DVB3030/DVB3030L

Digital Video Broadcast Modulator

Installation and Operation Manual

TM052 - Rev. 3.5
April, 2001

RADYNE COMSTREAM

Radyne ComStream Corporation • 3138 E. Elwood St. • Phoenix, AZ 85034 • (602) 437-9620 • Fax: (602) 437-4811

Latest Software Revision Confirmation

When new features are added to Radyne ComStream Corp. 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 Corp. 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 Corp. 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.

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Radyne ComStream Corporation Warranty Policy

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Radyne ComStream Corporation (Seller) warrants the items manufactured and sold by Radyne ComStream Corporation to be free of defects in material and workmanship for a period of two (2) years from date of shipment Radyne ComStream Corporation's obligation under its warranty is limited in accordance with the periods of time and all other conditions stated in all provisions of this warranty.

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Warranty Period

The applicable warranty period shall commence on the date of shipment from Radyne ComStream Corporation's facility to the original purchaser and extend for the stated period following the date of shipment. Upon beginning of the applicable Radyne ComStream Corporation warranty period, all customer's remedies shall be governed by the terms stated or referenced in this warranty. In-warranty repaired or replacement products or parts are warranted only for the remaining unexpired portion of the original warranty period applicable to the repaired or replaced products or parts. Repair or replacement of products or parts under warranty does not extend the original warranty period.

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The following are expressly ***not covered*** under warranty:

1. Any loss, damage and/or malfunction relating in any way to shipping, storage, accident, abuse, alteration, misuse, neglect, failure to use products under normal operating conditions, failure to use products according to any operating instructions provided by Radyne ComStream Corporation, lack of routine care and maintenance as indicated in any operating maintenance instructions, or failure to use or take any proper precautions under the circumstances.

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In no event shall Radyne ComStream Corporation be liable for Incidental, consequential, special or resulting loss or damage of any kind howsoever caused. Radyne ComStream Corporation's liability for damages shall not exceed the payment, if any, received by Radyne ComStream Corporation for the unit or product or service furnished or to be furnished, as the case may be, which is the subject of claim or dispute.

Statements made by any person, including representatives of Radyne ComStream Corporation, which are inconsistent or in conflict with the terms of this warranty, shall not be binding upon Radyne ComStream Corporation unless reduced to writing and approved by an officer of Radyne ComStream Corporation.

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

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

Any product returned to Radyne ComStream Corporation for examination must be sent prepaid via the means of transportation indicated as acceptable to Radyne ComStream Corporation. 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 ComStream Corporation permission to open and disassemble the product as required for evaluation. In all cases, Radyne ComStream Corporation has sole responsibility for determining the cause and nature of failure, and Radyne ComStream Corporation's determination with regard thereto shall be final.

DVB3030/DVB3030L Digital Video Broadcast Modulator
Installation and Operation Manual
TM052 – Record of Revisions

Radyne ComStream Corporation is constantly improving its products and therefore the information in this document is subject to change without prior notice. Radyne ComStream Corporation makes no warranty of any kind with regard to this material, Including but not limited to the implied warranties of merchantability and fitness for a particular purpose. No responsibility for any errors or omissions that may pertain to the material herein is assumed. Radyne ComStream Corporation makes no commitment to update nor to keep current the information contained in this document. Radyne ComStream Corporation assumes no responsibility for use of any circuitry other than the circuitry employed in Radyne ComStream Corporation systems and equipment.

Revision Level	Date	Reason for Change
1	6-18-96	New Release
2	8-22-96	Updated to include new symbol rate information, Update drawings
2.1	4-12-97	Minor operational changes; updated to include DVB3030 symbol rate data.
2.2	8-10-97	Changed manual to DVB3030, changed specifications and added framing and roll off data
2.3	12-01-97	Added Ethernet Data, updated drawings, minor additions to remote spec.
3.0	12-05-98	Added 3030L-Band Data; Updated Remote Port Specification
3.1	5-13-99	Updated data rates, added additional interfaces, updated remote port spec.
3.2	7-1-99	Added Test pattern generator data
3.3	7-14-99	Updated Remote Port Specification; added clarifications, Added Ethernet MIB, Appendix C.
3.4	11-05-99	Added last rate control data and updated DVB ASI information
3.5	4-17-00	Added Simple Network Management Protocol (SNMP).

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Section 1 – Introduction

1.0 Description

The Radyne ComStream Corporation DVB3030 and DVB3030L Digital Video Satellite Modulators (Figure 1-1) combine full compatibility with digital video standards, and the best features of a flexible programmable modulator at a low price. They are designed as high-speed, frequency-agile, multi-data rate digital uplinks. The DVB3030 and DVB3030L are ideal for use in digital video hub uplinks, and mobile Satellite Newsgathering (SNG) vehicles. Other applications include video distribution and one-way data distribution.

The modulator offers a full frequency agile IF output from 50 MHz to 90 MHz or from 100 MHz to 180 MHz, or L-Band (from 950 MHz to 1750 MHz) in 100 Hz steps. Data rates from 1 Mbps to 78.75 Mbps (1.0 to 45.0 Msps) can be set in 1 bps increments. The modulator is fully compliant with ETS (European Telecom Standard) 300-421, DVB and MPEG-2 standards.

The DVB3030 and DVB3030L Modulators are completely programmable from the front panel. Menus are specifically designed for ease of use and quick online operation as well as for changes in modulator configuration. All aspects of the modulator can also be monitored and controlled through the RS-232/RS-485 Serial Control Port or Ethernet Port. Operating parameters, such as data rates and IF frequencies can be readily set and changed at the front panel or through a remote serial interface. An optional 1:1 Redundancy Control Switch (RCS11) can be employed to give the DVB3030 and DVB3030L high systems reliability.

Note: Unless specified, DVB3030 denotes both the DVB3030 and DVB3030L units.

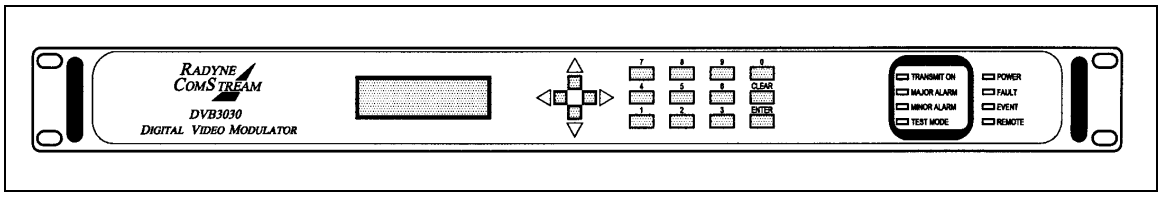

Figure 1-1. DVB3030/DVB3030L Digital Video Broadcast Modulator

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Section 2 – Installation

2.0 Installation Requirements

The DVB3030/DVB3030L can be installed within any standard 19-inch equipment cabinet or rack, and requires 1 RU mounting space (1.75 inches) vertically and 17 inches of depth. Including cabling, a minimum of 20-inches of rack depth is required. The rear panel is designed to have power enter from the left and IF cabling enter from the right when viewed from the rear of the unit. Data and control cabling can enter from either side although they are closer to the center. The unit can be placed on a table or suitable surface if required.

There are no user-serviceable parts or configuration settings located inside the DVB3030 chassis. There is a potential shock hazard internally at the power supply module. DO NOT open the DVB3030 chassis under any circumstances.

Before initially applying power to the unit, it is a good idea to disconnect the transmit output from the operating ground station equipment. This is especially true if the current DVB3030 configuration settings are unknown, where incorrect settings could disrupt existing communications traffic.

2.1 Unpacking

The DVB3030/DVB3030L Modulator was carefully packaged to avoid damage and should arrive complete with the following items for proper installation:

1. DVB3030/3030L Unit.
2. Power Cord, 6-foot with applicable AC connector.
3. Installation and Operation Manual.

2.2 Removal and Assembly

Carefully unpack the unit and ensure that all of the above items are in the carton. If the Prime AC power available at the installation site requires a different power cord/AC connector, then arrangements to receive the proper device will be necessary before proceeding with the installation.

The DVB3030 Modulator is shipped fully assembled. It does not require removal of the covers for any purpose in installation. The only replaceable assembly in the unit is the data interface and is not intended to be accomplished in the field. 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 application using from 100 to 240 VAC, 50 – 60 Hz, 0.5 A.

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° and 35° C, and held constant for best equipment operation. The air available to the rack should be clean and relatively dry. The DVB3030 units may be stacked one on top of the other up to a maximum of 10 consecutive units before providing a 1 RU space for airflow.

Do not mount the DVB3030 in an unprotected outdoor location where there is direct contact with rain, snow, wind or sun. The DVB3030 is designed for indoor applications only.

The only tools required for rack mounting the DVB3030 is a set of four rack mounting screws and an appropriate screwdriver. Rack mount brackets are an integral part of the cast front bezel of the unit and are not removable.

Shielded cables with the shield terminated to the conductive backshells are required in order to meet EMC directives. Cables with insulation flammability ratings of 94 VO or better are required in order to meet low voltage directives.

The following interface connections should be available at the mounting location as a minimum:

1. Prime AC power.
2. A 75-Ohm Transmit IF cable with BNC male connector.
3. An RS–449 data interface cable with a 37-pin male ‘D’ sub-connector.

2.4 Modulator Checkout

The following descriptions assume that the DVB3030 is installed in a suitable location with prime AC power and supporting equipment available.

2.4.1 Initial Power-Up

Before initial powerup of the DVB3030, it is a good idea to disconnect the transmit output from the operating ground station equipment. This is especially true if the current modulator configuration settings are unknown, where incorrect settings could disrupt the existing communications traffic. New units from the factory are normally shipped in a default configuration which includes setting the transmit carrier off.

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 DVB3030 microprocessor will test itself and several of its components before beginning its main Monitor/Control program. These power-up diagnostics show no results if successful. If a failure is detected, the Fault LED is illuminated.

The initial field checkout of the DVB3030 can be accomplished from the front panel or in the Terminal Mode. The Terminal Mode has the advantage of providing full screen access to all of the DVB3030’s parameters, but requires a separate terminal or computer running a terminal program. The unit is placed into terminal mode by setting the option via the front panel. Set the ‘Control Mode’ parameter to ‘Terminal.’ See below for a quick introduction on the use of the front panel and steps for entering parameters.

Section 3 – Operation

3.0 Theory of Operation

A digital terrestrial interface supplies the modulator with a data stream. The data stream is synchronized if the incoming stream is framed. The data is scrambled, and FEC is added. The data is then convolutionally encoded, punctured, then constellation mapped. The resulting I&Q symbols are digitally filtered. The data is then converted into an analog waveform and is vector modulated onto an RF Carrier produced from the Transmit IF Synthesizer Circuitry.

3.1 DVB3030 Operation

A block diagram of the signal flow is shown in Figure 3-1 below.

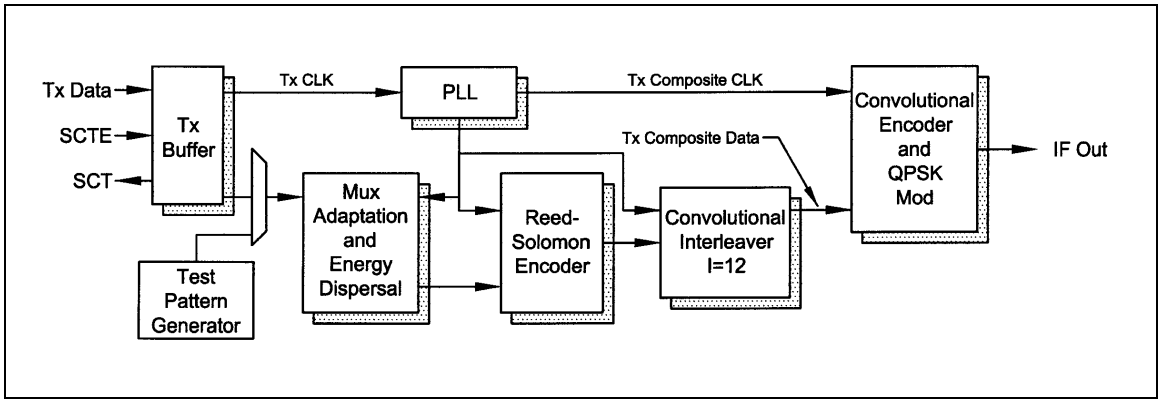


Figure 3-1. Functional Block Diagram

3.2 Last Rate Control

The mechanism used to set the Symbol Rate (SR) and Data Rate (DR) in the modems has traditionally allowed SR to have precedence. This means that if the Modulation Format (MF), Framing Rate (FR), or Code Rate (CR) are changed, then the SR is assumed correct, and the DR is recalculated. Several problems have become apparent, some code related, some operator related:

1. The operator does not have the privilege of having DR to have precedence over SR. This may be important for DR dependant applications, such as fixed rate interfaces or fixed rate data multiplexers. In some cases, the iterative procedure to set an exact DR when no calculator is available becomes very a tedious, time consuming iterative process.

2. The block commands for Ethernet or remote port operation have had problems because the SR, DR, and other rate modifying commands can all be received simultaneously. This has caused problems with precedence and ordering of calculations, and in the timing of the multiple commands in relation to modem re-synchronization. The result being some commands not being executed properly.

With *Last Rate Control*, a front panel setting allows the operator to select between *Symbol*, *Data* and *Auto* modes. A status submenu under Monitor allows the operator to check the current modem setting.

If *Symbol* mode is selected, the operation of the modem should be very similar to other Radyne products. If the Symbol Rate is entered, the Data Rate is calculated from the newly entered Symbol Rate, the Framing mode, the QAM mode and the Convolutional mode. If the Data Rate is entered, then the Symbol Rate is calculated instead. If the Framing mode, the QAM mode or the Convolutional mode is entered, the Data Rate is recalculated.

If *Data* mode is selected, the operation should reflect the desire to have Data Rate as the primary variable. If the Data Rate is entered, the Symbol Rate is calculated from the newly entered Data Rate, the Framing mode, the QAM mode and the Convolutional mode. If the Symbol Rate is entered, then the Data Rate is calculated instead. If the Framing mode, the QAM mode or the Convolutional mode is entered, the Symbol Rate is recalculated.

If *Auto* mode is selected, the modem remembers if Symbol Rate or Data Rate was the last variable entered. For example, if the Data Rate was the last variable entered, then the operator entered Framing mode, most likely the operator would not like the Data Rate to immediately change to a new value. Instead, by remembering that the last rate variable entered was Data Rate, the modem would automatically assume that the operator wishes the Symbol Rate to change instead.

Section 4 – User Interfaces

4.0 User Interfaces

There are four user interfaces available for the DVB3030. These are:

a. Front Panel
b. Remote Port
c. Ethernet Port
d. Terminal

4.1 Front Panel User Interface

The front panel of the DVB3030 allows for complete control and monitor of all DVB3030 parameters and functions via 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 three functional areas: the LCD Display, the Keypad, and the LED Indicators, each described below in Table 4-1.

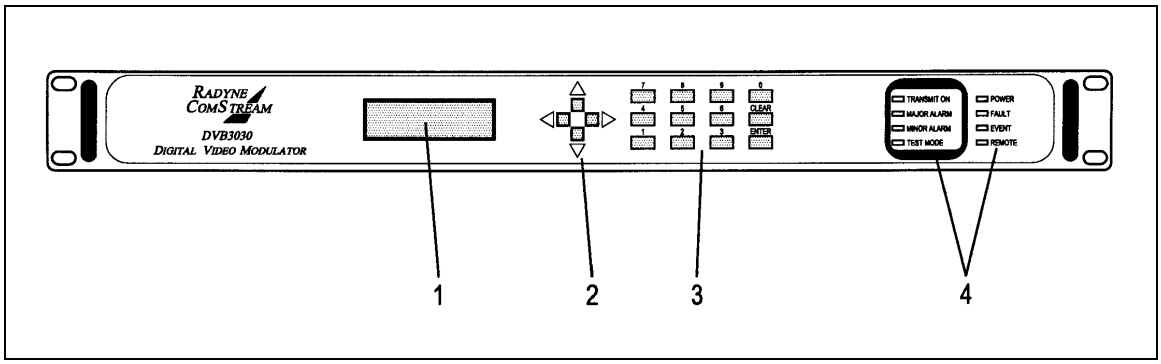


Figure 4-1. DVB3030 Front Panel

Table 4-1.

Item Number	Description	Function
1	LCD Front Panel Display	Displays DVB3030 Operating parameters and Configuration data
2	Cursor Control Arrows	Controls the up, down, right and left motion of the cursor in the LCD Display window
3	Numeric Keypad	Allows entry of numeric data and Clear and Enter function keys
4	Front Panel LED Indicators	See Paragraph 3.1.5 below for an itemized description of these LEDs

4.1.1 Front Panel 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 areas showing current

information. The upper area shows the current parameter being monitored, such as 'Frequency' or 'Data Rate'. The lower line 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.

4.1.2 Front Panel LED Indicators

Eight LEDs on the DVB3030 front panel (Refer to Table 4-2) indicate the status of the DVB3030's operation. The LED colors maintain a consistent meaning. Green signifies that the indication is appropriate for normal operation, Yellow means that there is a condition not proper for normal operation, and Red indicates a fault condition that will result in lost communications.

Table 4-2.

LED	Color	Function
Transmit On	Green	Indicates the DVB Transmitter is turned on.
Major Alarm	Red	Indicates that the transmit direction has failed, losing traffic.
Minor Alarm	Yellow	Indicates a transmit warning condition exists.
Test Mode	Yellow	Indicates the modulator is involved in a current test mode activity.
Power	Green	Indicates the DVB3030 unit is currently powered up.
Fault	Red	Indicates a memory failure or power out of spec.
Event	Yellow	Indicates that a new event has been logged into the event buffer.
Remote	Green	Indicates that the unit is set to respond to the remote control or terminal input.

4.1.3 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.

4.1.4 Parameter Setup

The four arrow keys (↑), (↓), (→), (←), to the right of the LCD display are used to navigate the menu tree and select the parameter to be set. After arriving at a parameter that needs to be modified, depress <ENTER>. The first space of the modifiable parameter highlights (blinks) and is ready for a new parameter to be entered. After entering the new parameter using the keypad (Refer to Figure 4-3), depress <ENTER> to lock in the new parameter. If a change needs to be made prior to pressing <ENTER>, depress <CLEAR> and the display defaults back to the original parameter. Depress <ENTER> again and re-enter the new parameters followed by <ENTER>.

Following a valid input, the DVB3030 will place the new setting into the nonvolatile EEPROM making it available immediately and is available the next time the unit is powered-up.

Table 4-3.							
Edit Mode Key Functions (Front Panel Only)							
Parameter Type	0 – 9	↑	↓	←	→	'Clear' & ←	'Clear' & →
Fixed Point Decimal	Changes Digit	Toggles ± (If Signed)	Toggles ± (If Signed)	Moves Cursor 1 Position Left	Moves Cursor 1 Position Right	N/A	N/A
Unsigned Hexadecimal	Changes Digit	Increments Digit Value	Decrements Digit Value	Moves Cursor 1 Position Left	Moves Cursor 1 Position Right	N/A	N/A
Enumerated	N/A	Previous Value in List	Next Value in List	N/A	N/A	N/A	N/A
Date/ Time	Changes Digit	N/A	N/A	Moves Cursor 1 Position Left	Moves Cursor 1 Position Right	N/A	N/A
IP Address	Changes Digit	Increments Digit Value	Decrements Digit Value	Moves Cursor 1 Position Left	Moves Cursor 1 Position Right	N/A	N/A
Text Strings	Changes Character	Increments Character Value	Decrements Character Value	Moves Cursor 1 Position Left	Moves Cursor 1 Position Right	Clears to Left of Cursor Inclusive	Clears to Right of Cursor Inclusive

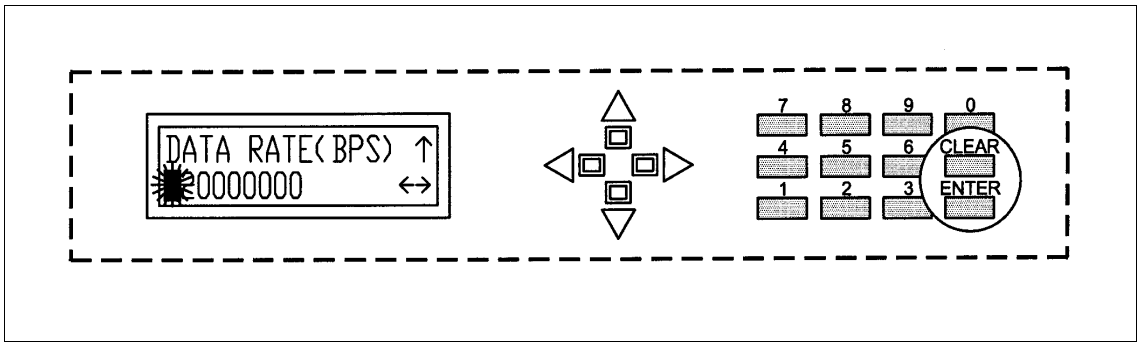


Figure 4-2. Entering New Parameters

4.2 Front Panel Control Screen Menus

The complete set of DVB3030 Front Panel Control Screens is shown below in Figure 4-3.

4.2.1 Main Menus

There are six main menus available from the Front Panel of the DVB3030/DVB3030L (Refer to Figure 4-4). These include:

1. **Modulator:**
2. **Interface:**
3. **Monitor:**
4. **Alarms:**
5. **System:**
6. **Test:**

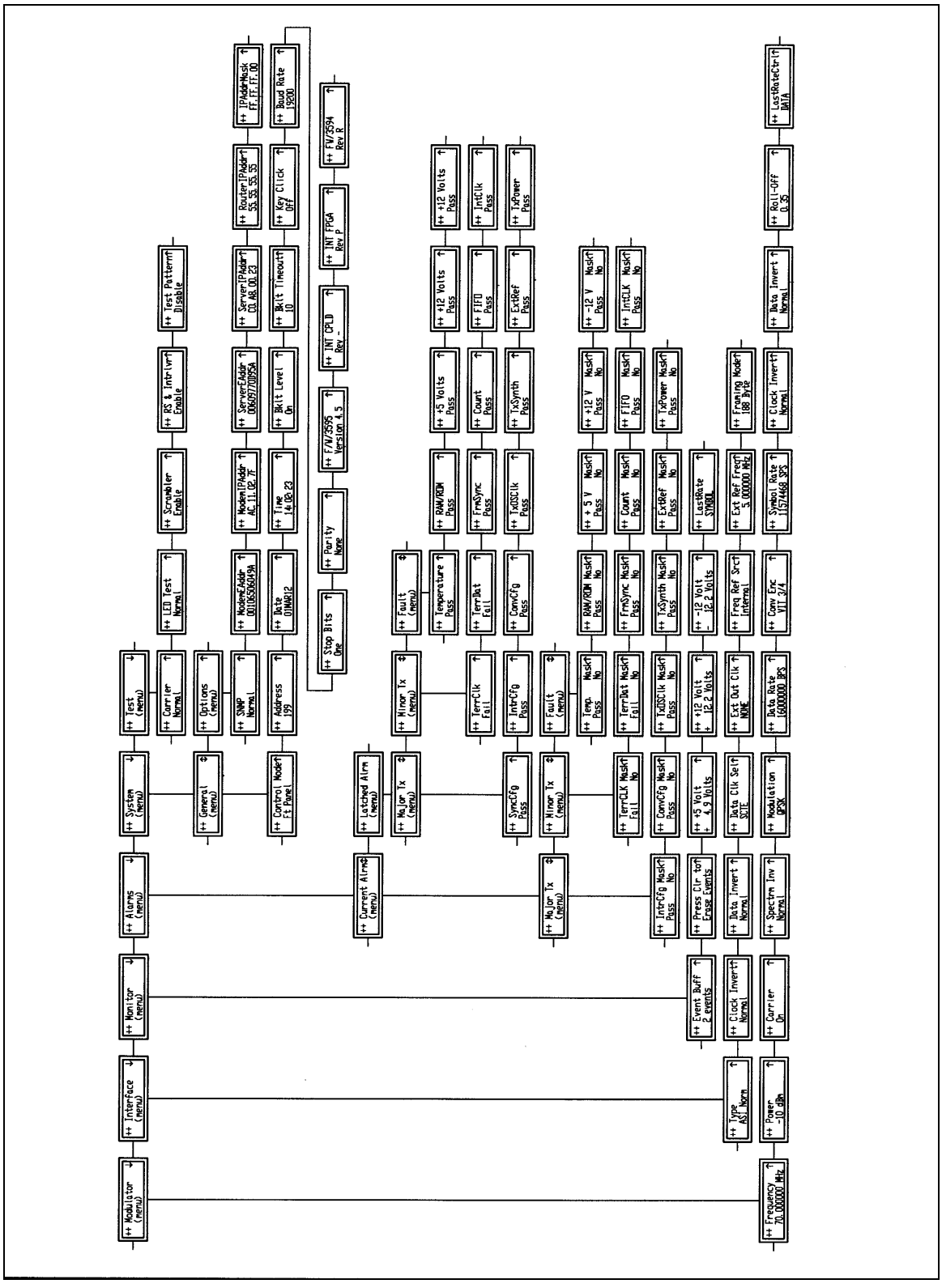


Figure 4-3. Front Panel Control Screens

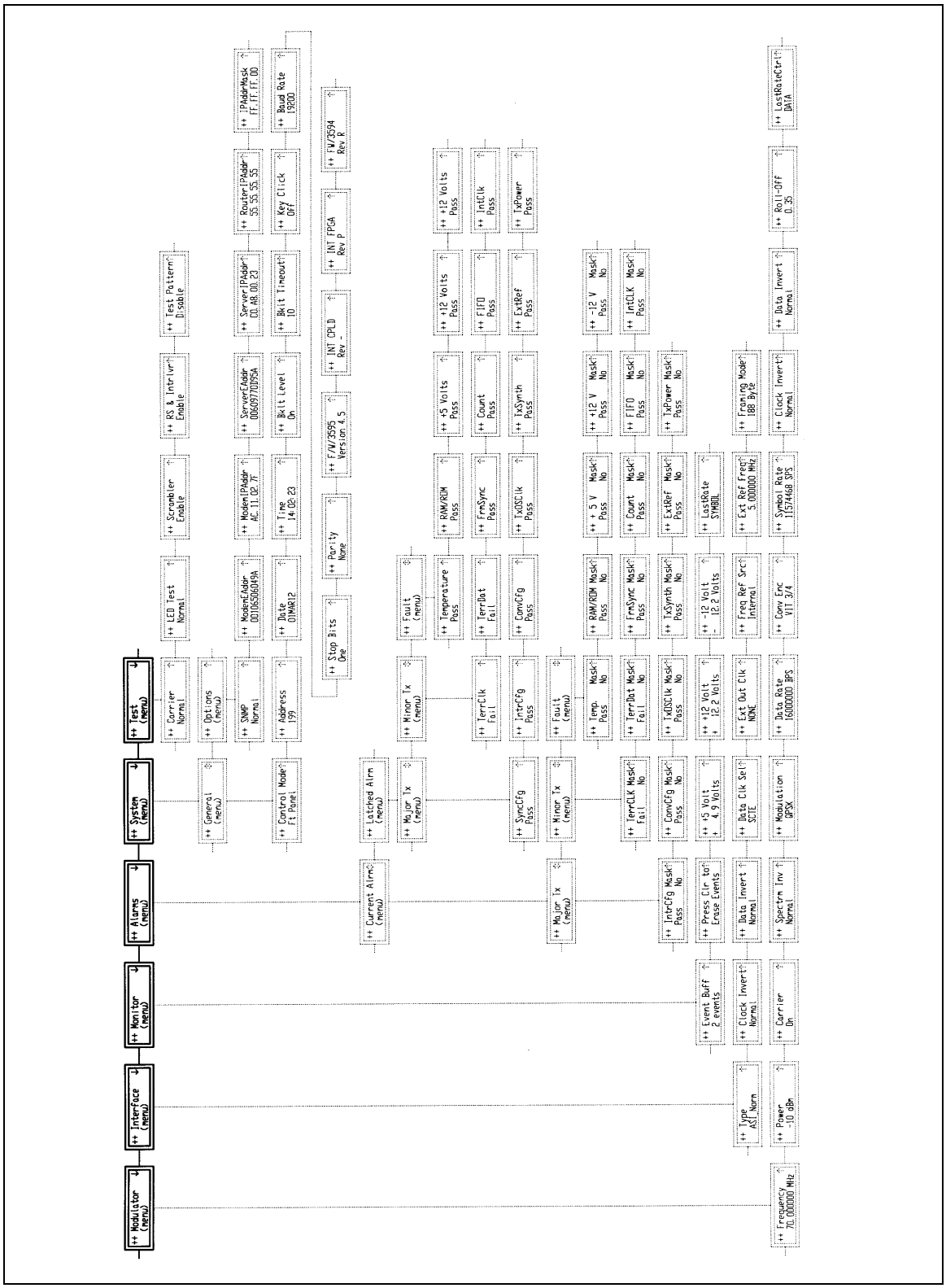


Figure 4-4. Main Menus

4.2.2 Modulator Menu Options and Parameters

There are 12 Modulator Screens available (Refer to Figure 4-5). These include:

1.	**Frequency:**	IF Carrier Frequency Enter in 100 Hz increments from 50 - 90 or 100 - 180 MHz. L-Band (950-1525 MHz) is optional.
2.	**Power:**	Transmit Output Power Enter in 0.1 dBm increments from -20.0 to 5.0 dBm.
3.	**Carrier:**	**{On, Off}** Transmitter Power On/Off Control.
4.	**Spectrum Inv:**	**{Normal, Inverted}** Modulated output spectrum inversion.
5.	**Modulation:**	**{QPSK, BPSK}** Modulation Type.
6.	**Symbol Rate:**	Output Symbol Rate Enter in 1 SPS increments from 1,000,000 to 45,000,000 SPS.
7.	**Data Rate:**	Terrestrial Data Rate Enter in 1 BPS increments from 1,000,000 to 78,750,000 BPS.
8.	**Clock Invert:**	**{Normal, Inverted}** Inverts the terrestrial data clock.
9.	**Data Invert:**	**{Normal, Inverted}** Inverts the terrestrial data stream.
10.	**Conv Enc:**	**{None, VIT1/2, VIT2/3, VIT3/4, VIT5/6, VIT6/7, VIT7/8}** Sets the convolutional encoder rate.

Note: Changing FEC rate will leave Symbol rate constant while changing data rate for new overhead. If previous data rate is desired, it must be reentered after FEC rate change.

11.	**Roll Off:**	**{0.35, 0.20}** Changes the Spectrum Roll Off.
12.	**Last Rate Control:**	**{SYMBOL, DATA, AUTO}** Selects rate precedence, See Last Rate Control Notes.

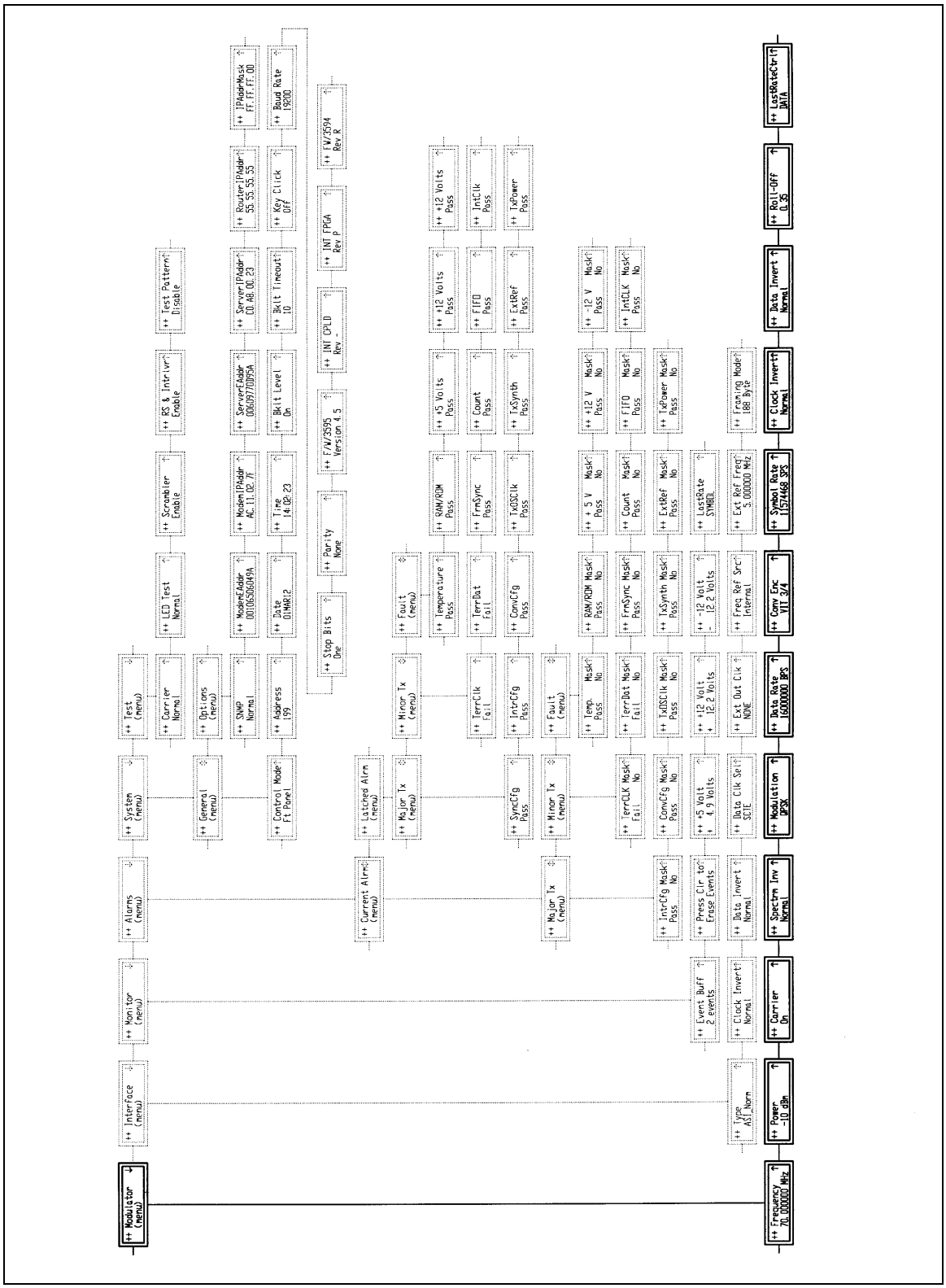


Figure 4-5. Modulator Menu Options

4.2.3 Interface Menu Options and Parameters Menu

There are eight Interface Screens available (Refer to Figure 4-6). These include:.

1. **Type:** **{Serial, Parallel, ASI, G.703, HSSI}**
   Enter the terrestrial interface type.

Note: Interface types that have not been ordered may not be selected.

2. **Clock Invert:** **{Normal, Inverted}**
   Inverts the terrestrial data clock. This is the same as Clock. Invert under the Modulator Menu.

3. **Data Invert:** **{Normal, Inverted}**
   Inverts the terrestrial data stream. This is the same as Data Invert under the Modulator Menu.

4. **Data Clock Select:** **{SCT, SCTE}**
   SCT: Data clock is supplied by DVB modulator internally.
   SCTE: Data clock is supplied by user equipment to DVB modulator.

Note: The Transmit Clock (SCT) supplied by the DVB3030 is always Output. Normally, this clock is used to clock the data out of the data source and then return it to the SCTE pins of J9. The DVB3030 is then set to SCTE mode eliminating any possible clock skew. Alternately, the data source can generate the SCTE clock internally and the SCT signal can be ignored. If SCT mode is selected, the Modulator data clock will not be locked to the incoming data stream. This mode is NOT recommended except for testing or fault backup.

5. **EXT CLK OUT:** **{SCT, SCTE, NONE}**
   Selects the source of clock output from the G.703 Interface. For Serial or Parallel, the selection is 'SCT' and for ASI, it is 'NONE.'

6. **Freq Ref Src:** **{Internal, External}**
   Selects the frequency reference source.

7. **Ext Ref Freq:** External Reference Frequency: Enter the external reference frequency in 8 KHz steps from 1 MHz to 10 MHz.

8. **Framing Mode:** **{None, 188, 204}**
   Selects the number of bytes per incoming data frame, or unframed data.

Note: 'None' is unframed data

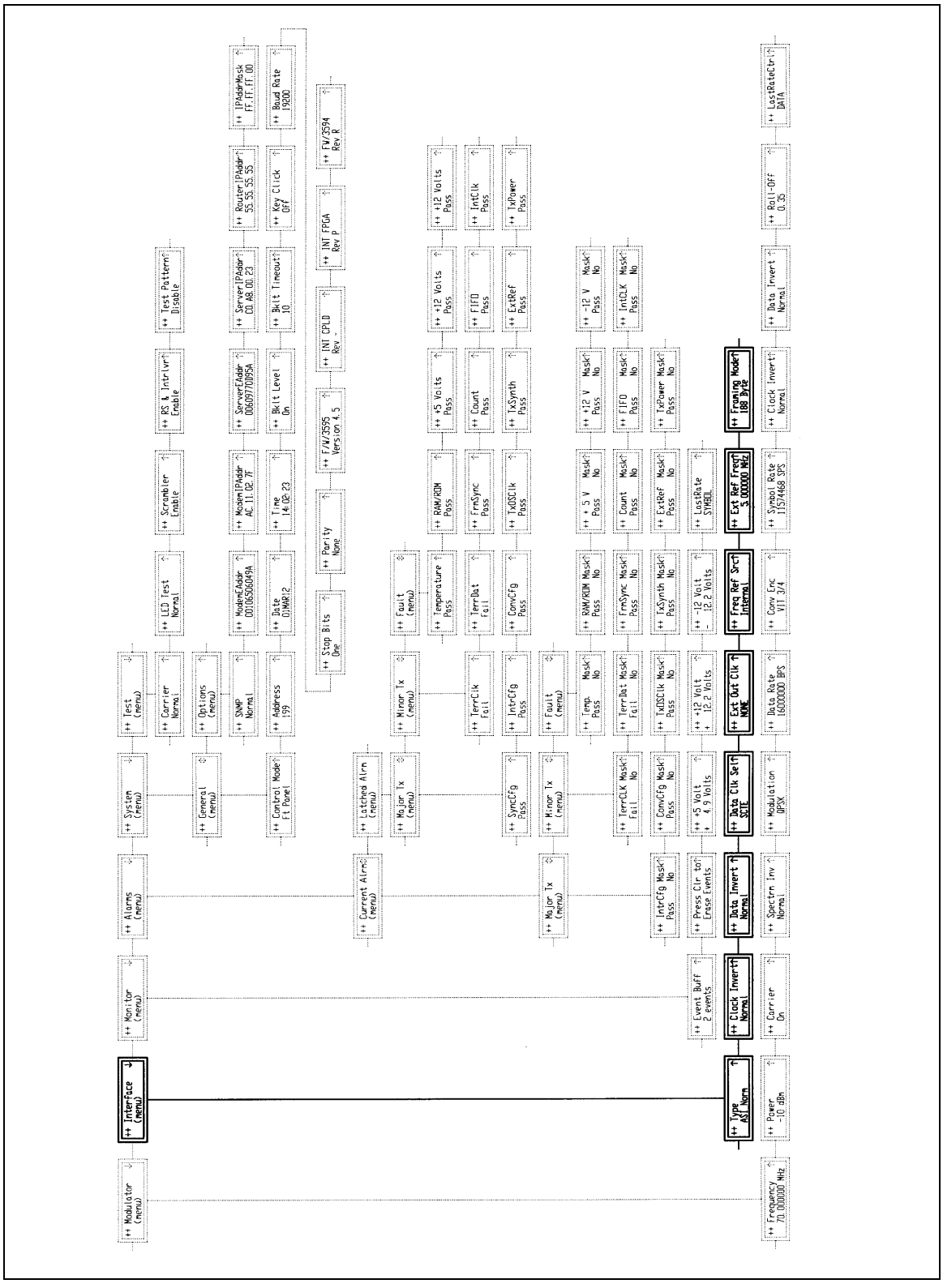


Figure 4-6. Interface Menu Options

4.2.4 Monitor Options and Parameters Menu

There are six Monitor Screens available (Refer to Figure 4-7). These include:

1.	**Event Buff:**	Display/Clear logged events and faults.
2.	**Clear Events:**	Clear all logged events and faults from the event buffer.
3.	**+5 Volt:**	Display the currently measured +5 VDC power supply.
4.	**+12 Volt:**	Display the currently measured +12 VDC power supply.
5.	**-12 Volt:**	Display the currently measured -12 VDC power supply.
6.	**Last Rate:**	**{SYMBOL, DATA}** Shows modulator rate precedence. See Last Rate Control notes.

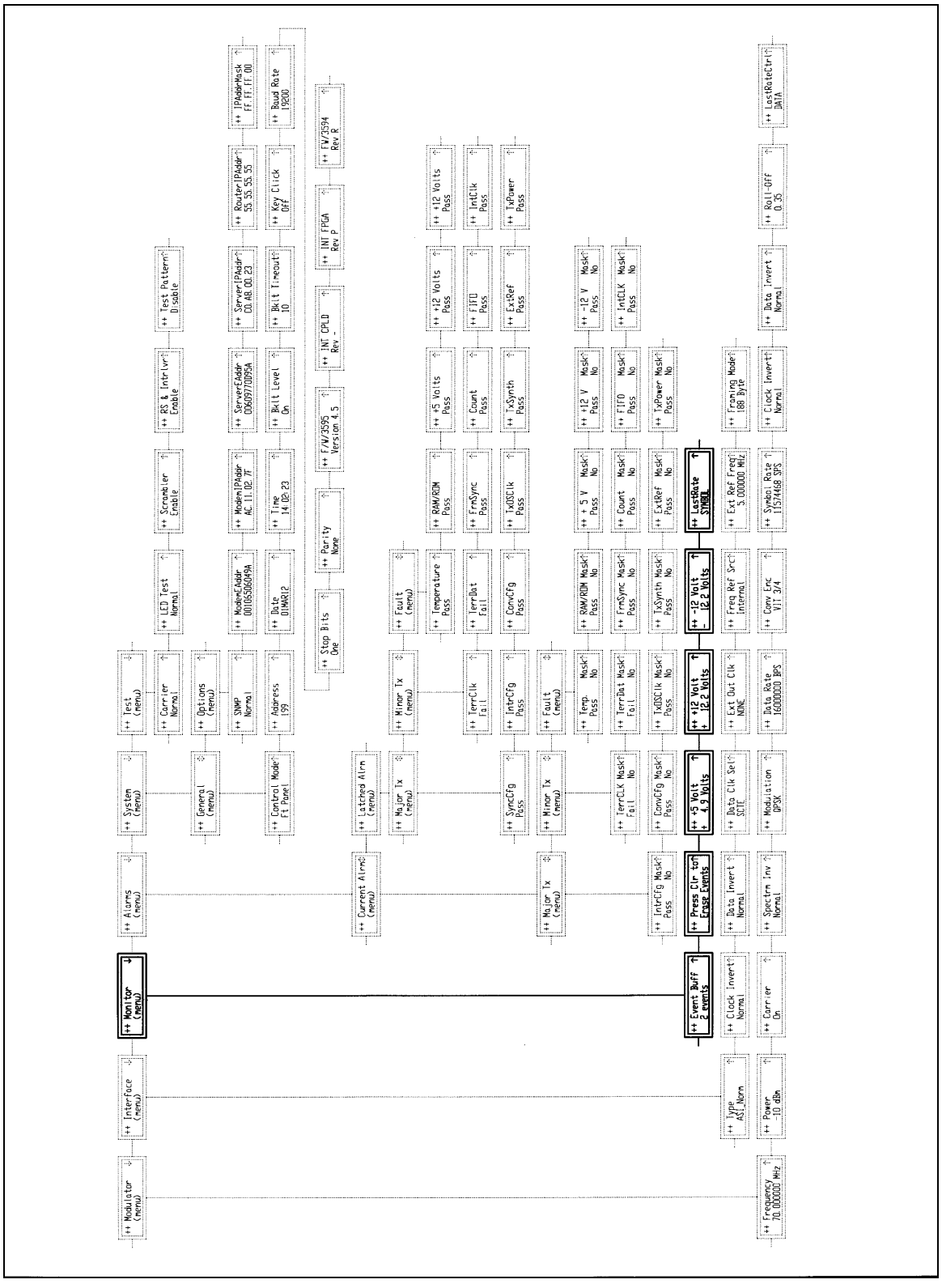


Figure 4-7. Monitor Menu Options

4.2.5 Alarms Options and Parameters Menu

The Alarms Screens are shown in Figure 4-8. These include:

Current Alarm (Menu): Displays Current Alarm Status.

Major TX (Menu)

Tx Power Mask: View or change the masking for Tx Power Alarm.

IntrCfg Mask: View or change the masking for Interleaver Configuration Alarm.

ConvCfg Mask: View or change the masking for Convolutional Encoder Alarm.

TxOSClk Mask: View or change the masking for Transmit Oscillator Alarm.

TxSynth Mask: View or change the masking for Transmit Synthesizer Alarm.

ExtRef Mask: View or change the masking for External Reference PLL Alarm.

Minor TX (Menu)

TerrClk Mask: View or change the masking for Terrestrial Clock Present Alarm.

TerrDat Mask: View or change the masking for Terrestrial Data Present Alarm.

FrmSync Mask: View or change the masking for DVB Frame Synchronization Alarm.

Count Mask: View or change the masking for DVB Interleaver Count Error Alarm.

FIFO Mask: View or change the masking for Reed-Solomon FIFO Empty/Full Alarm.

IntClk Mask: View or change the masking for Internal Clock Present Alarm.

Fault (Menu)

Temp. Mask: View or change the masking for Temperature Fault.

RAM/ROM Mask: View or change the masking for ROM/RAM Error Fault.

+ 5V Mask: View or change the masking for +5 VDC Supply Fault.

+12V Mask:	View or change the masking for +12 VDC Supply Fault.
-12V Mask:	View or change the masking for -12 VDC Supply Fault.
Latched Alarm (Menu):	This menu duplicates the Current Alarm Menu, but displays Latched Alarms instead of Current Alarms.

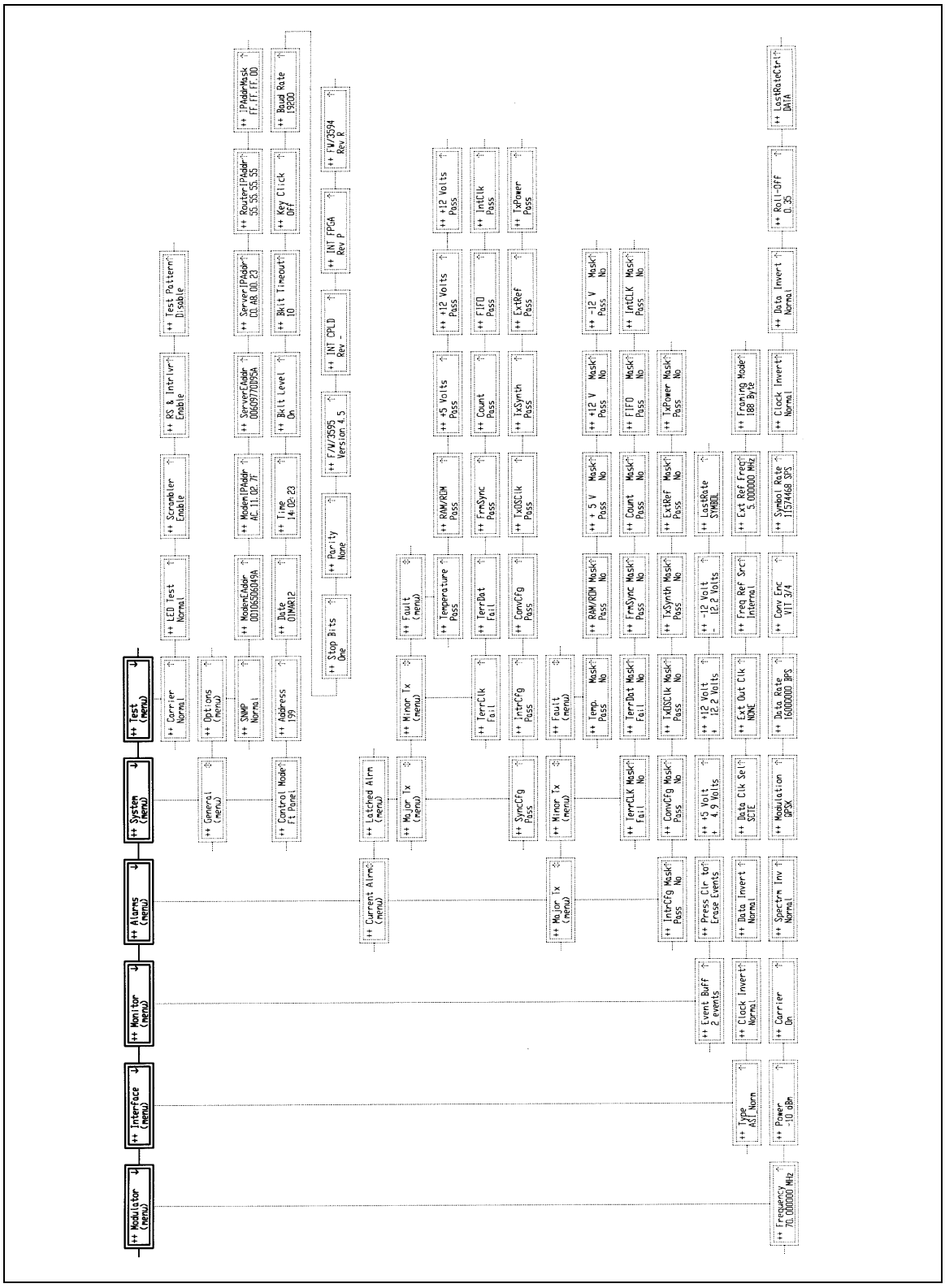


Figure 4-8. Alarms Menu Options

4.2.6 System Options and Parameters Menu

The System Screens are shown in Figure 4-9. These include:

1. **General (menu)**

Control Mode:	**{FT Panel, Computer, Terminal}** Enter the control mode for: FT Panel (Front panel commands accepted), or Terminal (Terminal commands accepted), or Computer (Computer M&C commands accepted).
Address:	Multi-Drop Address: Enter the address for computer control from 32 to 255.
Date:	Enter the date in YY/MM/DD format.
Time:	Enter the time in HH:MM:SS format.
Bklt Level:	**{Low, Mid, High, ON}** Enter the backlight level intensity. 'ON' will disable the timeout and backlight will remain on.
Bklt Timeout:	Enter the timeout for the backlight in 1 second intervals from 0 to 99 seconds.
Key Click:	**{Off, On}** Set Key Click.
Baud Rate:	**{2400, 9600, 19200}** Remote port baud rate for Terminal and Computer Mode.

Note: When changing the Baud Rate, power must be cycled for the new rate to take effect.

Stop Bits (N/A):	Number of Stop Bits is always 1 for Remote Port.
Parity (N/A):	Parity is always None for Remote Port.
Terminal Emulation:	**{ADDS VP, VT100, WYSE 50}** Set Remote Port Terminal Mode Emulation.
Version #.#:	Displays software revision number.
INT CPLD:	Displays Interface CPLD Revision Number.
INT FPGA:	Displays Interface FPGA Revision Number.
Version #.#:	Displays Convolutional Encoder Revision Number

Options (menu)

SNMP:	**{Normal, Test}**
Modem E Addr:	Enter the Modem Ethernet Address
Modem IP Addr:	Enter the Modem IP Address
Server E Addr:	Enter the Server Ethernet Address
Server IP Addr:	Enter the Server IP Address
Router IP Addr:	Enter the Router IP Address
IP Addr Mask:	Enter the IP Addr Mask

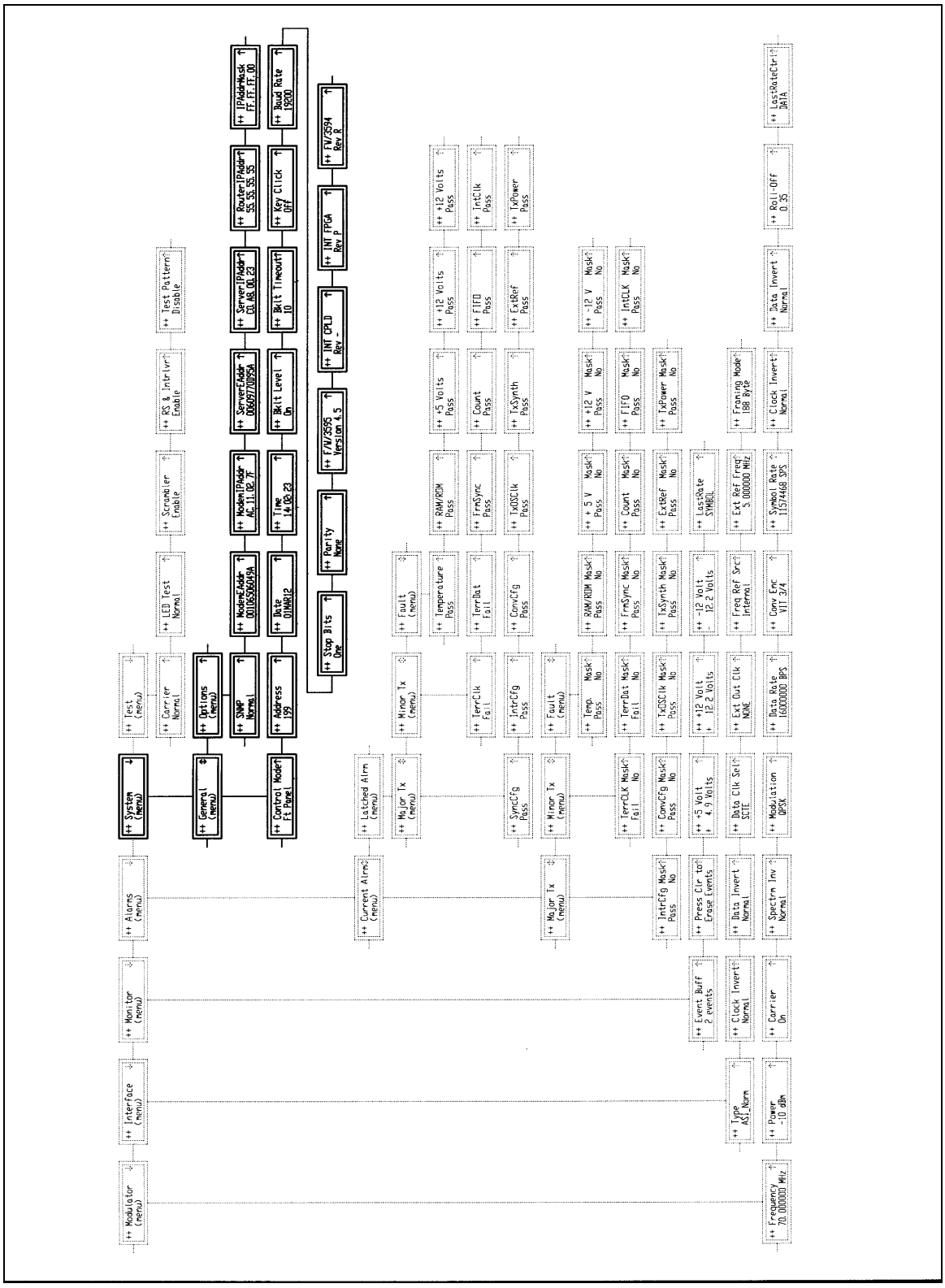


Figure 4-9. System Menu Options

4.2.7 Test Menu Options and Parameters

There are five Test Screens available (Refer to Figure 4-10). These include:

	Carrier:	**{Normal, CW, Dual, Offset, POS.FIR, NEG.FIR}** Sets carrier test modes.
2.	**LED Test:**	**{Normal, Test}** Selecting 'Test' will light all front panel LEDs for 5 seconds.
3.	**Scrambler:**	**{Enable, Disable}** Enables DVB Scrambler for Energy Dispersal
4.	**RS & Intlvr:**	**{Enable, Disable}** Enables Reed-Solomon Encoder and Convolutional Interleaver
5.	**Test Pattern:**	**{Enable, Disable}** Enables Test Pattern Generator. Inserts 2^{15}-1 Test Pattern in the data stream before the scrambler.

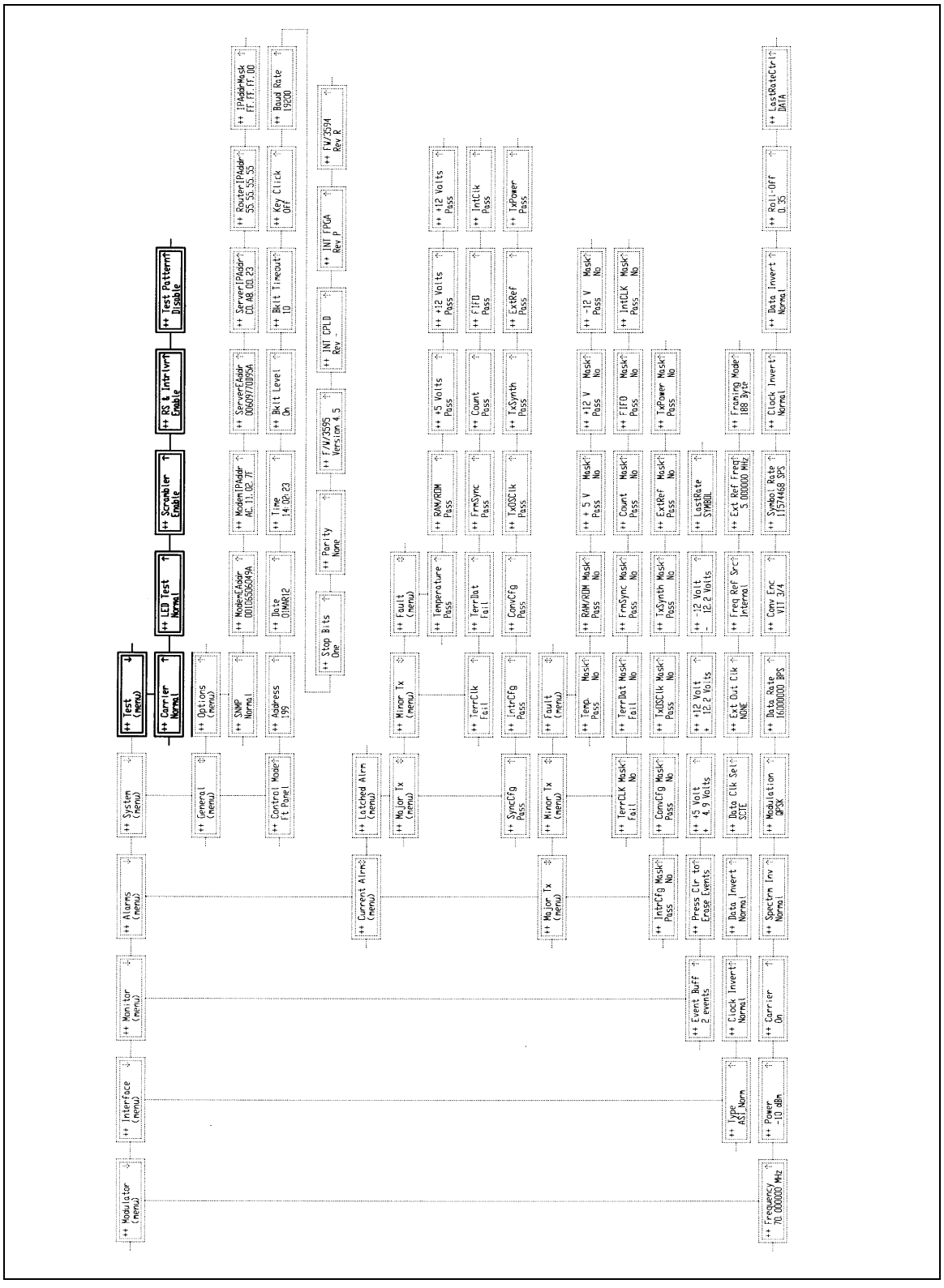


Figure 4-10. Test Menu Options

4.3 Remote Port User Interface

The Remote Port of the DVB3030 allows for complete control and monitor functions via an RS-485 Serial Interface.

Control and status messages are conveyed between the DVB3030 and the subsidiary modems and the host computer using packetized message blocks in accordance with a proprietary communications specification. This communication is handled by the Radyne Link Level Protocol (RLLP), which serves as a protocol 'wrapper' for the M&C data.

Complete information on monitor and control software is contained in the following sections.

4.3.1 Protocol Structure

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control software used in satellite earth station equipment such as modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex 9600 baud multi-drop control buses that conform to EIA Standard RS-485.

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

4.3.2 Protocol Wrapper

The Radyne COMMSPEC is byte-oriented, with the Least Significant Bit (LSB) issued first. Each data byte is conveyed as mark/space information with 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 (00h) substitutes this mark. This handling scheme is controlled by the hardware and is transparent to the user. A pictorial representation of the data and its surrounding overhead may be shown as follows:

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

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

The COMMSPEC developed for use with the Radyne Link Level Protocol (RLLP) organizes the actual monitor and control data within a shell, or "protocol wrapper", that surrounds the data. The format and structure of the COMMSPEC message exchanges are described herein. Decimal numbers have no suffix; hexadecimal numbers end with a lower case h suffix and binary values have a lower case b suffix. Thus, 22 = 16h = 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 through TBD. This field is 2 bytes long for the DVB3030 protocol.

<SOURCE ID> - the Source Identifier defines the multi-drop address origin. Note that all nodes on a given control bus have an unique address that must be defined.

<DESTINATION ID> - The Destination Identifier serves as a pointer to the multi-drop destination device that indicates where the message is to be sent.

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

<OPCODE> - The Operation Code field contains a number that identifies the message type associated with the data that follows it. Equipment under MCS control recognizes this byte via firmware identification and subsequently steers the DATA accordingly to perform a specific function or series of functions. Acknowledgment and error codes are returned in this field. This field is 2 Bytes for the DVB3030 protocol.

<...DATA...> - The Data field contains the binary, bi-directional 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 B-1.

Table B-1. Checksum Calculation Example

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

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

00h + 02h + F0h + 2Ah + 09h + 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>

4.3.3 Flow Control and Task Processing

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

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

Radyne equipment is logically linked to the control bus via an Internal Input/Output Processing Task (IOPT) to handle frame sequencing, error checking, and handshaking. The IOPT is essentially a link between the equipment RLLT and the control bus. Each time the M&C computer sends a message packet, the IOPT receives the message and performs error checking. If errors are absent, the IOPT passes the message to the equipment's RLLT. If the IOPT detects errors, it appends error messages to the packet. Whenever an error occurs, the IOPT notes it and discards the message; but it keeps track of the incoming packet. Once the packet is complete, the IOPT conveys the appropriate message to the RLLT and invokes an I/0 wait state (wait for next <SYN> character).

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

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

4.3.4 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 (such as the DVB3030) requesting access to the bus. Data is processed in

accordance with the OPCODE, and the checksum for the frame is calculated. If the anticipated checksum does not match then a checksum error response is returned to the message frame originator. The entire message frame is discarded and the wait-for-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 an appropriate response message is not received by the packet originator. The original command packet is then re-transmitted with the same FSN. If the repeated message is received correctly at this point, it is considered a new message and is executed and acknowledged as such.

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

To reiterate, valid equipment responses to a message require the FSN tag in the command packet. This serves as part of the handshake/acknowledge routine. If a valid response message is absent, then the command is re-transmitted with the same FSN. For a repeat of the same command involving iterative processes (such as increasing or decreasing transmit power level of a DVB3030), the FSN is incremented after each message packet. When the FSN value reaches 255, it overflows and begins again at zero. The FSN tag is a powerful tool that assures sequential information framing, and is especially useful where commands require more than one message packet.

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

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

4.3.5 Global Response Operational Codes

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

Table B-2. Response Opcodes	
Response Opcode Description	**Opcode**
Good Message	00h
Bad Parameter	FFh
Bad Opcode	FEh
Bad Checksum	FDh
Command Not Allowed in LOCAL Mode	FCh
Command Not Allowed in AUTO Mode	FBh
Bad Destination	FAh
Unable to Process Command	F9h
Packet Too Long	F8h

The following response error codes are specific to the DVB3030:

DVB3030 Response Error Codes	
Description	**Opcode**
MPARM_FREQUENCY_ERROR	0x0401
MPARM_STRAP_ERROR	0x0402
MPARM_DATARATE_ERROR	0x0404
MPARM_EXTREFERENCE_ERROR	0x0406
MPARM_EXTREFSOURCE_ERROR	0x0407
MPARM_MODULATIONTYPE_ERROR	0x0408
MPARM_CONVENCODER_ERROR	0x0409
MPARM_REEDSOLOMON_ERROR	0x040A
MPARM_SCRAMBLERCONTROL_ERROR	0x040B
MPARM_SCRAMBLERTYPE_ERROR	0x040C
MPARM_IBSSCRAMBLER_ERROR	0x040D
MPARM_V35SCRAMBLER_ERROR	0x040E
MPARM_DIFFERENTIALENCODER_ERROR	0x040F
MPARM_XMITPOWERLEVEL_ERROR	0x0410
MPARM_CARRIERCONTROL_ERROR	0x0411
MPARM_CARRIERSELECTION_ERROR	0x0412
MPARM_SPECTRUM_ERROR	0x0413
MPARM_OPERATINGMODE_ERROR	0x0414
MPARM_CLOCKCONTROL_ERROR	0x0417
MPARM_CLOCKPOLARITY_ERROR	0x0418

MPARM_FRAMING_ERROR	0x0419
MPARM_SCTSOURCE_ERROR	0x041B
MPARM_CIRCUITID_ERROR	0x0423
MPARM_INTERFACETYPE_ERROR	0x0429
MPARM_INTERFACENOTPRESENT_ERROR	0x042A
MPARM_INTERFACECOMMUNICATION_ERROR	0x042B
MPARM_SYMBOLRATE_ERROR	0x042C
MPARM_NOTIMPLEMENTED_ERROR	0x042D
MPARM_DATAPOLARITY_ERROR	0x042E
MPARM_INTERFACE_ERROR	0x042F
MPARM_SYMBOLRATEMODE_ERROR	0x0430
MPARM_FRAMINGMODE_ERROR	0x0450
MPARM_ROLLOFF_ERROR	0x0451
MDPARM_TIME_ERROR	0x0A01
MDPARM_DATE_ERROR	0x0A02

4.3.6 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 DVB3030 Modulators 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 23. If their actual setup parameters, status, or internal timing differs, they will both attempt to respond to the override simultaneously with different information, or asynchronously in their respective message packets and response packets, causing a collision on the serial control bus.

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

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

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

Table B-3. 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	05
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	23
Reserved for future equipment types	24 - 31

Note that 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 Corp. 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.”

4.3.7 Software Compatibility

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

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

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

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

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

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

4.3.8 RLLP Summary

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

During transmission, the protocol wrapper surrounds the actual data to form information packets. Each transmitted packet is subject to 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. If the checksum values do not match, the receiver replies with a negative acknowledgment (NAK) in its response frame.

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

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

To reiterate, the format of the message block is shown in Table 4, Link Level Protocol Message Block.

Table 4. Link Level Protocol Message Block

SYNC	COUNT	SRC ADDR	DEST ADDR	FSN	OP CODE	DATA BYTES	CHECKSUM

4.3.9 DVB3030 Opcode Command Set

Command	Opcode
Query Mod All	2400h
Query Identification	2403h
Query Modem Control Mode	2404h
Query Mod Latched Alarms	2405h
Query Mod Current Alarms	2408h
Query Mod Status	240Bh
Query Time	240Eh
Query Date	240Fh
Query Time and Date	2410h
Command Modem Control Mode	2600h
Command Mod Configuration	2601h
Command Mod Single Parameter: Frequency Strap Code Data Rate Modulation Type Convolutional Encoder Differential Encoder Carrier Control Carrier Test Clock Control Clock Polarity Transmit Power Level Reed-Solomon Spectrum Operating Mode Scrambler Control Scrambler Type Framing External Reference Source External Reference Data Polarity Interface	 2602h 2603h 2604h 2606h 2607h 2608h 2609h 260Ah 260Bh 260Ch 260Fh 2610h 2611h 2612h 2613h 2614h 2615h 2616h 261Bh 2620h 2621h
Command Clear Latched Alarms	2A19h
Command Set Time	2C04h
Command Set Date	2C05h
Command Set Time and Date	2C06h

4.3.10 Detailed Command Descriptions

Opcode: <2400h> (Query Mod All) Query a modulator's configuration and status

Query Response		
<1>	Number of nonvol bytes	
<4>	IF Frequency	Binary value, 1 Hz steps
<2>	Strap Code	Binary value, 0 through 65535
<4>	Data Rate	Binary value, 1 bps steps
<4>	External Reference	Binary value, 1 Hz steps
<1>	Freq. Reference Source	0 = Internal, 1 = External
<1>	Modulation Type	0 = QPSK
<1>	Convolutional Encoder	0 = None, 1 = Viterbi 1/2 Rate, 2 = Viterbi 2/3 Rate, 3 = Viterbi 3/4 Rate, 4 = Viterbi 5/6 Rate, 5 = Viterbi 7/8 Rate
<1>	Reed-Solomon	1 = Enable
<1>	Scrambler Control	1 = Enable
<1>	Scrambler Type	0 = DVB
<1>	Differential Encoder	0 = Off
<2>	Transmit Power Level	Signed value. +50 to -200 (+5.0 to -20.0 dBm implied decimal point)
<1>	Carrier Control	0 = Off, 1 = On
<1>	Carrier Test	0 = Off, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos FIR, 5 = Neg FIR
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Operating Mode	0 = Normal
<1>	Tx Interface Type	0 = Serial, 1 = Parallel, 2 = ASI
<1>	Clock Polarity	0 = Normal, 1 = Inverted
<1>	Data Polarity	0 = Normal, 1 = Inverted
<1>	Clock Control	0 = SCTE, 1 = SCT, 2 = SCTE-Auto
<1>	Framing	0 = DVB
<11>	Reserved	Circuit ID. Filled with 11 ASCII characters
<1>	Alarm Mask Enable	0 = All masks disabled, 1 = All masks enabled
<1>	Major Alarm Mask	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock

		Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Minor Alarm Mask	Bit 0 = Loss Internal Clock Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty)
<1>	Common Fault Mask	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares
<1>	Symbol Rate Mode	0 = Variable, 1 = Fixed
<4>	Symbol Rate	Symbol Rate in bps
<1>	Framing Mode	0 = 188 Byte, 1 = 204 Byte, 2 = No Framing
<1>	Roll Off	0 = 0.35, 1 = 0.2
<1>	Control Mode	0 = Local, 1 = Terminal, 2 = Computer, 3 = Ethernet
Status Bytes		
<1>	Control Mode	0 = Local, 1 = Terminal, 2 = Computer, 3 = Ethernet
<1>	Revision Number	Decimal point implied
<1>	Mod Fault Status	TBD
<1>	Major Alarm	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Minor Alarm	Bit 0 = Loss Internal Clock Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty

<1>	Common Fault	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares
<1>	Latched Major Alarm	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Latched Minor Alarm	Bit 0 = Loss Internal Clock Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty
<1>	Latched Common Fault	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares
<1>	Online Flag	TBD
<1>	+5V Voltage	+5V. Implied decimal point. ex: 49 = +4.9 V
<1>	+12V Voltage	+12V. Implied decimal point. ex: 121 = +12.1 V
<1>	-12V Voltage	-12V. Implied decimal point and minus sign. 118 = -11.8 V
<2>	Temperature	Degrees C. Implied decimal point. 500 = 50.0 C

Opcode: <2405h> Query a modulator's latched alarms

Query Response		
<1>	Latched Major Alarm	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Latched Minor Alarm	Bit 0 = Loss Internal Clock Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error

		Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty
<1>	Latched Common Fault	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares

Opcode: <2408h> Query a modulator's current alarms

Query Response		
<1>	Major Alarm	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Minor Alarm	Bit 0 = Loss Internal Clock Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty
<1>	Common Fault	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares

Opcode: <240Bh> Query a modulator's status

Query Response		
<1>	Control Mode	0 = Local, 1 = Terminal, 2 = Computer, 3 = Ethernet
<1>	Revision Number	Decimal point implied
<1>	Mod Fault Status	TBD
<1>	Major Alarm	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Minor Alarm	Bit 0 = Loss Internal Clock

		Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty
<1>	Common Fault	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares
<1>	Latched Major Alarm	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Latched Minor Alarm	Bit 0 = Loss Internal Clock Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty
<1>	Latched Common Fault	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares
<1>	Online Flag	TBD
<1>	+5V Voltage	+5 V. Implied decimal point. ex: 49 = +4.9 V
<1>	+12V Voltage	+12V. Implied decimal point. ex: 121 = +12.1 V
<1>	-12V Voltage	-12V. Implied decimal point and minus sign. 118 = -11.8 V
<2>	Temperature	

Opcode: <240Eh> Query time

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

Opcode: <240Fh> Query date

<1>	Year	0 – 99
<1>	Month	1 – 12
<1>	Day	1 – 31

Opcode: <2410h> Query time and date

<1>	Year	0 – 99
<1>	Month	1 – 12
<1>	Day	1 – 31
<1>	Hour	0 – 23
<1>	Minute	0 – 59
<1>	Second	0 – 59

Opcode: <2601h> Command a modulator's configuration

<4>	IF Frequency	Binary value, 1 Hz steps
<1>	Strap Code	Binary value, 1 through 255
<4>	Data Rate	Binary value, 1 bps steps
<4>	External Reference	Binary value, 1 Hz steps
<1>	Frequency Reference Source	0 = Internal, 1 = External
<1>	Modulation Type	0 = QPSK
<1>	Convolutional Encoder	0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate 5 = Viterbi 7/8 Rate
<1>	Reed-Solomon	1 = Enable
<1>	Scrambler Control	0 = Enable
<1>	Scrambler Type	0 = DVB
<1>	Differential Encoder	0 = Off
<2>	Transmit Power Level	Signed value. +50 to -200 dBm (+5.0 to -20.0 dBm implied decimal point)
<1>	Carrier Control	0 = Off, 1 = On
<1>	Carrier Test	0 = Off 1 = CW

		2 = Dual 3 = Offset 4 = Pos FIR 5 = Neg FIR
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Operating Mode	0 = Normal
<1>	Tx Interface Type	0 = Serial 1 = Parallel 2 = ASI
<1>	Clock Polarity	0 = Normal, 1 = Inverted
<1>	Data Polarity	0 = Normal, 1 = Inverted
<1>	Clock Control	0 = SCTE 1 = SCT 2 = SCTE-AUTO
<1>	Framing	0 = DVB
<11>	Reserved	Circuit ID. Fill with 11 ASCII characters
<1>	Alarm Mask Enable	0 = All masks disabled, 1 = All masks enabled
<1>	Major Alarm Mask	Bit 0 = Transmit output power level Bit 1 = Transmit oversample PLL lock Bit 2 = Composite clock PLL lock Bit 3 = IF synthesizer PLL lock Bit 4 = External reference PLL lock Bit 5 = Frame synchronizer Xilinx config error Bit 6 = Frame interleaver Xilinx config error Bit 7 = Mod Map Xilinx config error
<1>	Minor Alarm Mask	Bit 0 = Loss Internal Clock Bit 1 = Loss Terrestrial Clock Bit 2 = Loss Terrestrial Data Bit 3 = Reed-Solomon FIFO empty Bit 4 = Interleaver frame count error Bit 5 = DVB frame synchronization error Bit 6 = Event buffer not empty
<1>	Common Fault Mask	Bit 0 = -12V alarm. 1 = Fail Bit 1 = +12V alarm. 1 = Fail Bit 2 = +5V alarm. 1 = Fail Bit 3 = Temperature. 1 = Fail Bit 4 = RAM and ROM alarm flag Bits 5 - 7 = Spares
<1>	Symbol Rate Mode	0 = Variable, 1 = Fixed
<4>	Symbol Rate	Symbol Rate in bps
<1>	Framing Mode	0 = 188 Byte 1 = 204 Byte

		2 = No Framing
<1>		0 = 0.35, 1 = 0.2
	Roll Off	
<1>		0 = Local
	Control Mode	1 = Terminal 2 = Computer 3 = Ethernet

Opcode: <2602h> Command a modulator's frequency

<4>	Frequency	Binary value, 1 Hz steps This command will cause the carrier to turn off.

Opcode: <2603h> Command a modulator's strap code

<2>	Strap code	Binary value, 0 through 65535 This command will cause the carrier to turn off.

Opcode: <2604h> Command a modulator's data rate

<4>	Data rate	Binary value, 1 bps steps This command will cause the carrier to turn off.

Opcode: <2606h> Command a modulator's modulation type

<1>	Modulation Type	0 = QPSK

Opcode: <2607h> Command a modulator's convolutional encoder

<1>	Convolutional Encoder	0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate 5 = Viterbi 7/8 Rate This command will cause the carrier to turn off.

Opcode: <2608h> Command a modulator's differential encoder

<1>	Differential Encoder	0 = Off

Opcode: <2609h> Command a modulator's carrier control

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

Opcode: <260Ah> Command a modulator's carrier test

<1>	Carrier Test	0 = Normal 1 = CW 2 = Dual 3 = Offset 4 = Pos FIR 5 = Neg FIR

Opcode: <260Bh> Command a modulator's clock control

<1>	Clock Control	0 = SCTE, 1 = SCT

Opcode: <260Ch> Command a modulator's clock polarity

<1>	Clock Polarity	0 = Normal, 1 = Inverted

Opcode: <260Fh> Command a modulator's output level

<2>	Transmit Power Level	Signed value. +50 to -200 dBm (+5.0 to -20.0 dBm implied decimal point)

Opcode: <2610h> Command a modulator's Reed-Solomon

<1>	Reed-Solomon	1 = Enable

Opcode: <2611h> Command a modulator's spectrum

<1>	Spectrum	0 = Normal, 1 = Inverted

Opcode: <2612h> Command a modulator's operating mode

<1>	Operating Mode	0 = Normal

Opcode: <2613h> Command a modulator's scrambler control

<1>	Scrambler Control	0 = Enable

Opcode: <2614h> Command a modulator's scrambler type

<1>	Scrambler Type	0 = DVB

Opcode: <2615h> Command a modulator's framing

<1>	Framing	0 = DVB

Opcode: <2616h> Command a modulator's external reference source

<1>	External Ref. Source	0 = Internal, 1 = External

Opcode: <261Bh> Command a modulator's external reference frequency

<1>	External Ref. Freq.	Binary value, 1Hz steps

Opcode: <2620h> Command a modulator's clock control

<1>	Data Polarity	0 = Normal, 1 = Inverted

Opcode: <2621h> Command a modulator's interface

<1>	Interface	0 = Serial, 1 = Parallel

Opcode: <2622h> Command a modulator's symbol rate mode

<1>	Symbol Rate Mode	0 = Variable, 1 = Fixed

Opcode: <2403h> Query a modem's identification

Query Response		
<1>	Modem ID	DVB3030 modulator = 23

Opcode: <2404h> Query a modem's control mode

Query Response		
<1>	Modem control mode	0 = Local, 1 = Remote

Opcode: <2600h> Command a modem's control mode

<1>	Modem control mode	0 = Front Panel 1 = Terminal 2 = Computer 3 = Ethernet

Opcode: <2C03h> Command clear latched alarms

		No parameters

Opcode: <2C04h> Command set time

<1>	Hour	0 – 23
<1>	Minute	0 – 59
<1>	Second	0 – 5 9

Opcode: <2C05h> Command 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: <2640> Command a Modulator's Framing Mode

<1>	Framing Mode	0 = 188 Byte 1 = 204 Byte 2 = 187 Byte

Opcode: <2641> Command a Modulator's Roll Off

<1>	Roll Off	0 = 0.35, 1 = 0.24

4.4 Ethernet Port User Interface

The Ethernet Port of the DVB3030 allows for complete control and monitoring of all DVB3030 parameters and functions via a 10BaseT Ethernet Connection. The pinout assignments are listed in Figure 4-11 below:

Figure 4-11	
Pin Number	**Description**
1	Twisted Pair Output (TPOP)
2	Twisted Pair Output (TPON)
3	Twisted Pair Input 2 (TPIP)
4	NC
5	NC

6	Twisted Pair Input 1 (TPIN)
7	NC
8	NC

4.4.1 SNMP Overview

The simple Network Management Protocol, SNMP, is used by industry to manage networks. On a network, a client in one host, an SNMP manager, communicates with a server in another host, an SNMP agent. The manager requests the agent to read or write information (objects) in a Management Information Base, MIB, resident in the agent.

4.4.1.1 Object Identifiers

An object identifier is a sequence of integers separated by decimal points. These integers go through a tree structure, similar to a Unix file system. Figure 4-12 shows the structure of this tree when used with SNMP. All variables in the standard MIB start with the object identifier 1.3.6.1.2.1. All variables in the Radyne Private MIB start with the object identifier 1.3.6.1.4.1.2591. 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.

4.4.2 Management Information Base

The MIB is the database of information maintained by the agent that the manager can query or set. The standard MIB is described in RFC 1213. The Radyne MIB is listed at the end of this document.

4.4.2.1 Front Panel Control

A top-level sub-menu, titled "Options", is added to the Front Panel ‘System’ Menu. The user has the capability to disable/enable the SNMP option, and view both the Ethernet and IP Addresses of the modem and the default router, and the IP Address Mask. The Modem Ethernet Address is set at the factory to a unique value that can never be changed to avoid address conflicts with external devices.

4.4.2.2 Terminal Control

A new terminal screen is added to the terminal interface to view and set the modem Ethernet/SNMP Parameters. The modem can be interactively monitored and controlled in the Terminal mode, with a full screen presentation of current SNMP settings and status. Programming is accomplished by selecting the item to be modified and following user prompts. For example, to change the control mode, press the '2' Key on the terminal. The switch will respond by presenting the options available and requesting input. Two types of input may be requested. If the input is multiple choice, the user can scroll through the various choices using the space bar and then pressing 'Enter'. The other possible input type requires a numerical input and then pressing 'Enter'. An input can be aborted at any time by pressing the 'ESC' key. Invalid input keys cause an error message to be displayed on the terminal.

Following a valid input, the switch will place the new setting into the non-volatile RAM making it available immediately and also automatically the next time the unit is powered up.

The user has the capability to disable/enable the SNMP Option, and view both the Ethernet and IP Addresses of the modem and the default router, and the IP Address Mask. The Modem

Ethernet Address is set at the factory to a unique value that can never be changed to avoid address conflicts with external devices.

Following is the DVB3030 terminal mode screens

```
                        Main Menu

                    1. Controls
                    2. Modulator Controls
                    3. Event Buffer



                    8. Ethernet Configuration


                      Radyne ComStream Corp.
                  DVB3030 Digital Video Modulator


                     Enter Selection Number:
```

MODEM	ALARMS		MASK	STATUS	
1. Main Menu	11. Loss Terr Clock:	Fail	NO	Software Release	= 2.4
2. Control Mode : Terminal	12. Loss Terr Data:	Pass	NO	Temperature (c)	= 33.3
	13. Loss DVB Frame:	Pass	NO	+5 V Monitor	= +5.0
	14. Loss Frame Cnt:	Pass	NO	+12 V Monitor	= +12.2
	15. FIFO Error:	Pass	NO	-12 V Monitor	= -12.0
	16. Loss Int Clock:	Pass	NO		

---------- ETHERNET CONFIGURATION ----------

31. SNMP Mode: Normal	43. Community: Public
32. ModemEtherAddr: 00106507340D	44. BootMode: Nonvol
33. ModemIPAddr: 192.168.0.20	
34. ServerEthAddr: 006097107878	
35. ServerIPAddr: 192.168.0.1	
36. ServerHostName: tcphost	
37. RouterIpAddr: 192.168.0.254	
38. IPAddrMask: 255.255.255.0	

Enter Selection Number:

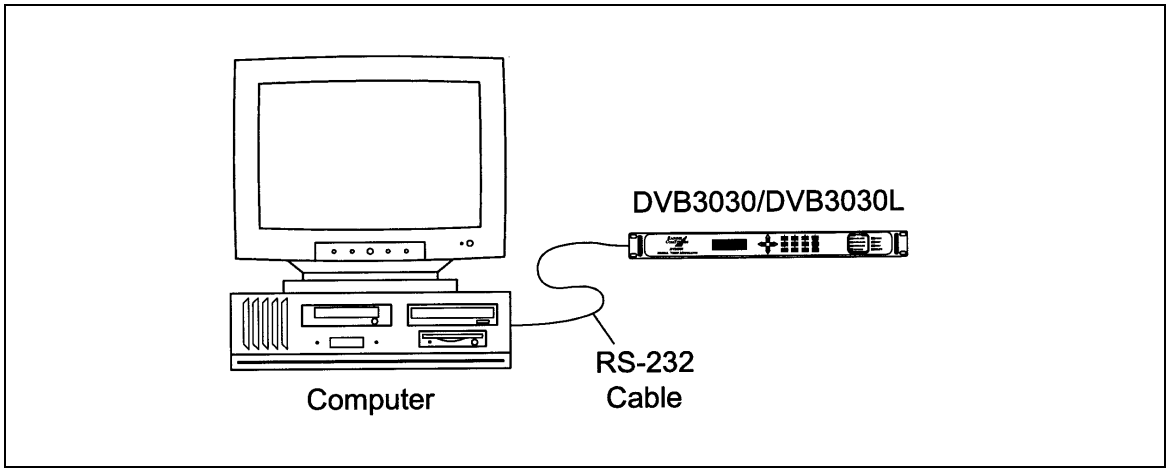
4.4.2.3 SNMP Setup

The following setup will require the use of a computer with HyperTerminal or Procomm Terminal Emulation Software (or Dumb Terminal).

4.4.2.4 Connecting the Terminal

Connect the computer to the DVB3030 Terminal Connector (J10) on the rear of the unit using an RS-232 cable.

Aside from the Modem Ethernet Address, which is set at the factory, the user is able to modify the SNMP Parameters from the Terminal Interface depending on the SNMP mode of operation.



4.4.2.5 Setting the SNMP Mode

There are two SNMP modes of operation: Normal and Test. When in Normal Mode, the user has the capability to modify the settings for the Server IP Address, the IP Address Mask, the Community String, and the Boot Mode. When in Test mode, these additional parameters can be modified: Modem IP Address, Server Ethernet Address, Server Host Name, and the Router IP Address. These later parameters are only accessed in Test Mode to make the user aware that he might be overriding settings downloaded through a BOOTP Server.

From the Main Menu, select ‘8’ for Ethernet Configuration. Select '31' and press the Enter Key. Scroll through to the desired selection of either 'Normal' or 'Test' and press the Enter Key.

4.4.2.6 Setting the Boot Mode

Select '44' from the Configuration Screen and press the Enter Key. Scroll through to the desired selection of either 'Default', 'Nonvol', or 'BootP' and press the Enter Key.

The Default Mode pre-loads the SNMP parameters with preset values. The Nonvol Mode uses the same parameters previously stored in Non Volatile Memory. The BootP Mode uses Bootstrap Protocol to download the following parameters from a Boot Server: Modem IP Address, Server Ethernet Address, Server Host Name, Router IP Address, and the IP Address Mask.
The Router IP Address and the IP Address Mask are retrieved from the vendor-specific area of the BootP Reply Packet.

4.4.2.7 Setting the Modem IP Address

While the SNMP Mode is set to Test, select '33' from the Configuration Screen and type in the IP Address in decimal dot notation and press the Enter Key.

example - 192.168.0.35

4.4.2.8 Setting the Server IP Address

Select '35' from the Configuration Screen and type in the IP Address in decimal dot notation and press the Enter Key.

example - 192.168.0.35

4.4.2.9 Setting the IP Address Mask:

Select '38' from the Configuration Screen and type in a Class 'C' Address Mask and press the Enter Key.

Class C Address Mask - 255.255.255.0

4.4.2.10 Setting the Community String:

Select '43' from the Configuration Screen and press the Enter Key. Type in a maximum of 11 alphanumeric characters and press the Enter Key.

Community String of 'public' is usually used.

4.4.2.11 Setting the Server Ethernet Address

Select '34' from the Configuration Screen and press the Enter Key. Type in the Ethernet Address and press the Enter Key.

Example - 000092811B12

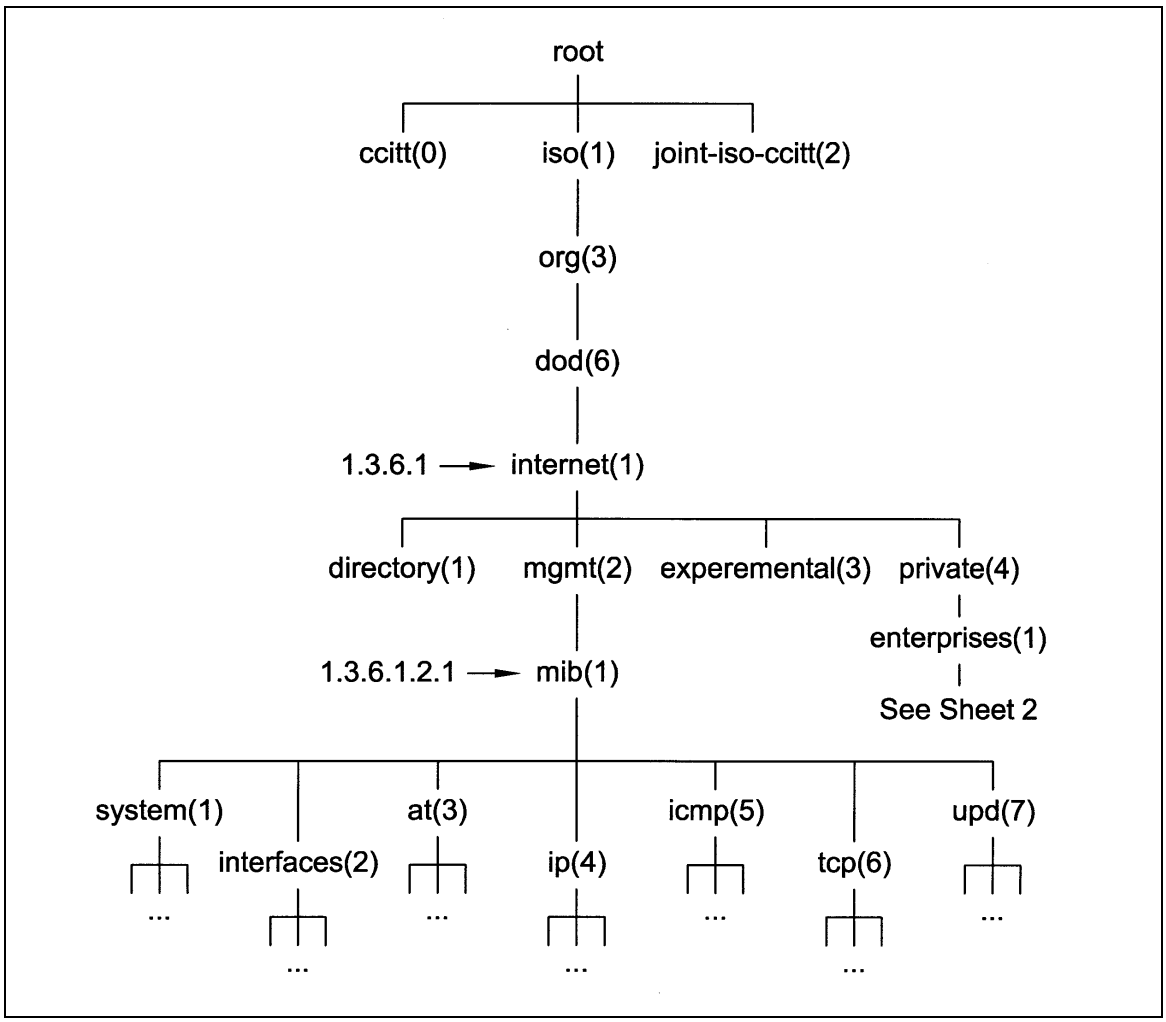


Figure 4-12. Object Identifiers in the Management Information Base (Sheet 1 of 2)

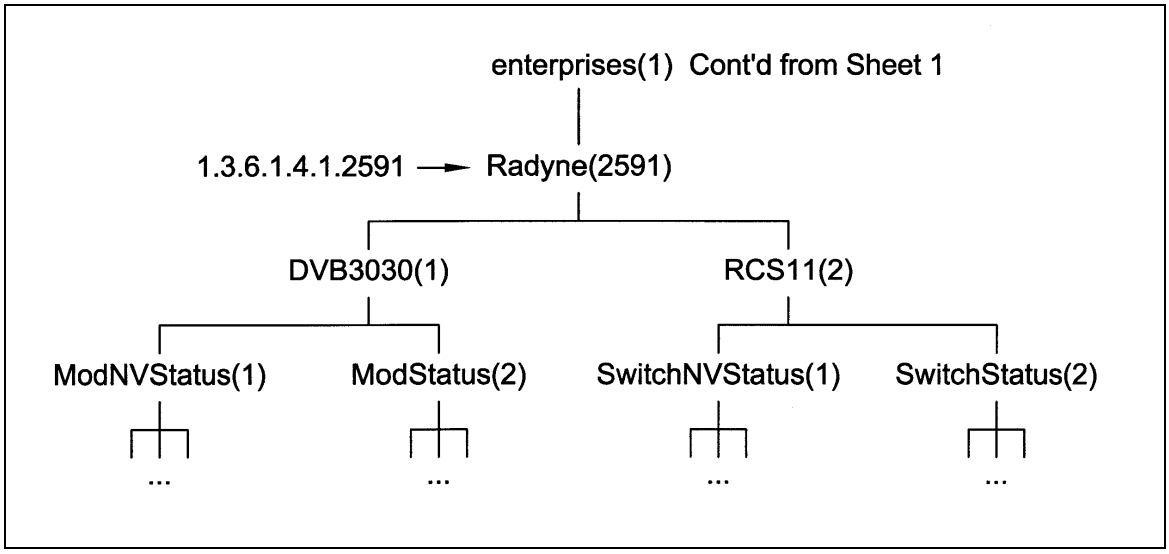


Figure 4-12. Object Identifiers in the Management Information Base (Sheet 2 of 2)

Radyne has been testing SNMP using the Carnegie-Mellon software, available from ftp.net.cmu.edu. Log in as anonymous, go to pub/snmp-dist, and get the files in binary mode. Our platform is a 166 MHz Pentium computer running REDHAT Linux distribution version 4. 1. When you run the make install, all the files get stored in the correct place. Some useful utilities are SNMPget, SNMPgetnext, SNMPset, SNMPtest, and SNMPwalk.

Examples:

1. Example on how to query the carrier control setting of a DVB3030 modulator with an IP Address of 192.1.1.51 and a Community Name of 'public':

   snmpget 192.1.1.51 public.1.3.6.1.4.1.2591.1.1.1.0

   Response:

   enterprises.2591.1.1.1.0 = 1 (This indicates that the carrier control is ON)

2. Example on how to query the IF frequency setting of a DVB3030 modulator with an IP address of 192.1.1.51 and a community name of "public":

   snmpget 192.1.1.51 public.1.3.6.1.4.1.2591.1.1.3.0

   Response:

   enterprises.2591.1.1.3.0 = 75000000 (This indicates that the IF freq. is set to 75 MHz)

3. Example on how to query the system group of a DVB3030 modulator with an IP address of

   192.1.1.51 and a community name of "public": snmpwalk 192.1.1.51 public system

   Response:

   system.sysDescr.0 = "DVB3030 Running SNMP Agent" system.sysObjectID.0 = OID: entereprises.2591. 1.1 system.sysUpTime.0 = Timeticks: (30) 0:00:00 system.sysContact.0 = "RADYNE (602) 437 - 9620" system.sysName.0 = "DVB3030" system.sysLocation.0 = "RADYNE Phoenix, AZ" system.sysServices.0 = 79

   Note: snmpwalk communicates with a host using SNMP GET Next Requests.

4. Example on how to set the clock control of a DVB3030 modulator to SCTE with an IP address of 192.1.1.51 and a community name of "public":

   snmpset 192.1.1.51 public. 1.3.6.1.4.1.2591.1.1.9.0 1 0

   Response:

   entreprises.2591.1.1.9.0 = 0 (This indicates that the clock control is set to SCTE)

5. Example on how to set the Carrier Test control of a DVB3030 modulator to CW with an IP address of 1921.1.51 and a community name of "public":

   snmpset 192.1.1.51 public. 1.3-61.4.1.2591.1.1.27.011

   Response:

   enterprises.2591.1.1.27.0 = 1 (This indicates that the Carrier Test control is set to CW)

6. Example on how to query the DVB3030 modulator non-volatile status with an IP address of 192.1.1.51 and a community name of "public":

   snmpwalk 192.1.1.51 public.1.3.6.1.4.1.2591.1.1

   Response:

enterprises.2591. 1. 1. 1.0 = 1	(Carrier Control = ON)
enterprises.2591.1.1.2.0 = -56	(Transmit Power = -5.6 dBm)
enterprises.2591.1.1.3.0 = 75000000	(IF Frequency = 75000000 MHz)
enterprises.2591.1.1.4.0 = 2831060	(Data Rate = 2831060 bps)
enterprises.2591.1.1.5.0 = 2048000	(Symbol Rate = 2048000 bps)
enterprises.2591.1.1.6.0 = 0	(Symbol Rate Mode = VARIABLE)
enterprises.2591.1.1.7.0 = 8	(Strap Code = 8)
enterprises.2591.1.1.8.0 = 3	(Convolutional Encoder = VIT3/4)
enterprises.2591.1.1.9.0 = 0	(Clock Control = SCTE)
enterprises.259 1. 1. 1.1 0.0 = 0	(Framing Mode = 188 Byte)
enterprises.2591.1.1.1 1.0 = 0	(Rolloff=0.35)
enterprises.2591.1.1.12.0 = 0	(Frequency Reference Source = INTERNAL)
enterprises.2591.1.1.13.0 = 1024000	(External Reference = 1024000 Hz)
enterprises.2591.1.1.14.0 = 0	(Interface Type = SERIAL)
enterprises.2591.1.1.15.0 = 0	(Clock Polarity = NORMAL)
enterprises.2591.1.1.16.0 = 0	(Data Polarity = NORMAL)
enterprises.2591.1.1.17.0 = 0	(Spectrum = NORMAL)
enterprises.2591.1.1.18.0 = 0	(Modulation Type = QPSK)
enterprises.2591.1.1.19.0 = 0	(Framing = DVB)
enterprises.2591.1.1.20.0 = 1	(Reed-Solomon = ENABLE)
enterprises.2591.1.1.21.0 = 1	(Scrambler Control = ENABLE)
enterprises.2591.1.1.22.0 = 0	(Scrambler Type = DVB)
enterprises.2591.1.1.23.0 = 0	(Differential Encoder = OFF)
enterprises.2591.1.1.24.0 = 1	(Alarm Mask Enable = ENABLE)
enterprises.2591.1.1.25.0 = 255	(Major Alarm Mask = NONE MASKED)
enterprises.2591.1.1.26.0 = 255	(Minor Alarm Mask = NONE MASKED)
enterprises.2591.1.1.27.0 = 255	(Common Alarm Mask = NONE MASKED)
enterprises.2591.1.1.28.0 = 0	(Operating Mode = NORMAL)
enterprises.2591.1.1.29.0 = 0	(Carrier Test = OFF)
enterprises.2591.1.1.30.0 = ""	(Circuit ID = "")
enterprises.2591.1.1.31.0 = 0	(Control Mode = LOCAL)

Note: snmpwalk communicates with a host using SNMP GET Next Requests.

7. Example on how to query the DVB3030 modulator volatile status with an IP Address of 192.1.1.51 and a community name of 'public'.

   snmpwalk 192.1.1.51 public.1.3.6.1.4.1.2591.1.2

   Response:

enterprises.2591.1.2. 1.0 = 0	(Major Alarm Status)
enterprises.2591.1.2.2.0 = 46	(Minor Alarm Status)
enterprises.2591.1.2.3.0 = 0	(Common Alarm Status)
enterprises.2591.1.2.4.0 = 2	(Latched Major Alarm Status)
enterprises.2591.1.2.5.0 = 46	(Latched Minor Alarm Status)
enterprises.2591.1.2.6.0 = 0	(Latched Common Alarm Status)

```
enterprises.2591.1.2.7.0 = 15          (Revision Number = Version 1.5)
enterprises.2591.1.2.8.0 = 50          (+5V Monitor = + 5 Volts)
enterprises.2591.1.2.9.0 = 122         (+ 12V Monitor = 12.2 Volts)
enterprises.2591.1.2.1 0.0 = -1 20     (-l2V Monitor = -12.0 Volts)
enterprises.2591.1.2.11.0 = 357        (Temperature Monitor = 35.7°C)
END OF MIB
```

Note: snmpwalk communicates with a host using SNMP GET Next Requests.

4.5 Terminal Port User Interface

The Terminal Port of the DVB3030 allows for complete control and monitoring of all DVB3030 parameters and functions via an RS-232 Serial Interface.

4.5.1 DVB3030 Terminal Mode Control

'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:

a. 19,200 Baud;
b. 8 Data bits;
c. 1 stop bit;
d. No parity.

The baud rate can be changed at the front panel by using the *System>Baud Rate* menu.

The new baud rate does not take effect until power to the unit has been shut down and turned back on again.

4.5.2 Terminal Mode Control Screen Menus

The Terminal Control Mode is menu-driven as shown in the screen captures below. The allowable values for each item number are 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.

```
                              Main Menu

                            1 Main Menu
                            2 Modulator Controls
                            3 Event Buffer


                         Radyne ComStream Corp.
                       DVB3030 Digital Video Modulator



 Enter Selection Number:
```

```
   MODEM                      ALARMS          MASK          STATUS
1.Main Menu           11.Loss Terr Clock  :Fail Yes   Software Release: 1.1

2.Modulator Controls  12.Loss Terr Data   :Fail Yes

                      13.Loss DVB Frame   :Pass Yes   +5  V Monitor    : + 4.9

                      14.Loss Frame Cnt   :Fail Yes   +12 V Monitor    : +12.2

                      15.FIFO Error       :Fail Yes   -12 V Monitor    : -11.8

                      16.Loss Int Clock   :Pass Yes   Last Rate        : Symbol



-------------------------MODULATOR CONTROLS----------------------------

31.Freq.:70.000000 MHZ 40.Test Pattern             51.Modulation    :   QPSK

32.Strap:           00 41.Data Clk Sel             52.Output Level  :   -5.0

33.DR:     2048000 BPS 42.Ext Clk Out             53.Control Mode  : TERMINAL

34.SR:     1111148 SPS

35.Conv. Encoder:      43.Carrier Ctl    :  On     54.RefSource     : Internal

36.Test Mode:          44.Carrier Sel    :  Normal 55.ExtRef Freq.  : 10000000

37.Spectrum:           45.Clock Invert   :  Normal 56.Address       :   32

38.Scrambler:          46.Data Invert    :  Normal 57.Framing Mode  :   188

39.RS&Interleaver:     47.Interface      :  Serial 58.RollOff       :   0.35

                                                   59.Last Rate Control:AUTO

Enter Selection Number:
```

```
   MODEM                    ALARMS          MASK          STATUS
1.Main Menu          11.Loss Terr Clock  :Fail Yes   Software Release: 1.1

2.Modulator Controls 12.Loss Terr Data   :Fail Yes

                     13.Loss DVB Frame   :Pass Yes   +5  V Monitor    : + 4.9

                     14.Loss Frame Cnt   :Fail Yes   +12 V Monitor    : +12.2

                     15.FIFO Error       :Fail Yes   -12 V Monitor    : -11.8

                     16.Loss Int Clock   :Pass Yes   Last Rate       : Symbol




----------------------------EVENT BUFFER-------------------------------

     TIME     DATE     TYPE     MESSAGE









31.Delete One Entry    41.Delete All Entries


Enter Selection Number:
```

MAIN MENU

1. Main Menu:	Displays Main Menu
2. Modulator:	Displays Modulator Menu
3. Event Buffer:	Displays Event Buffer Menu

MODULATOR MENU

1. Main Menu:	Displays Main Menu
2. Modulator:	Displays Modulator Menu
11. Loss Terr Clock:	{YES, NO} Allows masking of Loss of Terrestrial Clock minor alarm.
12. Loss Terr Data:	{YES, NO} Allows masking of Loss of Terrestrial Data minor alarm.
13. Loss DVB Frame:	{YES, NO} Allows masking of Loss of DVB Frame Synchronization minor alarm.
14. Loss Frame Cnt:	{YES, NO} Allows masking of Interleaver DVB Frame Count Error minor alarm.

15. FIFO Error:	{YES, NO} Allows masking of Reed-Solomon FIFO Error minor alarm.
16. Loss Int Clock:	{YES, NO} Allows masking of Loss of Internal Clock minor alarm.
31. Freq.:	Enter in 1 Hz increments from 50-90 or 100-180 MHz.
32. Strap:	The strap code has not been implemented at this time.
33. DR:	Enter the data rate in 1 BPS increments from 1,000,000 to 78,750,000 BPS.
34. SR:	Enter the symbol rate in 1 SPS increments from 1,000,000 to 45,000,000 SPS.
35. Conv Encoder:	{NONE, VIT 1/2, VIT 2/3, VIT 3/4, VIT 5/6, VIT 6/7, VIT 7/8} changes the FEC encoding type and rate. ***Note: Changing FEC rate will leave Symbol Rate constant and change Data Rate for new overhead.***
36. Test Mode:	{ON LINE} No DVB Test Modes have been implemented.
37. Spectrum:	{NORMAL, INVERTED} Inverts the direction of vector rotation for QPSK modulation. Meets the IESS specification.
38. Scrambler:	{Enable, Disable} Enables DVB Scrambler for Energy Dispersal
39. RS & Intlvr:	{Enable, Disable} Enables Reed-Solomon Encoder and Convolutional Interleaver
40. Test Pattern:	{Enable, Disable} Inserts 2^{15}-1 Test Pattern in the Data Path before scrambler
41. Data Clock Sel:	{SCT, SCTE} SCT: Data clock is supplied by DVB modulator internally. SCTE: Data clock is supplied by user equipment to DVB modulator.

Note: The Transmit Clock (SCT) supplied by the DVB3030 is always Output. Normally, this clock is used to clock the data out of the data source and then return it to the SCTE pins of J9 or J8. The DVB3030 is then set to SCTE mode eliminating any possible clock skew. Alternately, the data source can generate the SCTE clock internally and the SCT signal can be ignored. If SCT mode is selected, the Modulator data clock will not be locked to the incoming data stream. This mode is NOT recommended except for testing or fault backup.

42. EXT CLK OUT:	{SCT, SCTE, NONE} Selects the source of clock output from the G.703 Interface. The selection is fixed at 'SCT' for Serial, Parallel and HSSI and fixed at 'None' for ASI.
43. Carrier Ctl:	{OFF,ON} Turns transmitter On or Off.
44. Carrier Sel:	{OFF, CW, DUAL, OFFSET, POS FIR, SEG FIR} OFF: Normal Modulation CW: Pure Carrier DUAL: Double Sideband OFFSET: Single Sideband POS.FIR: Positive Impulse Response NEG.FIR: Negative Impulse Response
45. Clock Invert:	{NORMAL,INVERTED} Inverts the data clock.
46. Data Invert:	{NORMAL,INVERTED} Inverts the data.
47. Interface:	{SERIAL, PARALLEL, ASI} Selects Serial, Parallel or ASI type interface.

Note: Only the interface option that has been ordered may be selected.

51. Modulation:	{QPSK, BPSK} Standard Modulation is QPSK, BPSK is optional.
52. Output Level:	Enter the transmitter output power in 0.1 dBm increments from -20 to 5 dBm.
53. Control Mode:	{FT PANEL, TERMINAL, COMPUTER, ETHERNET}
54. RefSource:	{INTERNAL, EXTERNAL} Select external or internal reference clock.
55. ExtRef Freq.:	Enter the external reference frequency in 8 KHz steps from 1 MHz to 10 MHz.
56. Address:	Enter the multidrop address from 32 to 255 for remote monitoring and control.
57. Framing Mode:	{NONE, 188, 204} Selects the Framing Mode.
58. Roll Off:	{0.35, 0.20} Selects the desired Spectrum Roll Off.
59. Last Rate Control:	{SYMBOL, DATA, AUTO} Selects rate precedence. See Last Rate Control notes.

EVENT BUFFER MENU:

1. Main Menu:	Displays Main Menu
2. Modulator:	Displays Modulator Menu
11. Loss Terr Clock:	{YES,NO} Allows masking of Loss of Terrestrial Clock minor alarm.
12. Loss Terr Data:	{YES,NO} Allows masking of Loss of Terrestrial Data minor alarm.
13. Loss DVB Frame:	{YES,NO} Allows masking of Loss of DVB Frame Synchronization minor alarm.
14. Loss Frame Cnt:	{YES,NO} Allows masking of Interleaver DVB Frame Count Error minor alarm.
15. FIFO Error:	{YES,NO} Allows masking of Reed-Solomon FIFO Error minor.
16. Loss Int Clock:	{YES,NO} Allows masking of Loss of Internal Clock minor alarm.
31. Delete One Entry:	Deletes one logged event from the event buffer.
41. Delete All Entries:	Deletes all logged events from the event buffer.

After arriving at a programmable parameter that needs to be modified (Figure 4-2), depress the ‘Enter’ Key. The first space of the modifiable parameter highlights (blinks) and is ready for a new parameter to be entered. After entering the new parameter using the numeric keypad, depress the ‘Enter’ key to lock in the new parameter. If a change needs to be made, depress the ‘Clear’ Key and the display defaults back to the original parameter. Depress ‘Enter’ again and re-enter

Note: If at any time the user wishes to abort the changes being made, depress the ‘Clear’ Key to begin again.

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Section 5 – Electrical Interfaces

5.0 DVB3030 Connections

All DVB3030 connections are made to labeled connectors located on the rear of the unit: The connector definitions below are those on the DVB3030 unit. Any connection interfacing to the DVB3030 must be the appropriate mating connector. Refer to Figure 5-1a and 5-1b for connector locations.

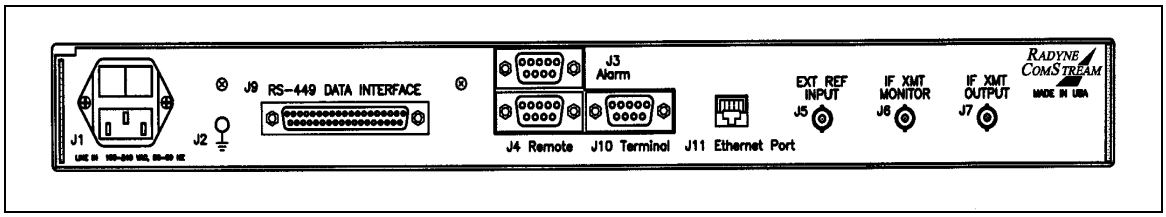

Figure 5-1a. DVB3030 Digital Video Broadcast Modulator Rear Panel Connectors

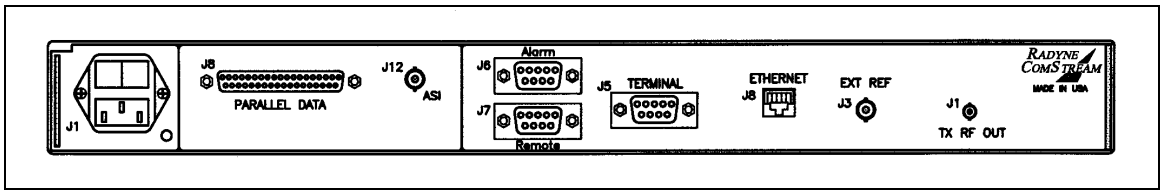

Figure 5-1b. DVB3030L Digital Video Broadcast Modulator Rear Panel Connectors

5.1 AC Power

The unit is powered from a 100 – 200 VAC, 50 – 60 Hz source. Maximum unit power consumption is 25 W. The switch turns power on and off to the unit. A chassis ground connection can be made to the stud located to the lower right of the AC Power Connector.

5.2 Ethernet Interface (I/O)

The Ethernet Interface (J11 for DVB3030, J8 for DVB3030L) can be used for the monitor & control functions of the unit. The physical interface is a standard RJ-45 Connector. Refer to Ethernet Port User Interface (Section 4.4) for programming details.

5.3 External Reference (Input)

The External Reference Input (J5 for DVB3030, J3 for DVB3030L) is supplied to allow the customer to phase-lock the modulator's internal oscillator to an external reference.

This female BNC Connector accepts a 1.5 – 5 Vp-p @ 50 Ohms. The frequency range of the external reference is 1 -–10 MHz in 8 KHz steps.

5.4 Remote Port (I/O)

The Remote Port Interface (J4 for DVB3030, J7 for DVB3030L) can be used for the monitor and control functions of the unit. The physical interface is a female 9-Pin D-Sub Connector. This bi-directional port complies with RS-485 Electrical Specifications. Refer to Remote Port User Interface (Section 4.3) for protocol and programming details. Pinouts are listed in Table 5-1.

Table 5-1. J4 (J7 L-Band) - RS-485 Remote Control- 9-Pin 'D' Female			
Pin No.	**Signal**	**Description**	**Direction**
1	Tx (B)	Transmit Data (+)	Output
5	GND	Ground	-
6	Tx (A)	Transmit Data (-)	Output
8	Rx (B)	Receive Data (+)	Input
9	Rx (A)	Receive Data (-)	Input

5.5 Terminal Port (I/O)

The Terminal Port Interface (J10 for DVB3030, J5 for DVB3030L) can be used for the monitor & control functions of the unit. The physical interface is a female 9-Pin D-Sub Connector. This bi-directional port complies with RS-232 Electrical Specifications. Refer to Section 4.6 for terminal interface details. The pinouts are listed in Table 5-2.

Table 5-2. J10 (J5 L-Band) - RS-232 Terminal Port - 9-Pin 'D' Female			
Pin No.	**Signal Name**	**Description**	**Direction**
3	TxD	Transmit Data	Output
2	RxD	Receive Data	Input
5	GND	Ground	---

5.6 Alarm Port

The Alarm Connector (J3 for DVB3030, J6 for DVB3030L) is used to indicate the fault condition of the modulator to external equipment. This male 9-Pin D-Sub Connector provides connection to two form-c relays and an open collector output. The user can distinguish between major and minor alarms with the relays. Refer to Table 5-3 for connector pinouts. Table 5-4 below describes the alarm indications.

Table 5-3. Alarm Connector J6 Pin Assignment	
Pin No.	**Connection**
1	Relay 1 NO
2	Relay 1 C
3	Relay 1 NC (Major Alarm)
4	Ground
5	No Connect
6	Mod Fault (Open Collector)
7	Relay 2 NO
8	Relay 2 C
9	Relay 2 NC (Minor Alarm)

Table 5-4. Alarm Indications	
Alarm	**Pin Description**
None	1 – 2 shorted, 7 – 8 shorted, open collector output driven low
Minor	1 – 2 shorted, 8 – 9 shorted, open collector output driven low
Major	2 – 3 shorted, 7 – 8 shorted, open collector output open

5.7 IF Port (Output)

If the customer orders the 70.140 MHz IF, the IF Port will be a 75-Ohm female BNC Connector. The power level is programmable from -20 to +5 dBm in 0.1 dBm steps. The IF Frequency can be programmed to 50 – 90 MHz or 100 – 180 MHz, in 1 Hz steps. If an L-Band IF is ordered, the IF Port will be a 50 Ohm SMA female connector. The power level is programmable from -30 to -5 dBm, in 0.1 dBm steps. The IF Frequency can be programmed to 950 – 1750 MHz, in 1 Hz steps.

5.8 ASI/Parallel RS-422 Interface

The pinouts for this connector are given in Table 5-5 and 5-6.

Table 5-5. J8 – M2P RS-422 Parallel Interface (Optional)		
Pin No.	**Signal Name**	**Direction**
1	OUTCLK+	Output
14	OUTCLK-	Output
2	CLK+	Input
15	CLK-	Input
3	SYNC+	Input
16	SYNC-	Input
4	VALID+	Input
17	VALID-	Input
5	D0+	Input
18	D0-	Input
6	D1+	Input
19	D1-	Input
7	D2+	Input
20	D2-	Input
8	D3+	Input
21	D3-	Input
9	D4+	Input
22	D4-	Input
10	D5+	Input

23	D5-	Input
11	D6+	Input
24	D6-	Input
12	D7+	Input
25	D7-	Input
13	Not Connected	–

Table 5-6. J8 – DVB RS-422 Parallel Interface

Pin No.	Signal Name	Direction
1	Clock +	Output
2	System GND	Output
3	D7 +	Input
4	D6 +	Input
5	D5 +	Input
6	D4 +	Input
7	D3 +	Input
8	D2 +	Input
9	D1 +	Input
10	D0 +	Input
11	DVALID +	Input
12	PSYNC +	Input
13	Cable Shield	Input
14	Clock -	Input
15	System GND	Input
16	D7 -	Input
17	D6 -	Input
18	D5 -	Input
19	D4 -	Input
20	D3 -	Input
21	D2 -	Input
22	D1 -	Input
23	D0 -	Input
24	DVALID -	Input
25	PSYNC -	–

5.9 ASI/Parallel LVDS Interface

This serial interface is supported on a DB-37 Female Connector. It complies with LVDS Electrical Specifications. Refer to Table 5-7 for the pinouts for this interface. The maximum data rate is 16 Mbps.

Table 5-7. J9 - Serial RS-422 Interface

Pin No.	Signal Name	Direction
1	Shield	GND
4	Send Data (SD) A	Input
5	Serial Clock Transmit (SCT) A	Output
7	Ready To Send (RTS) A	Output
9	CTS (A)	Output
11	Data Mode (DM) A	Output
14	Mod Fault	Output (OC)
15	Ext Ref Int A	Input
17	Serial Clock Transmit External (SCTE) A	Input
19	Signal GND	GND
20	Common	GND
22	Send Data (SD) B	Input
23	Serial Clock Transmit (SCT) B	Output
25	Ready To Send (RTS) B	Input
27	Clear To Send (CTS) B	Output
29	Data Mode (DM) B	Output
33	Ext Ref Int B	Input
35	Serial Clock Transmit External (SCTE) B	Input
37	Common	GND

5.10 Serial RS-422 Interface

This serial interface is supported on a DB-37 Female Connector. It complies with RS-422.RS-449 Electrical Specifications. Refer to Figure 5-8 for the pinouts for this interface. The maximum data rate is 16 Mbps.

Table 5-8. J9 - Serial RS-422 Interface

Pin No.	Signal Name	Direction
1	Shield	GND
4	Send Data (SD) A	Input
5	Serial Clock Transmit (SCT) A	Output

7	Ready To Send (RTS) A	Output
9	CTS (A)	Output
11	Data Mode (DM) A	Output
14	Mod Fault	Output (OC)
15	Ext Ref Int A	Input
17	Serial Clock Transmit External (SCTE) A	Input
19	Signal GND	GND
20	Common	GND
22	Send Data (SD) B	Input
23	Serial Clock Transmit (SCT) B	Output
25	Ready To Send (RTS) B	Input
27	Clear To Send (CTS) B	Output
29	Data Mode (DM) B	Output
33	Ext Ref Int B	Input
35	Serial Clock Transmit External (SCTE) B	Input
37	Common	GND

5.11 G.703 Interface

The G.703 Interface supports three different G.703 rates (E3, T3, and STS-1). The physical interface is a single Female BNC Connector. The data rate for the E3 Interface is 34 Mbps, 44 Mbps for the T3 Interface, and 51 Mbps for the STS-1 Interface. The interface complies with G.703 electrical specifications.

5.12 HSSI Interface

The HSSI (High-Speed Serial Interface) complies with the HSSI Functional and Electrical Specifications. The physical interface is a 50 Pin SCSI-2 Type Connector. Electrical levels are ECL. The pinouts for this interface are listed in Table 5-9.

Table 5-9. J9 – HSSI (High-Speed Serial Interface) 50-Pin Connector				
Pin No. (+)	**Pin No. (–)**	**Signal Name**	**Description**	**Direction**
1	26	SG	Signal Ground	-
2	27	RT	Receive Timing	Output
3	28	CA	DCE Available	Output
4	29	RD	Receive Data	Output
6	31	ST	Send Timing	N/A
7	32	SG	Signal Ground	-
8	33	TA	DTE Available	Input
9	34	TT	Terminal Timing	NA
10	35	LA	Loopback Circuit A	N/A
11	36	SD	Send Data	NA
12	37	LB	Loopback Circuit B	Not Used
13	38	SG	Signal Ground	-
15	40	EB CLK	External Bal. Clock	Used as EXT BAL CLK Input
14 - 18	39 – 43	5 Ancillary to DCE		Input
19	44	SG	Signal Ground	-
20 - 24	45 - 49	5 Ancillary from DCE		Output
25	50	SG	Signal Ground	-
22	47	LA		
23	48	LB		

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Section 6 – Maintenance

6.0 Periodic Maintenance

The DVB3030 modulator requires no periodic field maintenance procedures. Should a unit be suspected of a defect in field operations after all interface signals are verified, the correct procedure is to replace the unit with another known working DVB3030. If this does not cure the problem, wiring or power should be suspect.

There is no external fuse on the DVB3030. The fuse is located on the power supply assembly inside the case, and replacement is not intended in the field.

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Section 7 – Technical Specifications

7.0 Introduction

This section defines the technical performance parameters and specifications for the DVB3030 and DVB3030L Digital Video Broadcast Modulators.

7.1 IF Output Port

1.	Frequency Range:	50 - 90 MHz, 100 - 180 MHz	
	Optional:	950 - 1525 MHz (DVB3030L)	
	Step Size:	100 Hz	
	Stability:	10 ppm	
2.	Output Level:	+5 to -20 dBm (-5 to -30 for DVB3030L)	
	Step Size:	0.1 dB	
	Accuracy:	± 0.5 dB	
	Stability:	± 0.5 dB	
3.	Output Impedance:	75 Ohms	
	Option:	50 Ohms	
4.	Return Loss:	20 dB	
5.	Phase Noise:	100 Hz	-63 dBc
		1 KHz	-73 dBc
		10 KHz	-83 dBc
		100 KHz	-93 dBc
6.	Connector:	BNC, Female	
7.	Modulation:	QPSK, BPSK Optional	
8.	Spectral Mask:	Per ETS 300-421	
9.	Spurious Output:	-55 dBc In-Band	
		-45 dBc Out-of-Band	

7.2 Baseband

1.	Variable Data Rate:	
	Variable	1 to 78.75 Mbps
	Step Size	1 bps
2.	Symbol Rate	45 Msps max.
3.	Forward Error Correction (FEC) Encoding	
	Inner Code:	Convolutional
		K = 7, (171, 133)
	Rate:	1/2, 2/3, 3/4, 5/6, 6/7, 7/8
	Outer Code:	Reed Solomon
		(204,188, T = 8)
4.	Interleaving:	Convolutional, I = 12
5.	Data Scrambling:	Per ETS 300-421

6.	Data Interface:	
	Serial:	RS-422/-449 (< 16 Mbps) G.703 (HDB3) (Optional) DVB ASI - 'Hotlink' (Optional)
	Parallel:	RS-422, 25-Pin 'D' (≤ 50 Mbps) DVB, RS-422, 25-Pin 'D' LVDS DVB (Optional) G.703 (Optional) HSSI (Optional) ASI (Optional)
7.	Internal Clock Source:	
	Stability:	10 ppm
8.	External Clock:	
	Accuracy:	100 ppm

7.3 Monitor and Control

1.	Interface:	Serial RS-485 and RS-232, Ethernet, 10BaseT
2.	Parameters Controlled:	IF Frequency, IF Output Level, IF Output On/Off, Data Rate, Symbol Rate, Clock Polarity, Data Polarity, Inner Code Rate, Test Modes
3.	Parameters Monitored	Faults, Stored Faults

7.4 Environmental

1.	Prime Power:	100 - 240 VAC, 50-60 Hz, 0.5 A
2.	Operating:	
	Temperature:	0 – 50° C.
	Humidity:	Up to 95%, Non-condensing
3.	Storage:	
	Temperature:	-20 to 70° C.
	Humidity:	Up to 99%, Non-condensing
4.	Regulatory:	
	EMC:	EN55022, Class B EN50082-1 IEC801-2, 4 KV CD, 8 KV AD IEC801-3, 27-500 MHz, 3 V/M IEC801-4, 0.5 KV Signal, 1 KV Power
	Safety:	EN60950

5. Physical:

Weight:	10 Pounds (4 Kg)
Size:	19” W x 17” D x 1.75” H 48.3 cm x 43.2 cm x 4.45 cm

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