	Logon Password	Authentication Password	Privacy Password
Initial			
Viewer	Viewer	Viewer	
Oper–md5	Oper	Oper	Oper
Viewer–sha	Viewer	Viewer	
Oper-sha	Oper	Oper	Oper

Note: All entries are case sensitive

4.6.2.3 Exiting SNMP Configuration

1. Select the Main Menu by pressing ‘1’ followed by <ENTER>, to go back to the top-level Menu screen.

4.6.2.4 Logging On

1. The user must be logged on to have access to SNMP Features. To log on the SNMP configuration, press ‘50’ followed by <ENTER> to open the Logon Dialog Box.

```
+ - - - - - - - - - - - - - - - - - - | Logon | - - - - - - - - - - - - - - - - - - - - - -+
|                                                                                          |
|                           1.User ID :                                                    |
|                           2.Password :                                                   |
|                           3.OK          4.CANCEL                                         |
|                                                                                          |
+ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - +
```

2. In the User ID Text Box, enter “Oper-md5” (case sensitive).

3. In the Password Text Box, enter “Oper” (case sensitive).

4. Select OK

4.6.2.5 Changing the Logon Password

To change the password, logged on so that the “SNMP/Security” selection appears. Press ‘54’ followed by <ENTER> to open the Change Logon Password dialog.

```
+ - - - - - - - - - - - - - | Change Password | - - - - - - - - - - - - - - - - - -+
|                                                                                  |
|                 1.Old Password:                                                  |
|                 2.New Password:                                                  |
|                 3.Re-enter New Password:                                         |
|                 4.OK          5.CANCEL                                           |
|                                                                                  |
+ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -+
```

1. In the Old Password Text Box, enter “Oper” (case sensitive).

2. In the New Password Text Box, enter the new password (case sensitive, only *’s appear for security).

3. Re-enter the new password to verify the desired setting.

4. Select OK

4.6.2.6 Logging Off

1. To log off the SNMP Configuration, press ‘51’ followed by <ENTER>. The following confirmation message will be displayed to avoid inadvertent exits:

   You will be logged off. Are you sure? (Y/N):

4.6.2.7 Changing Your Authentication Password

1. Select 55. followed by <ENTER> to open the Change Password Dialog.

```
+ - - - - - - - - - - - -  - - -| Change Password | - - - - - - - - - - - - - - - - +
|                                                                                   |
|                         1.Old Password:                                           |
|                         2.New Password:                                           |
|                         3.Re-enter New Password:                                  |
||                        4.OK          5.CANCEL                                    |
|                                                                                   |
+ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - +
```

2. In the Old Password Text Box, enter “Oper” (case sensitive).

3. In the New Password Text Box, enter the new password (case sensitive, only *’s appear for security).

4. Re-enter the new password to verify desired setting.

5. Select OK

4.6.2.8 Changing Your Privacy Password

To change your privacy password, select 56 followed by <ENTER> to open the Change Password dialog.

```
+ - - - - - - - - - - - - - - - | Change Password |- - - - -  - - - - - - - - - - - +
|                                                                                   |
|                              1.Old Password:                                      |
|                              2.New Password:                                      |
|                              3.Re-enter New Password:                             |
|                              4.OK          5.CANCEL                               |
|                                                                                   |
+ - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - +
```

1. In the Old Password Text Box, enter “Oper” (case sensitive).

2. In the New Password Text Box, enter the new password (case sensitive, only *’s appear for security).

3. Re-enter the new password to verify desired setting.

4. Select OK

4.6.2.9 Converter Ethernet Address

1. The SFC2900A Upconverter Ethernet Address is configured at the factory. It is a unique Radyne ComStream equipment identifier.

   Example: 0010650903EB

NOTE

Do not modify the Ethernet Address. Major problems may result if it is changed.

4.6.2.10 Converter IP Address

1. Select ‘39’, Converter IP Address:. Enter the SFC2900A Upconverter Internet Address in dot notation and press <ENTER>. Please consult your network administrator for valid addresses.

   Example - 192.168.0.35

2. The IP Address that is selected will be used for the Ethernet Test that follows.

4.6.2.11 Server Ethernet Address

This section refers to the boot host.

1. Select 40.ServerEthAddr:. Enter the Server 12 Digit Ethernet Address and press <ENTER>. Zero out this address if not known at this time. The system will resolve it dynamically at run time.

   Example: 0FD0640203ED or 000000000000

4.6.2.12 Server IP Address

This section refers to the Host that will be used to optionally boot the Upconverter on power-up. The host should be acceptable to the transport layer. In other words, the transport layer needs to be able to open a connection to the entity specified by the server IP Address field.

1. Select 41.ServerIPAddr :. Enter the Server Internet Address in dot notation and press <ENTER>. Please consult your network administrator for valid addresses.

   Example: 192.168.0.50

2. The IP Address that is selected will be used for the Ethernet Test that follows.

4.6.2.13 Router IP Address

Select 42.RouterIPAddr :. Enter the router Internet Address in dot notation and press <ENTER>. Please consult your network administrator for valid addresses.

Example: 192.168.0.254

4.6.2.14 IP Address Mask

In the mask (more clearly seen in the binary format), binary 1s indicate the position of the network and subnet portion of the IP Address while binary 0s identify bits that represent the individual interfaces. To recognize a subnet, each system in the subnet must have the same subnet mask. Please consult your network administrator for a valid address class mask.

1. Select 43.IPAddressMask:. Enter the IP Address mask in dot notation and press <ENTER>.

   Example: 255.255.0.0

4.6.2.15 Boot Mode (Optional)

1. Select 37.Boot Mode : from the Controls Menu and press <ENTER>. Scroll through the various selections to 'NVBOOT' and press <ENTER>. The above settings will be enabled the next time the system is rebooted. If a bootp server is available, the Upconverter can be remotely configured by selecting bootp mode. This option is currently not available.

4.6.2.16 Community

Each managed station controls its own local MIB and must be able to control the use of that MIB by a number of management stations. This relates to security concerns. A managed MIB such as the Upconverter needs to protect itself from unwanted and unauthorized access. SNMP, as defined in RFC 1157, provides only a limited capability for such security, namely the concept of a community. An SNMP Community is the relationship between an SNMP Agent and Management Stations.

1. To set the community string on the SFC2900A Upconverter, select 34.Community:. Enter the desired community name and press <ENTER>.

   Example: "public"

4.6.2.17 Trap Type and Trap Hosts

Traps enable the converter to notify the management station of significant events such as alarms. Version1 and version2 Traps are supported at this time. These are Operator selectable using Terminal Command Number 30. The messages are sent to specific pre-defined hosts. The Primary and Secondary Trap Hosts IP Addresses are setup using Terminal Commands 31 and 32. Each host should be acceptable to the transport layer. In other words, the transport layer needs to be able to open a connection to the entities specified by the trap host fields.

4.6.2.18 Trace Mode

1. For debugging purposes, a trace mode is specified by the Operator users for various diagnostic levels.

4.6.2.19 SNMP V1 & 2 Access View

The default access rights for Version 1 and 2 SNMP users are minimal. They are limited to a system view, and a description of the Upconverter System and Contact Information. For additional information, go to View-Based Access Control Section. To accommodate older systems, an Operator user may modify these access rights to allow full or partial read/write access. SNMP Version 1 and 2 does not use any security measures, therefore users should be very careful when changing access rights.

4.6.2.20 Key Generation Mode

The password localization algorithm is intensive enough that the Motorola 68332 Embedded Processor cannot handle the process in a timely manner. This selection allows the Operator user to optionally store localized keys in non-volatile memory. These keys correspond to a set of passwords and Modem IP Address. If either changes, the SNMP agent automatically recalculates the new keys and stores them in non-volatile memory (only if the Key Generation Mode is set to 'STORE').

4.6.2.21 Context Engine ID

"contextEngineID" is the unique identifier of the Upconverter SNMP Engine that provides services for sending and receiving messages, authenticating and encrypting messages, and controlling access to managed objects.

1. The Context Engine ID, 80000A1F01AC1264B0, is formatted as follows:

   a. The first 4 bytes are the Radyne ComStream Private Enterprise Number (2591).

   b. The very first bit is set to 1, for example: 80000A1F (H).

   c. The fifth byte indicates how the 6th and remaining bytes are formatted. A '1' means it's an IPv4 Address.

   d. The last 4 bytes are the IP Address 172.18.100.176 (AC1264B0).

4.6.2.22 View-Based Access Control

SNMPv3 defines a method of access control known as the View-based Access Control Model (VACM). It is defined as a means to restrict access to particular subsets of variables based on the identity of the manager and the security level used in the request.

A view is a group of MIB variables on the agent. The agent defines a view for each user based on the user identity (securityName) and security level. Following are the major views:

System view: Access to system description

MIB-II view: Access to the standard MIB-II information

Device view: Access to the device private information

World view: Access to every managed object in the MIB

Following are the available access groups:

Group	Context/Community	Security Level	Read Access	Write Access
NULL	mib2	NoAuth/noPriv	System view	NONE
Viewer	mib2	Auth/noPriv	MIB-II view	NONE
Viewer	Dev	Auth/Priv	Device view	NONE
Oper	mib2	Auth/noPriv	MIB-II view	MIB-II view
Oper	Dev	Auth/Priv	Device view	Device view

The NULL Security Name is for backward compatibility with SNMP Version 1 and 2 management stations (security names are not defined for earlier protocols). In this case, the contextName in each view may refer to either a contextName or a communityName. The securityLevel would then be noAuth/noPriv.

4.6.3 Connecting the Ethernet Cable and Testing the Link

1. Connect the computer to the Upconverter Ethernet port (J9) using the RJ-45 to RJ-45 10 BaseT Cables via a hub as shown in Figure 4-3.

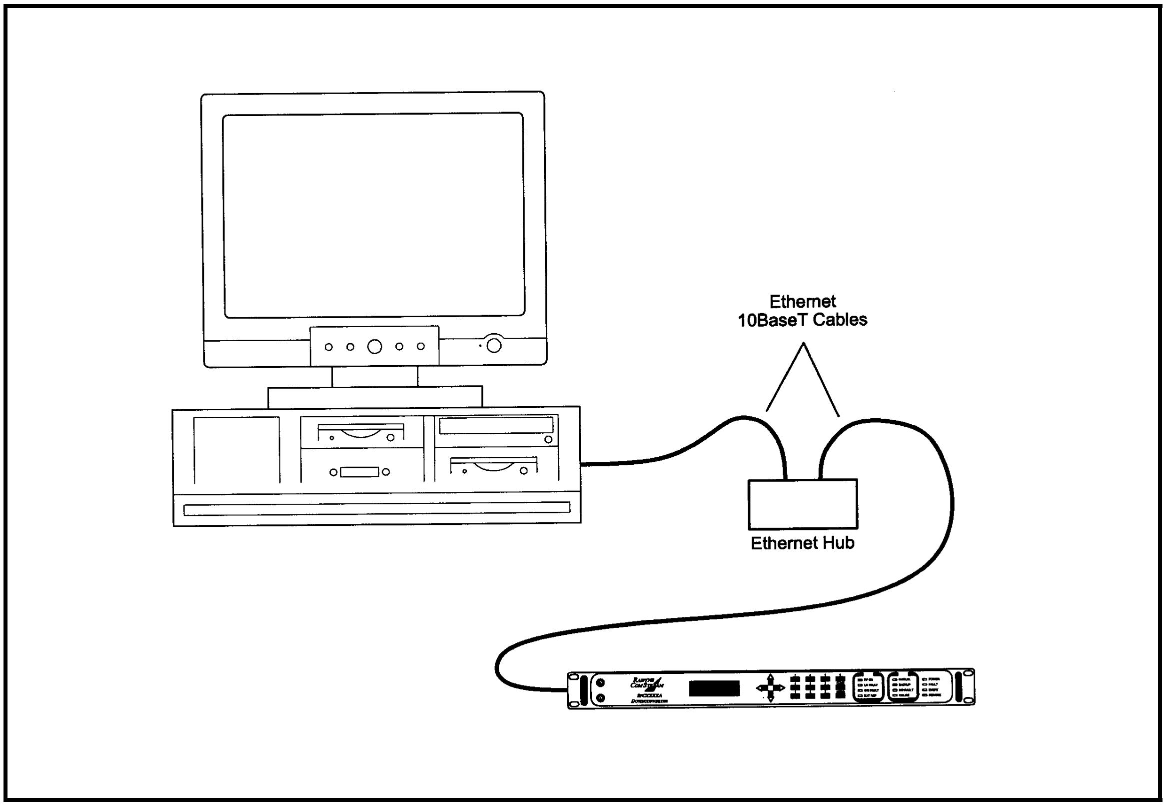


Figure 4-3. Ethernet Connection

4.6.3.1 Ping Program

1. PING is an application that uses the ICMP protocol to report if a host is responding. To check whether the SFC2900A Upconverter is reachable, use the PING program installed on your computer along with the modem IP Address set in Section 3.2.3.

   Example: ping 192.168.0.35

2. If everything is functioning correctly, replies from the modem will appear on the computer screen along with the time it took to respond. If unsuccessful, verify the following:

   a. The cables are secured.
   b. The Link Light is illuminated.
   c. The IP Address that is used matches the Modem's IP Address.
   d. The Server and Modem are on the same subnet.

4.6.3.2 SNMP Test

1. Once it is determined that the SFC2900A Upconverter is reachable, compile the custom Management Information Base (MIB) for use by the Network Management Station (NMS). The MIB uses a hierarchical naming scheme. Each managed object in the Upconverter is identified by an Object Identifier (OID), a sequence of non-negative integers that uniquely describes the path taken through the hierarchical structure.

2. Using the Upconverter IP Address, perform a Walk of the MIB to retrieve all the MIB objects managed in the Upconverter.

4.6.4 Management Information Base Structure

This section defines the terminology and hierarchy associated with management information base structure at Radyne ComStream Corporation.

4.6.4.1 Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP), as its name suggests, is a relatively simple protocol by which management information for a network device may be inspected and/or altered by remote administrators.

4.6.4.2 The Management Information Base (MIB)

Management objects are defined in the Management Information Base (MIB), which uses a hierarchical naming scheme. In this scheme, an Object Identifier (OID) identifies each object. The OID is a sequence of non-negative integers that uniquely describes the path taken through the hierarchical structure.

MIB objects may then be specified either from the Root (which has no designator), or alternatively from anywhere within the hierarchical structure.

For example: 1.3.6.1.4.1.2591.4 is equivalent to {iso(1). org(3). dod(6). internet(1). private(4). enterprises(1). Radyne(2591). RCS10L(4)} (See Figure 4-4).

In general, we are mainly concerned with just two groups that reside in the *internet* subtree, namely the *mgmt*, and *private* groups. For completeness however, the four major groups are discussed below:

Directory {internet 1} 1.3.6.1.1

This area was reserved to describe how the OSI directory structure may be used in the Internet. To date this has not been implemented and therefore is of little interest to us.

Mgmt {internet 2} 1.3.6.1.2

This area was reserved to describe objects in the standard MIB. As RFCs defining new groups are ratified, the Internet Assigned Numbers Authority (IANA) assigns new group IDs.

Experimental {internet 3} 1.3.6.1.3

This subtree provides an area where experimentation is carried out. Only those organizations directly involved in the experiment have any interest in this subtree.

Private {internet 4} 1.3.6.1.4

This is possibly the most important area of the MIB, since it is within this subtree that vendors place objects specific to their particular devices. Beneath the private branch, there is a subtree called enterprises, beneath which each vendor may define its own structure. Vendors are assigned Private Enterprise Numbers (PENs) that uniquely identify them. They may then place all objects specific to their devices in this tree, provided of course that the object conforms to the format defined by SMI. Radyne ComStream Corporation's Private Enterprise Number is 2591. Other products are added to Radyne ComStream Corporation's subtree as they become remotely manageable through SNMP.

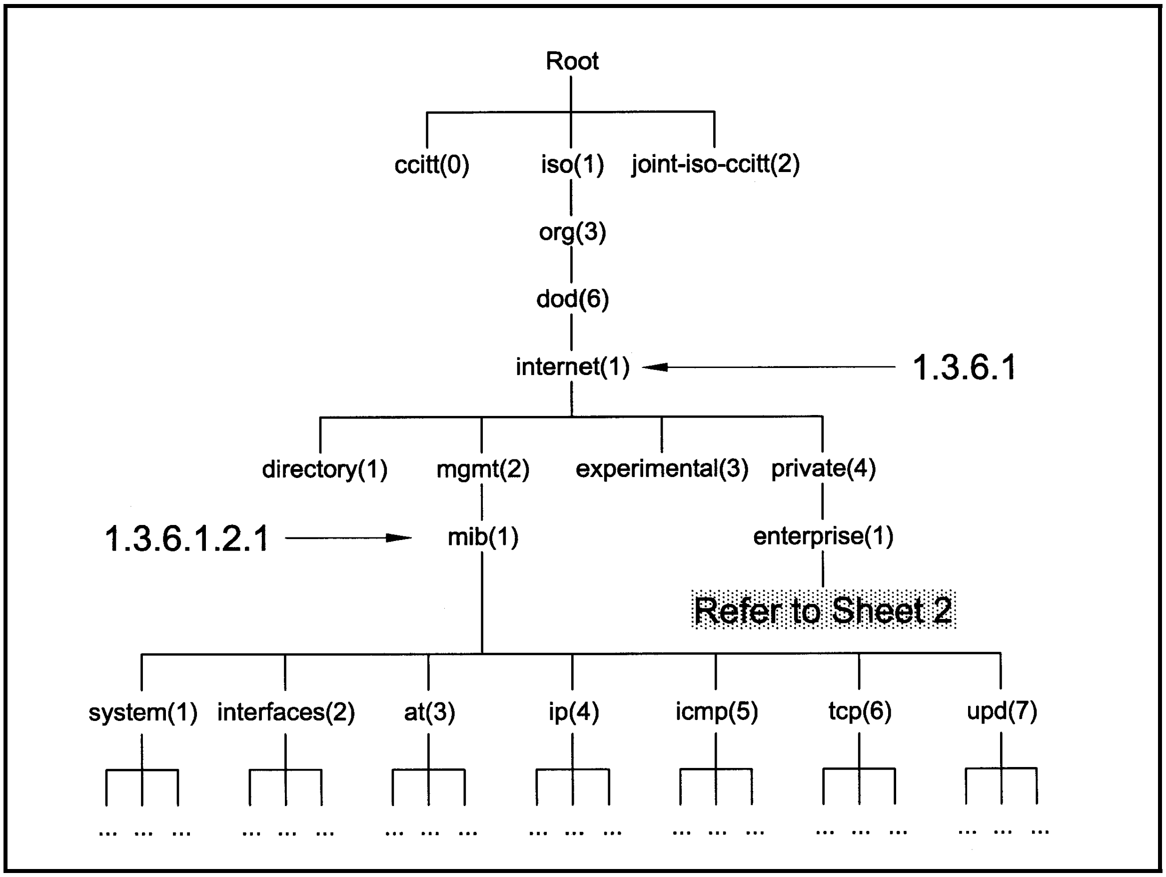


Figure 4-4. Object Identifiers in the Management Information Base (Sheet 1 of 2)

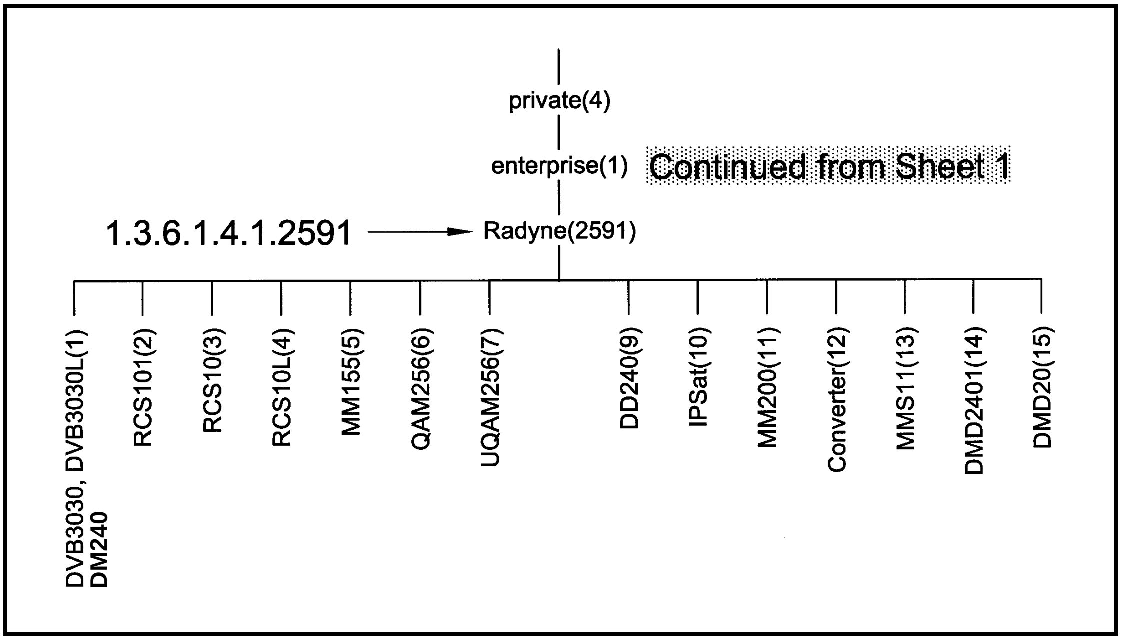


Figure 4-4. Object Identifiers in the Management Information Base (Sheet 2 of 2)

Refer to Appendix C for MIB listing.

Rear Panel Interfaces

5

5.0 SFC2900A Upconverter Connections

All SFC2900A Upconverter connections are made to labeled connectors. Any connection to an SFC2900A Upconverter must be made with the appropriate mating connector. Refer to Figure 5-1 for the various connector locations.

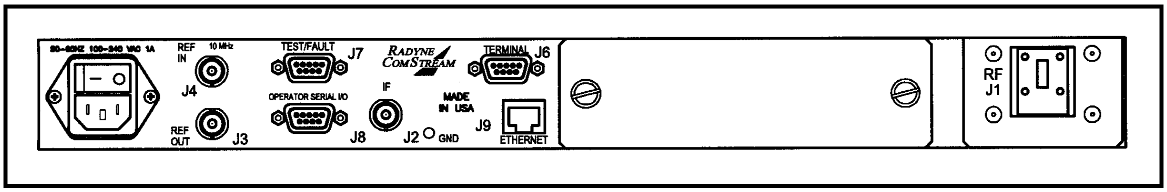


Figure 5-1. SFC2900A Upconverter Back Panel

5.1 Power

Located on the left side of the SFC2900A Upconverter Rear Panel is the AC Power Input Connector. This connector is an IEC/EN60320/C13 Power Entry Module. The unit is powered from a 100 – 240 VAC, 50 – 60 Hz source. Maximum unit power consumption is 50 W. The switch turns power on and off to the unit. A chassis ground connection can be made at the #10 size stud located between the IF (J2) and Ethernet (J9) connectors.

The Power Cord/connector for the SFC2900A Upconverter is a supplied item.

5.2 10 MHz Ref In (J4)

The Reference Input is a 50 Ohm BNC-F connector (J4) allows the operator to synchronize the synthesizer of the converter to an external 10 MHz reference. When an external reference is properly applied to the reference input, the external reference LED will illuminate on the front panel.

5.3 10 MHz Ref Out (J3)

The 10 MHz Reference Out (J3) is a 50 Ohm BNC-F Connector that provides a 10 MHz square wave, 50 Ohm AC coupled reference output signal at 0 dBm. In normal operation (no external reference) this output is synchronous with the internal high stability 10 MHz reference.

5.4 Test/Fault (J7)

The Test/Fault connector (J7) is a status port that allows monitoring of several system status indications at the back panel. These items are described in Table 5-1.

Table 5-1. J7 – Test/Fault Interface – D-Sub 9-Pin Female Connector

Pin No.	Signal	I/O	Description
1	N.C.	N.A.	No Connect
2	IF_LO_FAULT	O	1 = LO Fault Condition
3	GND	N.A.	Ground
4	IF_SIG_DET	O	Detected Power Level of IF Signal 0 to 5 VDC
5	N.C.	N.A.	No Connect
6	RLY_NO	N.A.	Form-C relay normally open contact, summary fault
7	RLY_NC	N.A.	Form-C relay normally closed contact, summary fault
8	RLY_C	N.A.	Form-C relay common contact, summary fault
9	RF_SIG_DET	O	Detected Power Level of RF Signal (Upconverter only, 0 - 5 VDC)

5.5 Operator Serial I/O (J8)

The Operator Serial I/O Port (J8) is a D Sub 9-Pin Female Connector. This port provides a serial interface that can be configured as either an RS-232 or RS-485 interface and allows the user to remotely control all of the features outlined in the Serial Protocol (See Section 4.2, Remote Port User Interfaces). The serial port comes configured as an RS-232 Serial Port for DCE unless otherwise indicated. The pinout for this interface is listed in Table 5-2. Note that the function of pin 1 and pin 9 depends on whether the protocol is set to RS-232 or RS-485 (Front Panel LCD Menu: SYSTEM < REMOTE PORT < REMOTE LINE).

Table 5-2. J8 – Operator Serial I/O Port – D-Sub 9-Pin Female Connector

Pin No.	Signal	I/O	Description
1	RX_485 – A RX_232	I	Inverted RS-485 Receive RS-232 receive
2	TX_485-B	O	Non-Inverted RS-485 transmit
3	RX_485-B	I	Non-Inverted RS-485 receive
4	DTR	N.A.	Connected internally to Pin 6-DSR
5	GND	N.A.	Ground
6	DSR	N.A.	Connected internally to Pin 4-DTR
7	RTS	N.A.	Connected internally to Pin 8-CTS
8	CTS	N.A.	Connected internally to Pin 7-RTS
9	TX_485 – A TX_232	O	Inverted RS-485 Transmit RS-232 Transmit

If the RS-232 option is chosen, an adapter must be used between J8 and the serial cable to the DTE. One end of the adapter will be a DB-9 Male Connector, which plugs into J8 on the Upconverter back panel. The other end will be a DB-9 Female Connector, which plugs into the PC serial port or dumb terminal. The pinout is given in Table 5-3.

Table 5-3. – RS-232 Adaptor – Operator Serial I/O Port

Pin No. DB-9 Male to Upconverter J8	Pin No. DB-9 Female to DTE
1	3
5	5
9	2
2,3,4,6,7,8	N.A.

5.6 IF In (J2)

The IF Input Connector (J2) is a 75 Ohm BNC-F Connector. Inputs are within 50 – 90 MHz for standard units and 100 – 180 MHz for units equipped with 140 MHz.

5.7 Terminal (J6)

The Terminal Port allows for complete control and monitoring of all Upconverter parameters and functions via an RS-232 Serial Interface. The interface comes configured as a DCE device. The pinout is given in Table 5-4.

Table 5-4. J8 – Terminal Port – D-Sub 9-Pin Female Connector

Pin No.	Signal	I/O	Description
2	TX_232	O	RS-232 transmit
3	RX_232	I	RS-232 receive
5	GND	N.A.	Ground
1, 4, 6, 7, 8, 9	N.A.	N.A.	No Connect

5.8 Ethernet (J9)

The Ethernet connector can be used for monitor & control functions of the Upconverter. The physical interface is a standard RJ-45 connector.

5.9 RF Out (J1)

The RF Out (J1) is the RF Input of the SFC2900A Upconverter. It is an WR-28 Waveguide.

5.10 Monitor Ports

The SFC2900A Upconverter has Monitor Ports located on the Front Panel (Figure 5-7) that allow the operator to monitor the IF Output and RF Input.

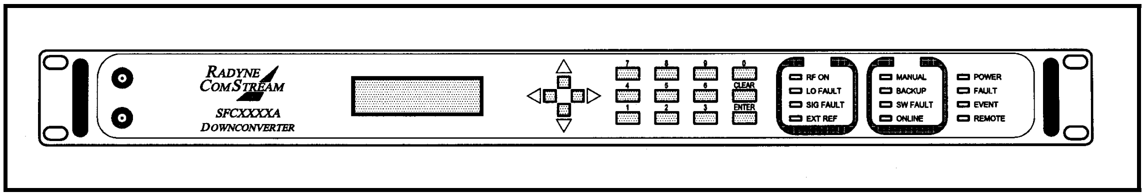


Figure 5-7. SFC2900A Upconverter Front Panel with Monitor Ports

5.10.1 IF Monitor Port

The IF Monitor Port is an SMA-F Type Connector located on the front panel that allows monitoring of the Upconverter's IF Output. The power level of the monitored signal will be-15 dB nominal below the level present at J2.

5.10.2 RF Monitor Port

The RF Monitor port is an SMA-F Type Connector located on the front panel that allows monitoring of the Upconverter's RF Input. The power level of the monitored signal will be-15 dB nominal below the level present at J1.

Maintenance and Troubleshooting

6

6.0 Periodic Maintenance

Radyne ComStream Corporation SFC2900A Upconverter is a designed to provide many thousands of hours of continuous operation. Normal aging and drifting of electronic components can cause the accuracy of the converter to change over time. As with any converter, these changes will affect the frequency accuracy and frequency conversion amplitude accuracy over time.

6.1 Failure Analysis

Faults in the converter are limited in scope to either a LO Fault or a Signal Fault. Other faults, such as a failure of the micro controller, may or may not provide an indication.

6.2 DCE/DTE Operation (DIP Switch S3)

Although the Terminal Port comes configured as a DCE, it can be changed to a DTE by changing the settings of DIP Switch S3 on the M&C PCB Assembly. Refer to Figure 6-1 for DIP Switch settings.

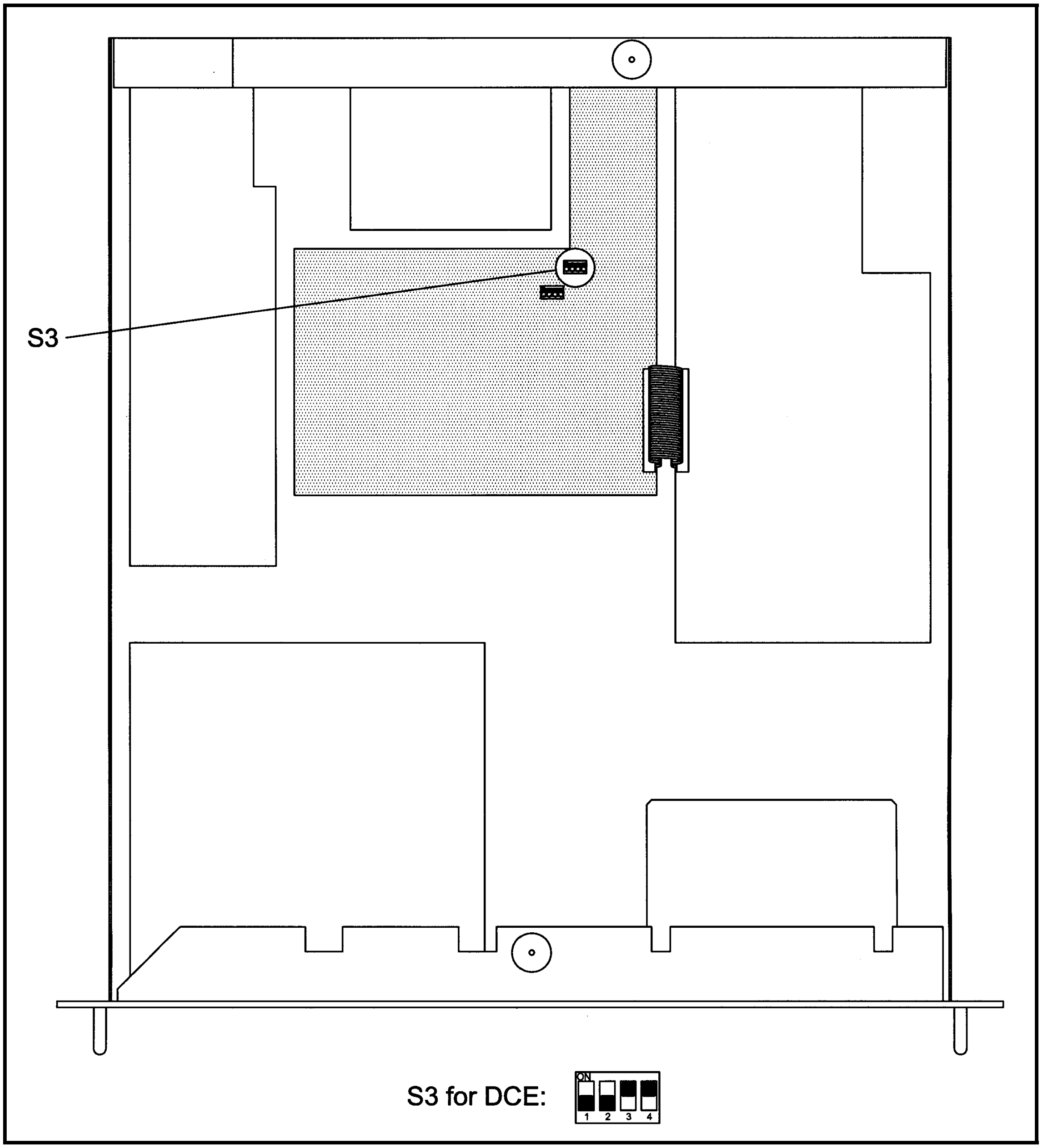


Figure 6-1. DIP Switch Settings for DCE

Technical Specifications

7

7.0 Introduction

This section defines the technical performance parameters and specifications for the SFC2900A Synthesized Frequency Upconverters

7.1 Output Characteristics

Frequency:	28000 - 29100 MHz (Plan A) 29000 - 30250 MHz (Plan B) 30000 - 31000 MHz (Plan C)
Impedance:	50 Ohms
Return Loss:	>19 dB
P1 dBm Output:	+10 dBm Minimum
Connector:	WR-28 Waveguide

7.2 Input Characteristics

Frequency:	70 MHz ±18 MHz Standard 140 MHz ±36 MHz Optional
Impedance:	75 Ohms
Return Loss:	>23 dB
P1 dBm Input:	-15 dBm
Pin Nominal:	-25 dBm
Connector:	BNC F

NOTE

Performance specifications guaranteed at nominal levels only.

7.3 Transfer Characteristics

Type:	Double Conversion, No Spectral Inversion
Gain:	25 dB Minimum
Gain Control:	20 dB in 0.2 dB Increments
Gain Ripple:	±0.25 dB/36 MHz Typical, ±0.50 dB Maximum
Gain Slope:	±0.02 dB/MHz
Gain Stability:	±0.25 dB/24 Hours, ± 1.5 dB; 0 to 50°C
Spurious:	-70 dBm Local Oscillator Related Spurious (In-Band) at Maximum gain -60 dBc Signal Related Spurious (In-Band) at Minimum Attenuation
Third Order Intercept:	+15 dBm -50 dBc IMD Two Tones With 0 dBm Total Output Power
AM/PM Conversion:	0.15°/dB @ +5 dBm Output
Group Delay Linear:	0.025 nsec./MHz
Parabolic:	0.005 nsec./MHz^2
Ripple:	1 nsec. p-p
Carrier Mute:	80 dBm Minimum

7.4 Frequency Synthesizer Characteristics

Resolution:	125 kHz Step Size
Accuracy:	$\pm 5 \times 10^{-9}$
Stability:	$\pm 5 \times 10^{-9}$ Over Temperature (0 to 50°C) $\pm 1 \times 10^{-9}$/24 Hours
Accuracy:	$\pm 5 \times 10^{-9}$

7.5 Single Side Band Phase Noise

Offset	Ka-Band Standard
100 Hz	-60 dBc/Hz
1 KHz	-75 dBc/Hz
10 KHz	-80 dBc/Hz
100 KHz	-80 dBc/Hz
1 MHz	-100 dBc/Hz

External Reference: 10 MHz, 0 dBm, 50 Ohms (5 MHz Optional)

7.6 Operator Interface

Front Panel:	Keypad Control, LED Indicators, and LCD Indicators
Remote Interfaces:	Terminal (RS-232), ASCII and RLLP (RS-232/RS-485) Serial Interfaces, and SNMP (Ethernet) 10 Base-T
Rear Panel Connections:	RF Output (WR-28), IF Input (75 Ohm BNC), Operator Serial Port (D Sub 9-Pin), 10 MHz REF In (50 Ohm BNC), 10 MHz REF Out (50 Ohm BNC), Fault/Test (D Sub 9-Pin), Switch Interface (D Sub 15-Pin), Equipment RS-485 Interface (D Sub 9-Pin), IEC/EN60320/C13 Power Entry Module/Switch, #10 Ground Lug
Front Panel Test Ports:	RF Monitor -25 dB (Nominal) SMA-F, IF Monitor -15 dB (Nominal) SMA-F

7.6.1 Converter Settings

Monitored and/or controlled from the front panel or remotely, using the RS-232/RS-484 or Ethernet remote port:

- Frequency
- Channel Gain
- Current Channel
- Gain Offset
- Event Buffer
- Faults Status and Mask
- Power Supply Voltages
- Frequency Reference Status and Offset Control
- Input Attenuation
- Remote Protocol, Baud, Line, and Echo Modes
- Carrier Control and Status
- Converter Band and User Minimum/Maximum Frequencies
- Converter and Frequency
- Terminal Emulation and Baud Rate Type
- RF Detector, IF Detector, and DAC Attenuation Voltages

7.6.2 LED Indicators

Standby
LO Fault
Sig Fault
Ext Ref Online
Backup
SwFault
Manual (Backup Only)
Power
Fault
Event
Remote

7.7 Physical Characteristics

Size:	19” x 1.75” x 21” deep (48.26 cm x 4.44 cm x 48.26 cm deep)
Weight:	12 lb. (5.44 kg)
Primary Power:	100 - 240 VAC, 50 - 60 Hz
Power Consumption:	50 Watts

7.8 Environmental Characteristics

Operating Temperature:	0 to 50°C
Humidity:	To 95% non-condensing
Altitude:	To 8,000 Feet (2438.4 meters) AMSL
Shock & Vibration:	No loss of frame synchronization at the BER Test set due to a standard hammer drop test on any outside surface of converter. Likewise, no loss of frame sync for temperature gradient of ±22°C/hour.
Non-Operating Temperature:	-32 to +70°C, 99% Humidity, Non-Condensing

NOTE

These specifications are subject to change without notice.

Remote ASCII

A

A.0 Control Commands

Control Commands are those commands that alter the setup or operating parameters of the converter. The applicable commands are as follows:

HELP	displays all available user commands
STATUS	displays converter status
DATA	displays data formats associated with commands
SHOWRSS	displays Received Signal Strength
SETFREQ	sets the frequency for the current channel
SETGAIN	sets the gain for the current channel
SETCHAN	sets the current channel
STORE	saves all data under the current channel
RFON	turns RF on
RFOFF	turns RF off
SETATTN	sets the input attenuation for the current channel
CLRFAULT	clears latched faults
RAMGAIN	sets the gain for another/alternate channel
RAMFREQ	sets the frequency for another/alternate channel
ERASE	erases stored status, frequency and gain data upon next reset
RESTART	restarts the converter
SETSN	sets unit serial number
ENYDAR	password (RADYNE backwards)
UNLOCK	unlocks the unit for factory setup
TOUCHUP	unlocks the unit for factory touchup of the calibration table
DISFAULT	disables faults
ENAFAULT	enables faults
LABHELP	display help for factory setup commands
DUMPCAL	-------
RDATTEN	displays the DAC value for a given freq and gain indexes
WRATTEN	writes the given DAC value for a given freq and gain indexes
GAINOFFSET?	displays the Gain Offset value
GAINOFFSET =	sets the Gain Offset value
DMPCHAN	displays the contents of the entire channel table
DMPCAL	displays DAC values in the calibration table for the given freq Index
CURDAC	displays the DAC value used for the unit's current configuration
DACFOR	displays the DAC value used for the given frequency and gain values

A.1 Remote Help Menu

The following command returns information on all remote serial commands. The command is as follows:

@01/HELP<cr>

A single converter or a prime converter in 1 for 8 configuration will return the following:

For Upconverter:

<cr><lf>	
HELP	Show all commands
DATA	Show data associated with commands
STATUS	Show status
RFOFF	Mutes the output
RFON	Unmutes the output
CLRFAULT	Clears any stored faults
DUMPADC	Dump ADC data
ERASE	Erases saved data when the converter is restarted
RESTART	Restarts the converter
SETCHANcc	Retrieve specified channel
SETFREQffff.t	Set current channel's frequency
SETGAINsgg.g	Set current channel's gain
SETATTNaa	Set converter input attenuation
STORE	Save current channel's frequency & gain
RAMGAINccsgg.g	Set stored gain for the specified channel
RAMFREQccffff.t	Set stored frequency for the specified channel
<cr><lf>	
<cr><lf>	{End of transmission}

For Upconverter:

<cr><lf>	
HELP	Show all commands
DATA	Show data associated with commands
STATUS	Show status
SHOWRSS	Displays the received signal strength
CLRFAULT	Clears any stored faults
DUMPADC	Dump ADC data
ERASE	Erases saved data when the converter is restarted
RESTART	Restarts the converter
SETCHANcc	Retrieve specified channel
SETFREQffff.t	Set current channel's frequency
SETGAINsgg.g	Set current channel's gain
SETATTNaa	Set converter input attenuation
STORE	Save current channel's frequency & gain
RAMGAINccsgg.g	Set stored gain for the specified channel
RAMFREQccffff.t	Set stored frequency for the specified channel
<cr><lf>	
<cr><lf>	{End of transmission}

A prime converter in a 1 for 1 configuration will return the following:

<cr><lf>	
HELP	Show all commands
DATA	Show data associated with commands
STATUS	Show status
RFOFF	Mutes the output
RFON	Unmutes the output
CLRFAULT	Clears any stored faults
DUMPADC	Dump ADC data
ERASE	Erases saved data when the converter is restarted
RESTART	Restarts the converter
SETCHANcc	Retrieve specified channel
SETFREQffff.t	Set current channel's frequency
SETGAINsgg.g	Set current channel's gain
SETATTNaa	Set converter input attenuation
STORE	Save current channel's frequency & gain
RAMGAINccsgg.g	Set stored gain for the specified channel
RAMFREQccffff.t	Set stored frequency for the specified channel
AUTO	Remote Auto switch
MANUAL	Remote Manual switch
<cr><lf>	{End of transmission}

A.2 Status Command

This command returns the current status of the converter. The command is as follows:

@01/STATUS<cr>

A single converter will return the following string of information:

For Upconverter:

<cr><lf>	
Configuration: Single	
Status:	{Offline, Warming up/Offline/Setup/Online}
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
Input Atten: aa dB	{aa = input attenuation}
RF:	{Off/On}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

For Upconverter:

<cr><lf>	
Configuration: Single	
Status:	{Offline, Warming up/Offline/Setup/Online}
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
RSS: aa dBm	{aa = received signal strength}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

A.3 Data

This command returns the applicable data formats for the various commands. The command is as follows:

@01/DATA

A single converter, prime converter in a 1:1 switch configuration or prime converter in a 1:8 Switch Configuration will return the following string of information:

For Upconverter:

<cr><lf>	
cc = channel (01 to 30)	
gg.g = gain (+5.0 to +30.0)	
s = sign (+ or -)	
ffff = frequency MHz (ffff.0 to ffff.0)	{ffff.0 = frequency in MHz, low end to high end}
t = Kilohertz step (0 to 7 for 000 - 875 in 125 kHz increments)	
aa = Input Attenuation (00 to 30)	
<cr><lf>	
<cr><lf>	{End of transmission}

For Upconverter:

<cr><lf>	
cc = channel (01 to 30)	
gg.g = gain (+5.0 to +30.0)	
ffff = frequency MHz (ffff.0 to ffff.0)	{ffff.0 = frequency in MHz, low end to high end}
t = Kilohertz step (0 to 7 for 000 - 875 in 125 kHz increments)	
<cr><lf>	
<cr><lf>	{End of transmission}

A.4 Show Received Signal Strength Command (Downconverter Only)

This command will cause the converter to output the Received Signal Strength.

@01/SHOWRSS<cr>

The converter will return the following:

<cr><lf>	
RSS: vv	{vv = value for Received Signal Strength}
<cr><lf>	
<cr><lf>	{End of transmission}

A.5 Set Current Channel Frequency Command

This command alters the stored frequency of the current channel. The command is as follows:

@01/SETFREQffff.t<cr>

The frequency numerical values include four digits for MHz and one digit "t" which indicates the resolution in 125 kHz steps.

The values of "t" are as follows:

t	**frequency**
0	000 kHz
1	125 kHz
2	250 kHz
3	375 kHz
4	500 kHz
5	625 kHz
6	750 kHz
7	875 kHz

Valid frequency ranges are dependant upon device configuration: To see range for current configuration, send the SETFREQ Command without any data (i.e. "@01SETFREQ<cr>"). This will result in an error message being returned that contains the current freq limits. Frequencies outside this range or frequencies that are of an invalid form will be responded to by the 'illegal frequency' prompt. If the synthesizer is unable to tune to the desired band and frequency, the converter will indicate an LO Fault Condition status indication and will change to an off-line or out-of-service indication.

If successful, the converter will return the following string:

For Upconverter:

<cr><lf>	
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
Input Atten: aa dB	{aa = input attenuation}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

For Upconverter:

<cr><lf>	
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

A.6 Set Current Channel Gain Command

This command alters the stored Gain of the current channel. The command is as follows:

@01/SETGAINsgg.g<cr>

The numeric value ‘s’ indicates the ‘plus’ sign (+) or ‘minus’ sign (-). The numeric value ‘g’ consists of three digits indicating gain. Valid Gain ranges are dependant upon device configuration: To see range for current configuration, send the setgain command without any data (i.e. “@SETGAIN<cr>”). This will result in an error message being returned that contains the current gain limits. Gain values outside this range will be responded to by the ‘ILLEGAL GAIN’ prompt.

If successful, the converter will return the following string:

For Upconverter:

<cr><lf>	
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
Input Atten: aa dB	{aa = input attenuation}
RF:	{Off/On}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

For Upconverter:

<cr><lf>	
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
RSS: nn	{n = current Received Signal Strength}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

A.7 Set Channel Command

This command changes the Current Channel and thus the Gain and Frequency of the converter to one of the 30 preprogrammed channels. The command is as follows:

@01/SETCHANcc<cr>

Where 'cc' represents a channel number from 01 - 30.

If successful, the converter will return the following string:

For Upconverter:

<cr><lf>	
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
Input Atten: aa dB	{aa = input attenuation}
RF:	{Off/On}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

For Upconverter:

<cr><lf>	
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
RSS: nn	{n = current Received Signal Strength}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

A.8 Store Current Channel Settings

This command stores the current settings for the Frequency and Gain into the channel table for the currently selected channel. The command is as follows:

@01/STORE<cr>

If successful, the converter will return the following string:

<cr><lf>	
Channel: cc	{cc = current channel number, 01 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

A.9 RF On/Off Command (Upconverter Only)

These commands control the converter's output. The commands are as follows:

@01/RFON<cr>

@01/RFOFF<cr>

> **NOTE**
>
> ***If the converter is faulted, any attempt to turn on the RF without first clearing the fault will fail.***

If successful, the converter will return the following string:

For backup converter:

Backup RF: {Off/On}	
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
<cr><lf>	
<cr><lf>	{End of transmission}

For Single or Primary Converter:

RF: {Off/On}	
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
<cr><lf>	
<cr><lf>	{End of transmission}

A.10 Change Input Attenuation Command (Upconverter Only)

This command alters the converter-input attenuation. The commands are as follows:

@01/SETATTNaa<cr>

Where aa is the input attenuation (00 - 30)

If successful, the converter will return the following string:

<cr><lf>	
Channel: cc	{cc = current channel number, 00 to 30}
Frequency: ffff.fff	{ffff.fff = frequency in MHz}
Gain: sgg.g	{s = ± and gg.g = gain in dB}
Input Atten: aa dB	{aa = input attenuation}
RF:	{Off/On}
Stored Faults:	{None/Signal Fault/LO Fault/LO Fault, Signal Fault}
Reference:	{Internal/External}
<cr><lf>	
<cr><lf>	{End of transmission}

A.11 Clear Faults Command

This command clears any stored faults. The command is as follows:

@01/CLRFAULT<cr>

The converter will not return a string.

A.12 Set Stored Gain For a Specified Channel

This command allows the user to set the Stored Gain for a specified channel. The command is as follows:

@01/RAMGAINccsgg.g<cr>

If successful, the converter will not return a string.

A.13 Set Stored Frequency For a Specified Channel

This command allows the user to set the Stored Frequency for a specified channel other than the current one. The command is as follows:

@01/RAMFREQccffff.t<cr>

If successful, the converter will not return a string.

A.14 Erase

This command allows the user to erase the Stored Status, Frequency and Gain Information the next time the unit is reset. The command is as follows:

@01/ERASE<cr>

If successful, the converter will not return a string.

A.15 Restart

This command allows the user to reset/restart the converter. The command is as follows:

@01/RESTART<cr>

If successful, the converter will not return a string.

A.16 Read DAC Value by Index

This command is used to display the contents of the calibration table (DAC value) for the given Frequency Index (ff) and the given Attenuation Index (aa). The command is as follows:

@01/RDATTENff aa<cr>

NOTE

Parameters are not actual values for frequency and attenuation but the actual index into the various arrays that make up the power calibration table: The valid ranges for these values are dependant on device type and configuration.

If successful, the converter will return the following string:

<cr><lf>	
Cal Data = dddd:	{dddd is the DAC value}
<cr><lf>	
<cr><lf>	{End of transmission}

A.17 Write DAC Value by Index

This command is used to set the contents of the calibration table (DAC value) for the given Frequency Index (ff) and the given Attenuation Index (aa) to the given value (vvvv). The command is as follows:

@01/WRATTENff aa vvvv<cr>

NOTE

Parameters are not actual values for frequency and attenuation but the actual index into the various arrays that make up the power calibration table: The valid ranges for these values are dependant on device type and configuration.

If successful, the converter will not return a string.

A.18 Get Gain Offset (Downconverter Only)

This command displays the value for the Gain Offset. The command is as follows:

@01/GAINOFFSET?<cr>

If successful, the converter will return the following string:

<cr><lf>	
Gain Offset Value = gg:	{gg is the gain offset value}
<cr><lf>	
<cr><lf>	{End of transmission}

A.19 Set Gain Offset (Downconverter Only)

This command sets the value for the Gain Offset. The command is as follows:

@01/GAINOFFSET = <cr>

If successful, the converter will return the following string:

<cr><lf>
Gain Offset Value = gg: {gg is the gain offset value}
<cr><lf>
<cr><lf> {End of transmission}

A.20 Dump Channel Table

This command returns the contents of the Channel Table. The command is as follows:

@01/DMPCHAN<cr>

If successful, the converter will return the following string:

<cr><lf>
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
<cr><lf>
<cr><lf> {End of transmission}

where:
ffff.f {f = frequency for channel entry]
sgg.g {s = ‘+’ or ‘-‘ : gg.g = Gain for channel entry]

A.21 Dump Calibration Table Set

This command returns the contents (DAC values for all gains) of the Power Calibration Table for the given Frequency Index. The command is as follows:

@01/DMPCALff<cr>

where:
ff {Index into the frequency array portion of the table}

If successful, the converter will return the following string:

<cr><lf>
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
[ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g] [ffff.f,sgg.g]
<cr><lf>
<cr><lf> {End of transmission}

where:
ffff.f {f = frequency for channel entry}
sgg.g {s = '+' or '-' : gg.g = Gain for channel entry}

A.22 Get Current DAC Value

This command returns the DAC value in use for the unit's current configuration (Values of Frequency and Gain). The command is as follows:

@01/CURDAC<cr>

If successful, the converter will return the following string.:

<cr><lf>
DAC Value = dddd {dddd = DAC Value}
<cr><lf>
<cr><lf> {End of transmission}

A.23 Get DAC Value for Frequency and Gain

This command returns the DAC value to be used for the given values of frequency and gain. The command is as follows:

@01/DACFORffff.f gg.g<cr>

where:
ffff.f {f = frequency }
sgg.g {s = '+' or '-' : gg.g = Gain }

If successful, the converter will return the following string.:

<cr><lf>
DAC Value = dddd {dddd = DAC Value}
<cr><lf>
<cr><lf> {End of transmission}

A.24 Error Messages

Bad address

<cr><lf>
INVALID ADDRESS
<cr><lf>
<cr><lf> {End of transmission}

Bad command

<cr><lf>
ILLEGAL COMMAND
<cr><lf>
<cr><lf> {End of transmission}

Only in backup 1 - 8

<cr><lf>
Command is ONLY valid for the backup converter
in a 1 for 8 configuration
<cr><lf> {End of transmission}

Only in backup 1 to 1

<cr><lf>
Command is ONLY valid in a 1 for 1 switch configuration
<cr><lf> {End of transmission}

Only in backup

<cr><lf>
Command is ONLY valid for the backup converter
<cr><lf> {End of transmission}

Bad channel

<cr><lf>
ILLEGAL CHANNEL (sb 01 to 30)
<cr><lf>
<cr><lf> {End of transmission}

Bad frequency

<cr><lf>
ILLEGAL FREQUENCY
(sb ffff.0 to ffff.0) {ffff.0 = frequency in MHz, low end to high end}
<cr><lf>
<cr><lf> {End of transmission}

Bad gain

<cr><lf>
ILLEGAL GAIN
(sb sgg.g to sgg.g) {s = ± and gg.g = gain in dB, low end to high end, were range is (– (Input Atten) + 10) to (– (Input Atten) + 30)}
<cr><lf>
<cr><lf> {End of transmission}

Bad input attenuation

<cr><lf>
ILLEGAL INPUT ATTENUATION (sb 00 to 30)
<cr><lf>
<cr><lf> {End of transmission}

Converter is faulted

<cr><lf>
Unable to turn RF on. Check converter status
<cr><lf> {End of transmission}

Remote mode only

<cr><lf>
Command valid in REMOTE mode only
<cr><lf> {End of transmission}

Invalid Data

<cr><lf>
INVALID DATA FIELD
<cr><lf> {End of transmission}

Remote RLLP

B

CAUTION!!

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

Before creating any software based on the information contained in this document, contact the Radyne ComStream Corporation Customer Service Department (602-437-9620) to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.

B.1 Converter Opcode Command Set

The converter opcode command set is listed below:

Command	Opcode
Query control mode	2404h
Query time	240Eh
Query date	240Fh
Query time and date	2410h
Query software revision number	3000h
Query firmware part number and release date	3001h
Query converter status	3002h
Query converter configuration	3003h
Query switch status	3010h

Query switch configuration	3011h
Command converter set control mode	2600h
Command converter clear latched alarms	2C03h
Command converter set time	2C04h
Command converter set date	2C05h
Command converter set time and date	2C06h
Command converter set terminal emulation	2C0Bh
Command converter set terminal baud rate	2C0Ch
Command converter set frequency for the current channel	3020h
Command converter set gain for the current channel	3021h
Command converter set frequency for the given channel	3022h
Command converter set gain for the given channel	3023h
Command converter set channel	3024h
Command converter set carrier control	3025h
Command converter set input attenuation	3026h
Command converter set alarm masks	3027h
Command switch set backup mode	3040h
Command switch force a manual backup	3041h
Command switch set learn configuration	3042h
Command switch backup test configuration	3043h
Command switch set compensation control	3044h
Command switch set converter compensation	3045h
Command switch set all converter compensations	3046h
Command switch set converter priority	3047h
Command switch set all converter priorities	3048h
Command switch set alarm masks	3049h
Command switch set fault delay	304Ah

B.2 Converter Queries

Opcode: *<2404H>* ***Query control mode***

Query Response		
<1>	Control Mode	0=Local, 1=Terminal, 2=Remote, 3=Ethernet

Opcode: *<240EH>* ***Query time***

Query Response		
<1>	Hour	0 – 23
<1>	Minute	0 – 59
<1>	Second	0 – 59

Opcode: *<240FH>* ***Query date***

Query Response		
<1>	Year	0 – 99
<1>	Month	0 – 11
<1>	Day	0 – 30

Opcode: *<2410H>* ***Query time and date***

Query Response		
<1>	Year	0 – 99
<1>	Month	0 – 11
<1>	Day	0 – 30
<1>	Hour	0 – 23
<1>	Minute	0 – 59
<1>	Second	0 – 59

Opcode: *<3000H>* ***Query software revision number***

Query Response		
<2>	Revision Number	Binary value with implied decimal point, 120 means release 1.20

Opcode: *<3001H>* ***Query firmware part number and release date***

Query Response		
<9>	Part Number String	FW/4835xx, xx represents the release version, example –B
<9>	Release Date String	Release date in the ddMMMyyyy format, ex 19MAR2004

Opcode: <3002H> Query converter status

Query Response

<4>	Signal strength	Reserved. Not implemented
<1>	Carrier Status	0=OFF, 1=ON
<1>	Converter Status	0=Standby, 1=Faulted Offline, 2=Online, 3=Faulted Online, 4=Setup
<1>	Switch Status	0=Backward Compatible Switch, 1=Prime Chain Switch, 2=Backup Chain Switch, 3=No Switch
<1>	Converter Config	0=Single Converter, 1=Primary1F1, 2=Backup1F1, 3=Primary1FN, 4=Baclup1FN
<1>	Converter Type	0=Down, 1=Up
<1>	Converter Band	0=C-Band, 1=Ku-Band, 2=Ka-Band
<1>	Frequency Type	0=70 MHz, 1=140 MHz
<1>	Reference Type	0=Internal, 1=External
<1>	Major Alarm Status	Bit 0 = LO Fault Bit 1 = Signal Fault Bits 2-7 = Spares
<1>	Minor Alarm Status	Bit 0 = RF Detect Fault Bit 1 = IF Detect Fault Bits 2-7 = Spares
<1>	Latched Major Alarm Status	Bit 0 = LO Fault Bit 1 = Signal Fault Bits 2-7 = Spares
<1>	Latched Minor Alarm Status	Bit 0 = RF Detect Fault Bit 1 = IF Detect Fault Bits 2-7 = Spares
<1>	Inter Converter Communication Address	
<1>	Reserved	

Opcode: *<3003H>* ***Query converter configuration***

Query Response		
<4>	Frequency	Binary value in 125 KHz steps
<4>	Gain	-20.0 dB to +30.0 dB depending on input attenuator setting
<1>	Input Attenuation	0 through 31, Up converter only
<1>	Channel	Current channel, 1 through 30
<1>	Carrier Control	0=Off, 1=On
<1>	Reference Type	0=Internal, 1=External
<1>	Major Alarm Mask	Bit 0 = LO Fault Bit 1 = Signal Fault

		Bits 2-7 = Spares
<1>	Minor Alarm Mask	Bit 0 = LO Fault Bit 1 = Signal Fault Bits 2-7 = Spares

B.3 Converter Commands

Opcode: *<2600H>* ***Command control mode***

<1>	Mode	0=Local, 1=Terminal, 2=Remote, 3=Ethernet

Opcode: *<2C03H>* ***Command clear latched alarms***

(No Command Data)

Opcode: *<2C04H>* ***Command set time***

<1>	Hour	0 – 23
<1>	Minute	0 – 59
<1>	Second	0 – 59

Opcode: *<2C05H>* ***Query set date***

<1>	Year	0 – 99
<1>	Month	0 – 11
<1>	Day	0 – 30

Opcode: *<2C06H>* ***Command set time and date***

<1>	Year	0 – 99
<1>	Month	0 – 11
<1>	Day	0 – 30
<1>	Hour	0 – 23
<1>	Minute	0 – 59
<1>	Second	0 – 59

Opcode: *<2C0BH>* ***Command set terminal emulation***

<1>	Emulation	0=AddsVP, 1=VT100, 2=WYSE50

Opcode: *<2C0CH>* ***Command set terminal baud rate***

<1>	Baud rate	0=Baud 2400, 1=Baud 9600, 2=Baud 19200

Opcode: *<3020H>* ***Command set frequency for the current channel***

<4>	Frequency	Binary value in 125 KHz steps

Opcode: *<3021H>* ***Command set gain for the current channel***

<4>	Gain	-20.0 dB to +30.0 dB depending on input attenuator setting

Opcode: *<3022H>* ***Command set frequency for the given channel***

<4>	Frequency	Binary value in 125 KHz steps
<1>	Channel	1 through 30

Opcode: *<3023H>* ***Command set gain for the given channel***

<4>	Gain	-20.0 dB to +30.0 dB depending on input attenuator setting
<1>	Channel	1 through 30

Opcode: *<3024H>* ***Command set channel***

<1>	Channel	1 through 30

Opcode: *<3025H>* ***Command set carrier control***

<1>	Carrier Control	0=Off, 1=On

Opcode: *<3026H>* ***Command set input attenuation*** *Opcode:* *<3026H>* ***Command set input attenuation***

<1>	Input Attenuation	0 through 31, Up converter only

Opcode: *<3027H>* ***Command set converter alarm masks***

<1>	Major Alarm Mask	Bit 0 = LO Fault Bit 1 = Signal Fault Bits 2-7 = Spares
<1>	Minor Alarm Mask	Bits 0-7 = Spares

<1>	Input Attenuation	0 through 31, Up converter only

Opcode: *<3027H>* ***Command set converter alarm masks***

<1>	Major Alarm Mask	Bit 0 = LO Fault Bit 1 = Signal Fault Bits 2-7 = Spares
<1>	Minor Alarm Mask	Bits 0-7 = Spares

SNMP MIB

C

```
CONVERTER-MIB DEFINITIONS ::= BEGIN

        IMPORTS
                enterprises
                        FROM RFC1155-SMI
                MODULE-IDENTITY, OBJECT-TYPE
                        FROM SNMPv2-SMI;

converter MODULE-IDENTITY
        LAST-UPDATED "200301081000Z"
        ORGANIZATION "Radyne ComStream Inc."
        CONTACT-INFO
                        "Customer Service
                        Postal: Radyne ComStream, Inc. - Phoenix.
                        3138 E. Elwood Street
                        Phoenix, AZ 85034
                        USA

                        Tel: (602) 437-9620
                        Fax: (602) 437-4811

                        Email: xxxx@radn.com"

        DESCRIPTION
                        "Radyne ComStream converter MIB module."

        REVISION    "200109051000Z"
                DESCRIPTION   "Initial version of the Radyne ComStream Converter MIB module.  This is a
                document whose contents are subject to change without prior notice. Converter MIB Object
                Identifiers description. The private enterprise number 2591 is a unique identifier assigned to
                Radyne by the Internet Assigned Numbers Authority (IANA).  This number is used to uniquely
                define vendor specific information such as private MIBs."

        ::= { radyne 12 }


-- groups in Radyne specific MIB

        radyne                          OBJECT IDENTIFIER ::= { enterprises 2591 }

        converterMIBObjects             OBJECT IDENTIFIER ::= { converter 1 }

        radConverterNVStatus            OBJECT IDENTIFIER ::= { converterMIBObjects 1 }
        radConverterStatus              OBJECT IDENTIFIER ::= { converterMIBObjects 2 }

        radConverterSwitchNVStatus      OBJECT IDENTIFIER ::= { converterMIBObjects 3 }
        radConverterSwitchStatus        OBJECT IDENTIFIER ::= { converterMIBObjects 4 }

        radConverterCommonNVStatus      OBJECT IDENTIFIER ::= { converterMIBObjects 5 }
        radConverterCommonStatus        OBJECT IDENTIFIER ::= { converterMIBObjects 6 }

        radConverterMIBTraps            OBJECT IDENTIFIER ::= { converterMIBObjects 7 }

        raConverterMIBConformance       OBJECT IDENTIFIER ::= { converter 2 }
        raConverterGroups               OBJECT IDENTIFIER ::= { radConverterMIBConformance 1 }
        radConverterAgentCapabilities   OBJECT IDENTIFIER ::= { radConverterMIBConformance 2 }

-- ---------------------------------------------------------------------------------------------------------------
```

```
-- ------------------------------------------------------------------------------------------------------------------
-- Textual Conventions

ControlType ::= TEXTUAL-CONVENTION
        STATUS          current
        DESCRIPTION     "Represents a boolean control value."
        SYNTAX          INTEGER { disable(1), enable(2) }

InversionType ::= TEXTUAL-CONVENTION
        STATUS          current
        DESCRIPTION     "Represents a boolean inversion value."
        SYNTAX          INTEGER { normal(1), inverted(2) }

AlarmByteType ::= TEXTUAL-CONVENTION
        STATUS          current
        DESCRIPTION     "Represents a one byte integer value. Limits are 0 to 255"
        SYNTAX          INTEGER (0..255)

PrimeStatusType ::= TEXTUAL-CONVENTION
        STATUS          current
        DESCRIPTION     "Represents a one byte integer value. Limits are 0 to 255
                                Bit0 = Prime1 status
                                Bit1 = Prime2 status
                                Bit2 = Prime3 status
                                Bit3 = Prime4 status
                                Bit4 = Prime5 status
                                Bit5 = Prime6 status
                                Bit6 = Prime7 status
                                Bit7 = Prime8 status "
        SYNTAX          INTEGER (0..255)

PrimeControlType ::= TEXTUAL-CONVENTION
        STATUS          current
        DESCRIPTION     "Represents a prime control setup. Limits are 1 to 9
                                1 = Prime1
                                2 = Prime2
                                3 = Prime3
                                4 = Prime4
                                5 = Prime5
                                6 = Prime6
                                7 = Prime7
                                8 = Prime8
                                9 = All Primes"
        SYNTAX          INTEGER (1..9)
-- ------------------------------------------------------------------------------------------------------------------
-- ------------------------------------------------------------------------------------------------------------------
-- Converter non-volatile status information.

radConverterFrequency OBJECT-TYPE
        SYNTAX          INTEGER (50000000..90000000)
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Selects RF input frequency in 125 KHz steps.
                                3.62 GHz to 4.20 GHz SFC4200 Ka-Band Down Converter
                                5.845 GHz to 6.425 GHz SFC6400 Ka-Band Up Converter
                                10.95 GHz to 12.75 GHz SFC 1275 Ku-Band Down Converter
                                14.00 GHz to 14.50 GHz SFC 1450 Ku-Band Up Converter"
        ::= { radConverterNVStatus 1 }

radConverterChannelGain OBJECT-TYPE
        SYNTAX          INTEGER (-200..300)
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Sets the Channel Gain in 0.1dB steps. -20.0 dB to 30.0 dB with an
                                implied decimal point. "
```

```
        ::= { radConverterNVStatus 2 }

radConverterCurrentChannel OBJECT-TYPE
        SYNTAX          INTEGER (1..30)
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Channel number, 1 through 30. Selects the current channel of the unit.
                        Each channel allows entering of an independent set of parameters
(Frequency,
                        Gain, etc.).  For example, Channel 1 Frequency might be set to 3.8GHz and
                        Channel 2 could be set to 4.0GHz.  Any other parameters could be different
                        as well.  The advantage is that a completely different setup can be arrived
                        at by merely changing the Channel number."
        ::= { radConverterNVStatus 3 }

radConverterCarrierControl OBJECT-TYPE
        SYNTAX          INTEGER {
                        off(1),
                        on(2)
                        }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Turns carrier off and on."
        ::= { radConverterNVStatus 4 }

radConverterMajorAlarmMask OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Major Alarm mask:
                        Bit 0 = LO Fault
                        Bit 1 = Signal Fault
                        Bit 2-7 = Spares
                        0 = Mask, 1 = Allow"
        ::= { radConverterNVStatus 5 }

radConverterMinorAlarmMask OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Minor Alarm mask:
                        Bit 0 = RF Dtect Fault
                        Bit 1 = IF Dtect Fault
                        Bit 2-7 = Spares
                        0 = Mask, 1 = Allow"
        ::= { radConverterNVStatus 6 }


-- ---------------------------------------------------------------------------------------------------------------
-- ---------------------------------------------------------------------------------------------------------------
-- Converter status information.

radConverterCarrierStatus OBJECT-TYPE
        SYNTAX          INTEGER {
                        off(1),
                        on(2)
                        }
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                        "Shows status of the carrier, on or off"
        ::= { radConverterStatus 1 }
```

```
radConverterSystemStatus OBJECT-TYPE
        SYNTAX          INTEGER {
                                standby(1),
                                online(2),
                                faulted(3),
                                setup(4)
                                }
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Shows operating status of the converter"
        ::= { radConverterStatus 2 }

radConverterSwitchPresentStatus OBJECT-TYPE
        SYNTAX          INTEGER {
                                not_present(1),
                                present(2)
                                }
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
"Shows switch status"
        ::= { radConverterStatus 3 }

radConverterConfiguration OBJECT-TYPE
        SYNTAX          INTEGER {
                                single_converter(1),
                                primary_1f1_converter(2),
                                backup_1f1_converter(3),
                                primary_1fn_converter(4),
                                backup_1fn_converter(5)
                                }
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Shows converter configuration"
        ::= { radConverterStatus 4 }

radConverterType OBJECT-TYPE
        SYNTAX          INTEGER {
                                down(1),
                                up(2)
                                }
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Shows converter type"
        ::= { radConverterStatus 5 }

radConverterBand OBJECT-TYPE
        SYNTAX          INTEGER {
                                c_band(1),
                                ku_band(2)
                                }
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Shows converter band"
        ::= { radConverterStatus 6 }

radConverterFrequencyType OBJECT-TYPE
        SYNTAX          INTEGER {
                                freq_70mhz(1),
                                freq_140mhz(2)
                                }
        MAX-ACCESS      read-only
        STATUS          current
```

```
        DESCRIPTION
                                "Shows converter frequency type"
        ::= { radConverterStatus 7 }

radConverterReferenceType OBJECT-TYPE
        SYNTAX          INTEGER {
                                internal(1),
                                external(2)
                                }
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Shows converter reference type"
        ::= { radConverterStatus 8 }

radConverterMajorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "A bit field.  On startup, the agent initializes this
                                to the value '00000000'B
                                Bit 0 = LO Fault
                                Bit 1 = Signal Fault
                                Bit 2-7 = Spares
                                0 = Pass, 1 = Fail"
        ::= { radConverterStatus 9 }

radConverterMinorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "A bit field.  On startup, the agent initializes this to
                                the value '00000000'B
                                Bit 0 = RF Dtect Fault
                                Bit 1 = IF Dtect Fault
                                Bit 2-7 = Spares
                                0 = Pass, 1 = Fail"
        ::= { radConverterStatus 10 }

radConverterLatchedMajorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "A bit field.  On startup, the agent initializes this
                                to the value '00000000'B.
                                Bit 0 = LO Fault
                                Bit 1 = Signal Fault
                                Bit 2-7 = Spares
                                0 = Pass, 1 = Fail"
        ::= { radConverterStatus 11 }

radConverterLatchedMinorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "A bit field.  On startup, the agent initializes this to
                                the value '00000000'B.
                                Bit 0 = RF Dtect Fault
                                Bit 1 = IF Dtect Fault
                                Bit 2-7 = Spares
                                0 = Pass, 1 = Fail"
        ::= { radConverterStatus 12 }
```

```
radConverterICCAddress OBJECT-TYPE
        SYNTAX          INTEGER (1..255)
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                " "
        ::= { radConverterStatus 13 }

radConverterICCType OBJECT-TYPE
        SYNTAX          INTEGER (0..255)
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "A bit field that shows converter ICC type.  On startup, the agent
                                initializes this to the value '00000000'B.
                                Bit 0-3 = Band
                                        Down-Band: 0 through 5
                                                0=Normal Ka-Band, 1=Extended Ka-Band, 2=Normal Ku-
Band,
                                                3=Normal American Ku-Band, 4=India High Ka-Band,
5=European Ku-Band
                                        Up-Band: 0 through 4
                                                0=Normal Ka-Band, 1=Extended Ka-Band, 2=Normal Ku-
Band,
                                                3=Normal Ku-Band, 4=India High Ka-Band
                                Bit 4-5 = Spare                 Not Used
                                Bit 6 = Normal_Custom           0=Normal, 1=Custom
                                Bit 7 = Down_Up                 0=Down,   1=Up"
        ::= { radConverterStatus 14 }


-- -------------------------------------------------------------------------------------------------------------------
-- -------------------------------------------------------------------------------------------------------------------
-- Converter Switch non-volatile status information.

radConverterSwitchBackupMode OBJECT-TYPE
        SYNTAX          INTEGER {
                        manual(1),
                        auto_nonrevertive(2),
                        auto_revertive(3)
                        }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Selects MANUAL or AUTOMATIC backup modes.
                        Manual:  A Prime Converter can be backed up through manual control only.
                        Auto-Nonrevertive:  A Prime Converter will be backed up if it fails.
                                It will remain backed up until it is manually unbacked.
                        Auto-Revertive:  A Prime Converter will be backed up if it fails.
                                If a second Converter of a higher priority (see 7. below) fails, the
                                Switch will unback the first and backup the second Converter.  Also,
                                if the first Converter recovers after it has been backed up (i.e., no
                                longer has a fault), the Switch will unback it and place it online again."
        ::= { radConverterSwitchNVStatus 1 }

radConverterSwitchLearn OBJECT-TYPE
        SYNTAX          PrimeControlType
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Learn Prime converter or learn All. Causes the Backup unit to 'Learn'
                                all the settings of the selected Primes.  The Backup can only backup a
                                Prime that it has learned."
        ::= { radConverterSwitchNVStatus 2 }

radConverterSwitchBackupTest OBJECT-TYPE
        SYNTAX          PrimeControlType
```

```
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Checks if Prime can be backed up."
        ::= { radConverterSwitchNVStatus 3 }

radConverterSwitchForceBackup OBJECT-TYPE
        SYNTAX          INTEGER (0..8)
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Force a manual backup (select 1..8), or unback of a Prime (select 0).
                                When in Manual Backup Mode, this selection will force the selected Prime
                                to be backed up.  Unback will release any Prime that is currently backed
                                up."
        ::= { radConverterSwitchNVStatus 4 }

radConverterSwitchPriority OBJECT-TYPE
        SYNTAX          INTEGER (0..8)
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Prime converter priority. Sets the switching priority of a Prime unit.
                                If more than one unit fails at the same time, the higher priority unit
                                will be backed up.  Also, if one unit is currently backed up and a second
                                unit with a higher priority fails, the first unit will be unbacked and
                                the second unit will be backed up (but only if Backup Mode is
                                Auto-Revertive, see 1. above).  The priority is set as follows.
                                0 = No priority (the Switch will ignore the Downconverter).
                                1 = Highest priority.
                                8 = Lowest priority."
        ::= { radConverterSwitchNVStatus 5 }

radConverterSwitchCompensationControl OBJECT-TYPE
        SYNTAX          INTEGER {
                                disable(1),
                                enable(2)
                                }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Controls the Prime converter compensation, ENABLE/DISABLE."
        ::= { radConverterSwitchNVStatus 6 }

radConverterSwitchCompensation OBJECT-TYPE
        SYNTAX          INTEGER (-50..+50)
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Prime converter compensation of -5.0 dB to +5.0 dB (Implied decimal
point).
                                Offsets the gain of the Backup unit to account for variations in loss
                                through the system.
                                This allows the user to ensure that the signal path of a particular Prime
                                Converter maintains the same output power when backed up."
        ::= { radConverterSwitchNVStatus 7 }

radConverterSwitchFaultDelay OBJECT-TYPE
        SYNTAX          INTEGER (50..10000 )
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Sets the delay between the time a Fault occurs in a Prime unit and the
                                time it is acknowledged by the Backup. This only used in automatic backup
                                modes."
        ::= { radConverterSwitchNVStatus 8 }
```

```
radConverterSwitchNoFaultDelay OBJECT-TYPE
        SYNTAX          INTEGER (50..10000 )
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Sets the delay between the time a Fault goes away in a Prime unit and
                        the time it is acknowledged as gone by the Backup. This only used in
                        automatic backup modes. Not yet implemented."
        ::= { radConverterSwitchNVStatus 9 }

radConverterSwitchMajorAlarmMask OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Major Alarm mask:
                        Bit 0 = RelayFault
                        Bit 1 = Backup Fault
                        Bit 2 = NoBackup
                        Bit 3 = PollingFault
                        Bit 4-7 = Spares
                        0 = Mask, 1 = Allow"
        ::= { radConverterSwitchNVStatus 10 }

radConverterSwitchMinorAlarmMask OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Minor Alarm mask:
                        Bit 0 = LearnedFault
                        Bit 1 = BackupTestFault
                        Bit 2 = ConfigChangedFault
                        Bit 3-7 = Spares
                        0 = Mask, 1 = Allow"
        ::= { radConverterSwitchNVStatus 11 }

-- ---------------------------------------------------------------------------------------------------------------------
-- ---------------------------------------------------------------------------------------------------------------------
-- Converter Switch status information.

radConverterSwitchMajorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                        "A bit field.  On startup, the agent initializes this
                        to the value '00000000'B.
                        Bit 0 = RelayFault
                        Bit 1 = Backup Fault
                        Bit 2 = NoBackup
                        Bit 3 = PollingFault
                        Bit 4-7 = Spares
                        0 = Pass, 1 = Fail"
        ::= { radConverterSwitchStatus 1 }

radConverterSwitchMinorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                        "A bit field.  On startup, the agent initializes this to
                        the value '00000000'B.
                        Bit 0 = LearnedFault
                        Bit 1 = BackupTestFault
                        Bit 2 = ConfigChangedFault
                        Bit 3-7 = Spares
```

```
                              0 = Pass, 1 = Fail"
        ::= { radConverterSwitchStatus 2 }

radConverterSwitchLatchedMajorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                              "A bit field.  On startup, the agent initializes this
                              to the value '00000000'B.
                              Bit 0 = RelayFault
                              Bit 1 = Backup Fault
                              Bit 2 = NoBackup
                              Bit 3 = PollingFault
                              Bit 4-7 = Spares
                              0 = Pass, 1 = Fail"
        ::= { radConverterSwitchStatus 3 }

radConverterSwitchLatchedMinorAlarmStatus OBJECT-TYPE
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                              "A bit field.  On startup, the agent initializes this to
                              the value '00000000'B.
                              Bit 0 = LearnedFault
                              Bit 1 = BackupTestFault
                              Bit 2 = ConfigChangedFault
                              Bit 3-7 = Spares
                              0 = Pass, 1 = Fail"
        ::= { radConverterSwitchStatus 4 }

radConverterSwitchFaultStatus OBJECT-TYPE
        SYNTAX          PrimeStatusType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                              "Prime converter fault status:
                              Bit 0 = Prime 1
                              Bit 1 = Prime 2
                              Bit 2 = Prime 3
                              Bit 3 = Prime 4
                              Bit 4 = Prime 5
                              Bit 5 = Prime 6
                              Bit 6 = Prime 7
                              Bit 7 = Prime 8
                              0 = No Fault, 1 = Fault"
::= { radConverterSwitchStatus 5 }

radConverterSwitchRelayStatus OBJECT-TYPE
        SYNTAX          PrimeStatusType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                              "Prime converter relay status:
                              Bit 0 = Prime 1
                              Bit 1 = Prime 2
                              Bit 2 = Prime 3
                              Bit 3 = Prime 4
                              Bit 4 = Prime 5
                              Bit 5 = Prime 6
                              Bit 6 = Prime 7
                              Bit 7 = Prime 8
                              0 = Off, 1 = On (Fault Condition)"
        ::= { radConverterSwitchStatus 6 }

radConverterSwitchConfigChangedStatus OBJECT-TYPE
```

```
        SYNTAX          PrimeStatusType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Prime converter configuration status:
                                Bit 0 = Prime 1
                                Bit 1 = Prime 2
                                Bit 2 = Prime 3
                                Bit 3 = Prime 4
                                Bit 4 = Prime 5
                                Bit 5 = Prime 6
                                Bit 6 = Prime 7
                                Bit 7 = Prime 8
                                0 = No change, 1 = Changed"
        ::= { radConverterSwitchStatus 7 }

radConverterSwitchLearnStatus OBJECT-TYPE
        SYNTAX          PrimeStatusType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Prime converter learn status:
                                Bit 0 = Prime 1
                                Bit 1 = Prime 2
                                Bit 2 = Prime 3
                                Bit 3 = Prime 4
                                Bit 4 = Prime 5
                                Bit 5 = Prime 6
                                Bit 6 = Prime 7
                                Bit 7 = Prime 8
                                0 = Not Learned, 1 = Learned"
        ::= { radConverterSwitchStatus 8 }

radConverterSwitchBackupTestStatus OBJECT-TYPE
        SYNTAX          PrimeStatusType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Prime converter backup test status:
                                Bit 0 = Prime 1
                                Bit 1 = Prime 2
                                Bit 2 = Prime 3
                                Bit 3 = Prime 4
                                Bit 4 = Prime 5
                                Bit 5 = Prime 6
                                Bit 6 = Prime 7
                                Bit 7 = Prime 8
                                0 = Fail, 1 = Pass"
        ::= { radConverterSwitchStatus 9 }

radConverterSwitchPowerSenseStatus OBJECT-TYPE
        SYNTAX          PrimeStatusType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "Prime converter power sense status:
                                Bit 0 = Prime 1
                                Bit 1 = Prime 2
                                Bit 2 = Prime 3
                                Bit 3 = Prime 4
                                Bit 4 = Prime 5
                                Bit 5 = Prime 6
                                Bit 6 = Prime 7
                                Bit 7 = Prime 8
                                0 = No Power Present, 1 = Power Present"
        ::= { radConverterSwitchStatus 10 }
```

```
radConverterSwitchBackedupPrime OBJECT-TYPE
        SYNTAX          INTEGER (0..8)
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                        "Shows the currently backed up prime. 0 means no converters are
                        currently backed up."
        ::= { radConverterSwitchStatus 11}

radConverterSwitchHotStandbyPrime OBJECT-TYPE
        SYNTAX          INTEGER (0..8)
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                        "Shows the current prime converter in hot standby. 0 means no converter
                        is currently in hot standby. This is valid only in automatic backup modes."
        ::= { radConverterSwitchStatus 12 }

-- -----------------------------------------------------------------------------------------------------------------
-- -----------------------------------------------------------------------------------------------------------------
-- Converter common non-volatile status information.

radConverterCommonControlMode OBJECT-TYPE
        SYNTAX          INTEGER {
                        front_panel(1),
                        terminal(2),
                        remote(3),
                        ethernet(4),
                        }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        ""
        ::= { radConverterCommonNVStatus 1 }

radConverterCommonTerminalBaudRate OBJECT-TYPE
        SYNTAX          INTEGER {
                        baud_2400(1),
                        baud_9600(2),
                        baud_19200(3)
                        }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Selects terminal baud rate."
        ::= { radConverterCommonNVStatus 2 }

radConverterCommonTerminalEmulation OBJECT-TYPE
        SYNTAX          INTEGER {
                        vt100(1),
                        wyse50(2),
                        addsvp(3)
                        }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                        "Selects terminal emulation."
        ::= { radConverterCommonNVStatus 3 }

radConverterCommonTerminalEchoMode OBJECT-TYPE
        SYNTAX          INTEGER {
                        on(1),
                        off(2)
                        }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
```

```
                                        "Selects terminal echo mode. Not currently in use."
      ::= { radConverterCommonNVStatus 4 }

radConverterCommonRemoteProtocol OBJECT-TYPE
      SYNTAX            INTEGER {
                                        ascii(1),
                                        rllp(2)
                                        }
      MAX-ACCESS        read-write
      STATUS            current
      DESCRIPTION
                                        "Selects remote port protocol."
      ::= { radConverterCommonNVStatus 5 }

radConverterCommonRemoteAddress OBJECT-TYPE
      SYNTAX            INTEGER (1..255)
      MAX-ACCESS        read-write
      STATUS            current
      DESCRIPTION
                                        "Remote port address, 1 through 255."
      ::= { radConverterCommonNVStatus 6 }

radConverterCommonRemoteBaudRate OBJECT-TYPE
      SYNTAX            INTEGER {
                                        baud_2400(1),
                                        baud_9600(2),
                                        baud_19200(3)
                                        }
      MAX-ACCESS        read-write
      STATUS            current
      DESCRIPTION
                                        "Selects remote port Baud Rate."
      ::= { radConverterCommonNVStatus 7 }

radConverterCommonRemoteLineControl OBJECT-TYPE
      SYNTAX            INTEGER {
                                        rs232(1),
                                        rs485(2)
                                        }
      MAX-ACCESS        read-write
      STATUS            current
      DESCRIPTION
                                        "Selects RS232 or RS485."
      ::= { radConverterCommonNVStatus 8 }

radConverterCommonRemoteEchoMode OBJECT-TYPE
      SYNTAX            INTEGER {
                                        on(1),
                                        off(2)
                                        }
      MAX-ACCESS        read-write
      STATUS            current
      DESCRIPTION
                                        "Sets Echo mode to on or off. Valid only for ASCII protocol remote
                                        serial interface"
      ::= { radConverterCommonNVStatus 9 }

radConverterCommonMajorAlarmMask OBJECT-TYPE
      SYNTAX            AlarmByteType
      MAX-ACCESS        read-write
      STATUS            current
      DESCRIPTION
                                        "Major Alarm mask:
                                        Bit 0 = CPLD test fault
                                        Bit 1 = FPGA test fault
                                        Bit 2 = Eeprom test fault
                                        Bit 3-7 = Spares
```

```
                              0 = Mask, 1 = Allow"
     ::= { radConverterCommonNVStatus 10 }

radConverterCommonMinorAlarmMask OBJECT-TYPE
     SYNTAX          AlarmByteType
     MAX-ACCESS      read-write
     STATUS          current
     DESCRIPTION
                              "Minor Alarm mask:
                              Bit 0 = VCC1 fault
                              Bit 1 = +9V fault
                              Bit 2 = +15V fault
                              Bit 3 = -15V fault
                              Bit 4 = Reference activity fault
                              Bit 5-7 = Spares
                              0 = Mask, 1 = Allow"
     ::= { radConverterCommonNVStatus 11 }

-- -------------------------------------------------------------------------------------------------------------------
-- -------------------------------------------------------------------------------------------------------------------
-- Converter common status information.

radConverterCommonMajorAlarmStatus OBJECT-TYPE
     SYNTAX          AlarmByteType
     MAX-ACCESS      read-only
     STATUS          current
     DESCRIPTION
                              "A bit field.  On startup, the agent initializes this
                              to the value '00000000'B.
                              Bit 0 = CPLD test fault
                              Bit 1 = FPGA test fault
                              Bit 2 = Eeprom test fault
                              Bit 3-7 = Spares
                              0 = Pass, 1 = Fail"
     ::= { radConverterCommonStatus 1 }

radConverterCommonMinorAlarmStatus OBJECT-TYPE
     SYNTAX          AlarmByteType
     MAX-ACCESS      read-only
     STATUS          current
     DESCRIPTION
                              "A bit field.  On startup, the agent initializes this to
                              the value '00000000'B.
                              Bit 0 = VCC1 fault
                              Bit 1 = +9V fault
                              Bit 2 = +15V fault
                              Bit 3 = -15V fault
                              Bit 4 = Reference activity fault
                              Bit 5-7 = Spares
                              0 = Pass, 1 = Fail"
     ::= { radConverterCommonStatus 2 }

radConverterCommonLatchedMajorAlarmStatus OBJECT-TYPE
     SYNTAX          AlarmByteType
     MAX-ACCESS      read-only
     STATUS          current
     DESCRIPTION
                              "A bit field.  On startup, the agent initializes this
                              to the value '00000000'B.
                              Bit 0 = CPLD test fault
                              Bit 1 = FPGA test fault
                              Bit 2 = Eeprom test fault
                              Bit 3-7 = Spares
                              0 = Pass, 1 = Fail"
     ::= { radConverterCommonStatus 3 }

radConverterCommonLatchedMinorAlarmStatus OBJECT-TYPE
```

```
        SYNTAX          AlarmByteType
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "A bit field.  On startup, the agent initializes this to
                                the value '00000000'B.
                                Bit 0 = VCC1 fault
                                Bit 1 = +9V fault
                                Bit 2 = +15V fault
                                Bit 3 = -15V fault
                                Bit 4 = Reference activity fault
                                Bit 5-7 = Spares
                                0 = Pass, 1 = Fail"
        ::= { radConverterCommonStatus 4 }

radConverterCommonUserMinFrequency OBJECT-TYPE
        SYNTAX          INTEGER (3620000..14750000)
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "User minimum frequency."
        ::= { radConverterCommonStatus 5 }

radConverterCommonUserMaxFrequency OBJECT-TYPE
        SYNTAX          INTEGER (3620000..14750000)
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                                "User maximum frequency."
        ::= { radConverterCommonStatus 6 }

radConverterCommonSynthesizerType OBJECT-TYPE
        SYNTAX          INTEGER {
                                mfs1191(1),
                                mfs448(2),
                                mfs459(3),
                                mfs544(3),
                                mfs881(4),
                                mfs474(5),
                                mfs4_47(6),
                                mfs4_59(7)
                                }
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "Shows the currently used synthesizer:
                                MFS 1191:IF LO= 1.7 GHz,     Low range = 11.91GHz, High range = 12.73 GHz
                                MFS 448:IF LO= 1.225 GHz, Low range = 4.48 GHz, High range = 5.355 GHz
                                MFS 459:IF LO= 1.1125 GHz, Low range = 4.5925 GHz, High range = 5.2425 GHz
                                MFS 544:IF LO= 1.1125 GHz, Low range = 5.4475 GHz, High range = 5.8675 GHz
                                MFS 881:IF LO= 2.0 GHz, Low range = 8.81 GHz, High range = 10.68 GHz
                                MFS 474:IF LO= 1.1125 GHz, Low range = 4.74 GHz, High range = 5.54 GHz
                                MFS 4_47:IF LO= 1.1125 GHz, Low range = 4.47 GHz, High range = 5.34 GHz
                                MFS 4_59:IF LO= 1.1125 GHz, Low range = 4.59 GHz, High range = 5.54 GHz"
        ::= { radConverterCommonStatus 7 }

radConverterCommonDCGainOffset OBJECT-TYPE
        SYNTAX          INTEGER (0..300)
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                                "DC Gain offset. Implied decimal point, 0 through 30.0 dB"
        ::= { radConverterCommonStatus 8 }

radConverterCommonFirmwareVersion OBJECT-TYPE
        SYNTAX          INTEGER (10..255)
        MAX-ACCESS      read-write
        STATUS          current
```

```
    DESCRIPTION
                    "Firmware version."
    ::= { radConverterCommonStatus 9 }

-- -----------------------------------------------------------------------------------------------------------------
-- -----------------------------------------------------------------------------------------------------------------

-- Converter Trap definitions.

-- Include Prefix for compatibility with SNMPv1 traps and procedures
-- employed by multi-lingual and proxy forwarding systems

radConverterMIBTrapPrefix   OBJECT IDENTIFIER ::= { radConverterMIBTraps 0 }

radConverterColdStartTrap  NOTIFICATION-TYPE
    STATUS          current
    DESCRIPTION     "Unexpected restart."
    ::= { radConverterMIBTrapPrefix 1 }

radConverterAuthenticationFailureTrap NOTIFICATION-TYPE
    STATUS          current
    DESCRIPTION     "Received a message that has failed authentication."
    ::= { radConverterMIBTrapPrefix 2 }

radConverterMajorAlarmTrap NOTIFICATION-TYPE
    STATUS          current
    DESCRIPTION     "Major alarm trap."
    ::= { radConverterMIBTrapPrefix 3 }

radConverterMinorAlarmTrap NOTIFICATION-TYPE
    STATUS          current
    DESCRIPTION     "Minor alarm trap."
    ::= { radConverterMIBTrapPrefix 4 }

radConverterCommonAlarmTrap NOTIFICATION-TYPE
    STATUS          current
    DESCRIPTION     "Common alarm trap."
    ::= { radConverterMIBTrapPrefix 5 }


-- -----------------------------------------------------------------------------------------------------------------
-- -----------------------------------------------------------------------------------------------------------------
-- Converter MIB conformance

radConverterNVStatusGroup OBJECT-GROUP
    OBJECTS                 {
                            radConverterFrequency,
                            radConverterChannelGain,
                            radConverterCurrentChannel,
                            radConverterCarrierControl,
                            radConverterMajorAlarmMask,
                            radConverterMinorAlarmMask
                            }
    STATUS          current
    DESCRIPTION     "Non-volatile status group."
    ::= { radConverterGroups 1 }

radConverterStatusGroup OBJECT-GROUP
    OBJECTS                 {
                            radConverterCarrierStatus,
                            radConverterStatus,
                            radConverterSwitchStatus,
                            radConverteConfiguration,
                            radConverterType,
                            radConverterBand,
                            radConverterFrequencyType,
                            radConverterReferenceType,
```

```
                                        radConverterMajorAlarmStatus,
                                        radConverterMinorAlarmStatus,
                                        radConverterLatchedMajorAlarmStatus,
                                        radConverterLatchedMinorAlarmStatus,
                                        radConverterICCAddress,
                                        radConverterICCType}
      STATUS          current
      DESCRIPTION     "Volatile status group."
      ::= { radConverterGroups 2 }

radConverterSwitchNVStatusGroup OBJECT-GROUP
      OBJECTS                           {
                                        radConverterSwitchBackupMode,
                                        radConverterSwitchLearn,
                                        radConverterSwitchBackupTest,
                                        radConverterSwitchForceBackup,
                                        radConverterSwitchPriority,
                                        radConverterSwitchCompensationControl,
                                        radConverterSwitchCompensation,
                                        radConverterSwitchFaultDelay,
                                        radConverterSwitchNoFaultDelay,
                                        radConverterSwitchMajorAlarmMask,
                                        radConverterSwitchMinorAlarmMask
                                        }
      STATUS          current
      DESCRIPTION     "Switch non-volatile status group."
      ::= { radConverterGroups 3 }

radConverterSwitchStatusGroup OBJECT-GROUP
      OBJECTS                           {
                                        radConverterSwitchMajorAlarmStatus,
                                        radConverterSwitchMinorAlarmStatus,
                                        radConverterSwitchLatchedMajorAlarmStatus,
                                        radConverterSwitchLatchedMinorAlarmStatus,
                                        radConverterSwitchFaultStatus,
                                        radConverterSwitchRelayStatus,
                                        radConverterSwitchConfigChangedStatus,
                                        radConverterSwitchLearnStatus,
                                        radConverterSwitchBackupTestStatus,
                                        radConverterSwitchPowerSenseStatus,
                                        radConverterSwitchBackedupPrime,
                                        radConverterSwitchHotStandbyPrime
                                        }
      STATUS          current
      DESCRIPTION     "Switch volatile status group."
      ::= { radConverterGroups 4 }

radConverterCommonNVStatusGroup OBJECT-GROUP
      OBJECTS                           {
                                        radConverterCommonControlMode,
                                        radConverterCommonTerminalBaudRate,
                                        radConverterCommonTerminalEmulation,
                                        radConverterCommonTerminalEchoMode,
                                        radConverterCommonRemoteProtocol,
                                        radConverterCommonRemoteAddress,
                                        radConverterCommonRemoteBaudRate,
                                        radConverterCommonRemoteLineControl,
                                        radConverterCommonRemoteEchoMode,
                                        radConverterCommonMajorAlarmMask,
                                        radConverterCommonMinorAlarmMask
                                        }
      STATUS          current
      DESCRIPTION     "Common non-volatile status group."
      ::= { radConverterGroups 5 }

radConverterCommonStatusGroup OBJECT-GROUP
      OBJECTS                           {
```

```
                                        radConverterCommonMajorAlarmStatus,
                                        radConverterCommonMinorAlarmStatus,
                                        radConverterCommonLatchedMajorAlarmStatus,
                                        radConverterCommonLatchedMinorAlarmStatus,
                                        radConverterCommonUserMinFrequency,
                                        radConverterCommonUserMaxFrequency,
                                        radConverterCommonSynthesizerType,
                                        radConverterCommonDCGainOffset,
                                        radConverterCommonFirmwareVersion
                                        }
          STATUS              current
          DESCRIPTION     "Common volatile status group."
          ::= { radConverterGroups 6 }

radConverterCommonNotificationsGroup NOTIFICATION-GROUP
          NOTIFICATIONS   {
                                        radConverterColdStartTrap,
                                        radConverterAuthenticationFailureTrap
                                        }
          STATUS              current
          DESCRIPTION
                                        "The two notifications which an SNMPv2 entity is required to
                                        implement."
          ::= { radConverterGroups 7 }

radConverterNotificationsGroup NOTIFICATION-GROUP
          NOTIFICATIONS    {
                                        radConverterMajorAlarmTrap,
                                        radConverterMinorAlarmTrap,
                                        radConverterCommonAlarmTrap
                                        }
          STATUS              current
          DESCRIPTION
                                        "Traps group."
          ::= { radConverterGroups 8 }

END
```

Glossary

G

A	
A	Ampere
AC	Alternating Current
ADC	Analog to Digital Converter
AGC	Automatic Gain Control
AIS	Alarm Indication System. A signal comprised of all binary 1s.
AMSL	Above Mean Sea Level
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASIC	Application Specific Integrated Circuit
ATE	Automatic Test Equipment
B	
BER	Bit Error Rate
BERT	Bit Error Rate Test
Bit/BIT	Binary Digit or Built-In Test
BITE	Built-In Test Equipment
bps	Bits Per Second
BPSK	Binary Phase Shift Keying
Byte	8 Binary Digits
C	
C	Celsius
CATS	Computer Aided Test Software
CA/xxxx	Cable Assembly
CD-ROM	Compact Disk – Read Only Memory
CLK	Clock
cm	Centimeter
COM	Common
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check. A system of error checking performed at the transmitting and receiving stations.
CW	Continuous Wave
C/N	Carrier to Noise Ratio

D	
DAC	Digital to Analog Converter
dB	Decibels
dBc	Decibels Referred to Carrier
dBm	Decibels Referred to 1.0 milliwatt
DC	Direct Current
DCE	Data Communications Equipment
Demod	Demodulator or Demodulated
DPLL	Digital Phase Locked Loop
DTE	Data Terminal Equipment
DVB	Digital Video Broadcast
D&I	Drop and Insert
E	
E_b/N_0	Ratio of Energy per bit to Noise Power Density in a 1 Hz Bandwidth.
EEPROM	Electrically Erasable Programmable Read Only Memory
EIA	Electronic Industries Association
EMI	Electromagnetic Interference
ESC	Engineering Service Circuits
ET	Earth Terminal
F	
F	Fahrenheit
FAS	Frame Acquisition Sync. A repeating series of bits which allow acquisition of a frame.
FCC	Federal Communications Commission
FEC	Forward Error Correction
FIFO	First In, First Out
FPGA	Field Programmable Gate Arrays
FW	Firmware
G	
g	Force of Gravity
GHz	Gigahertz
GND	Ground

H	
HSSI	High Speed Serial Interface
HW	Hardware
Hz	Hertz (Unit of Frequency)
I	
IBS	Intelsat Business Services
IDR	Intermediate Data Rate
I/O	Input/Output
IEEE	International Electrical and Electronic Engineers
IESS	INTELSAT Earth Station Standards
IF	Intermediate Frequency
INTELSAT	International Telecommunication Satellite Organization
ISO	International Standards Organization
J	
J	Joule
K	
Kbps	Kilobits per Second
Kbps	Kilobytes per Second
kg	Kilogram
kHz	Kilohertz
Ksps	Kilosymbols per Second
L	
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LO	Local Oscillator
M	
mA	Milliampere
Mbps	Megabits per Second
MFAS	Multi-Frame Acquisition Sync. See FAS.
MHz	Megahertz
MIB	Management Information Base
Mod	Modulator or Modulated
ms	Millisecond
M&C	Monitor and Control

N	
NC	Normally Closed
NO	Normally Open
ns	Nanoseconds
NVRAM	Non-Volatile Random Access Memory
N/C	No Connection or Not Connected
O	
OQPSK	Offset Quadrature Phase Shift Keying
P	
PC	Personal Computer
PLL	Phase Locked Loop
ppb	Parts per Billion
ppm	Parts per Million
P/N	Part Number
Q	
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
R	
RAM	Random Access Memory
RF	Radio Frequency
ROM	Read Only Memory
rms	Root Mean Square
RU	Rack Unit. 1 RU = 1.75”
Rx	Receive (Receiver)
RxD	Receive Data
R-S	Reed-Solomon Coding. Reed-Solomon codes are block-based error correcting codes with a wide range of applications in digital communications and storage.
S	
SEQ	Sequential
SYNC	Synchronize

T	
TBD	To Be Designed or To Be Determined
TM	Technical Manual
TPC	Turbo Product Codes
TRE	Trellis
Tx	Transmit (Transmitter)
TxD	Transmit Data
U	
UART	Universal Asynchronous Receiver/Transmitter
UUT	Unit Under Test
V	
V	Volts
VAC	Volts, Alternating Current
VCO	Voltage Controlled Oscillator
VDC	Volts, Direct Current
VIT	Viterbi Decoding
W X Y Z	
W	Watt
Misc.	
µs	Microsecond
16QAM	16 Quadrature Amplitude Modulation
8PSK	8 Phase Shift Keying

RADYNE