DMD20/DMD20 LBST

Universal Satellite Modem

Installation and Operation Manual

TM103
Revision 2.2

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

RADYNE COMSTREAM

Warranty Policy

WP

Radyne ComStream, Inc. (Seller) warrants the items manufactured and sold by Radyne ComStream, Inc. to be free of defects in material and workmanship for a period of two (2) years from date of shipment Radyne ComStream, Inc.'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.

This warranty applies only to defects in material and workmanship in products manufactured by Radyne ComStream, Inc. Radyne ComStream, Inc. makes no warranty whatsoever concerning products or accessories not of its manufacture. Repair, or at the option of Radyne ComStream, Inc., replacement of the Radyne ComStream, Inc. products or defective parts therein shall be the sole and exclusive remedy for all valid warranty claims.

Warranty Period

The applicable warranty period shall commence on the date of shipment from a Radyne ComStream, Inc. facility to the original purchaser and extend for the stated period following the date of shipment. Upon beginning of the applicable Radyne ComStream, Inc. warranty period, all customers' 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, Inc., 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.

2. Products, items, parts, accessories, subassemblies, or components which are expendable in normal use or are of limited life, such as but not limited to, bulbs, fuses, lamps, glassware, etc. Radyne ComStream, Inc. reserves the right to revise the foregoing list of what is covered under this warranty.

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Radyne ComStream, Inc. will not make warranty adjustments for failures of products or parts, which occur after the specified maximum adjustment period. Unless otherwise agreed, failure shall be deemed to have occurred no more than seven (7) working days before the first date on which Radyne ComStream, Inc. receives a notice of failure. Under no circumstances shall any warranty exceed the period stated above unless expressly agreed to in writing by Radyne ComStream, Inc.

Liability Limitations

This warranty is expressly in lieu of and excludes all other express and implied warranties, Including but not limited to warranties of merchantability and of fitness for particular purpose, use, or applications, and all other obligations or liabilities on the part of Radyne ComStream, Inc., unless such other warranties, obligations, or liabilities are expressly agreed to in writing by Radyne ComStream, Inc.

All obligations of Radyne ComStream, Inc. under this warranty shall cease in the event its products or parts thereof have been subjected to accident, abuse, alteration, misuse or neglect, or which have not been operated and maintained in accordance with proper operating instructions.

In no event shall Radyne ComStream, Inc. be liable for Incidental, consequential, special or resulting loss or damage of any kind howsoever caused. Radyne ComStream, Inc.'s liability for damages shall not exceed the payment, if any, received by Radyne ComStream, Inc. 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, Inc., which are inconsistent or in conflict with the terms of this warranty, shall not be binding upon Radyne ComStream, Inc. unless reduced to writing and approved by an officer of Radyne ComStream, Inc.

Warranty Repair Return Procedure

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

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

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

Non-Warranty Repair

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

Preface

P

This manual provides installation and operation information for the Radyne ComStream DMD20 and DMD20 LBST Universal Satellite Modem. This is a technical document intended for use by engineers, technicians, and operators responsible for the operation and maintenance of the DMD20 and DMD20 LBST.

Conventions

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

Cautions and Warnings

CAUTION!!

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

WARNING!!

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

NOTE

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

Trademarks

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Copyright

Disclaimer

This manual has been thoroughly reviewed for accuracy. All statements, technical information, and recommendations contained herein and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the products described. Radyne ComStream, Inc. assumes no responsibility for use of any circuitry other than the circuitry employed in Radyne ComStream, Inc. systems and equipment. Furthermore, since Radyne ComStream, Inc. is constantly improving its products, reserves the right to make changes in the specifications of products, or in this manual at any time without notice and without obligation to notify any person of such changes.

Record of Revisions

Revision Level	Date	Reason for Change
1.0	2-26-03	Initial Release
1.1	5-7-03	Revised Sections 2.2 and 5.1 for CE Certification.
1.2	7-11-03	Revised RLLP Specification.
2.0	3-17-04	Added LBST to the manual.
2.1	5-6-04	Added Ethernet option to the manual.
2.2	7-20-04	Added Variable Reed-Solomon option to the manual.

Comments or Suggestions Concerning this Manual

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

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Introduction

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This chapter provides an overview of the DMD20/DMD20 LBST Universal Satellite Modem. The DMD20 will be referred to in this manual as “the standard unit”; and the DMD20 LBST, referred to in this manual as the “LBST”. When describing the DMD20 or DMD20 LBST interchangeably, they may be referred to as “the DMD20”, “the modem”, or “the unit”.

> **NOTE**
>
> ***Unless specifically noted, references to the DMD20 include the DMD20 LBST.***

1.0 Overview

The Radyne ComStream DMD20 Universal Satellite Modem (Figure 1-1) offers the best features of a sophisticated programmable IBS/IDR and Closed Network Modem, at an affordable price.

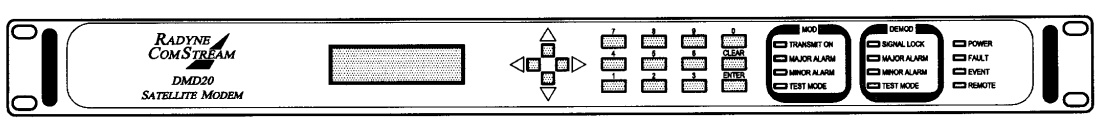

Figure 1-1. DMD20 Universal Satellite Modem Front Panel

This versatile equipment package combines unsurpassed performance with numerous user-friendly Front Panel Programmable Functions. The DMD20 provides selectable functions for different services: Intelsat IDR and IBS, as well as closed networks. All of the configuration and Monitor and Control (M&C) Functions are available at the Front Panel. Operating parameters, such as variable data rates, FEC Code Rate, modulation type, IF Frequencies, IBS/IDR Framing and interface type can be readily set and changed at the Front Panel by earth station operations personnel.

The modem operates at all standard IBS and IDR Data Rates up to 8.448 Mbps. Selection of any data rate is provided over the range of 2.4 Kbps to 20 Mbps in 1 bps steps.

For applications requiring system redundancy, the DMD20 Modem may be used with the Radyne ComStream RCS11 1:1 Redundancy Switch or the RCS20 M:N (N < 9) Redundancy Switch. An Internal Engineering Service Channel Unit is available to provide voice, data, and alarms for Intelsat IDR applications.

A full range of Industry Standard Interfaces is available for the DMD20. Interface types are selectable from V.35, RS-232, RS-422/-530, ITU G.703, HSSI, ASI, and DVB/M2P.

The DMD20 LBST (Figure 1-2) offers additional features that are not included in the standard DMD20 Modem. The features included in DMD20 LBST serves as an interface between the indoor unit (DMD20 LBST) and the outdoor units (consisting of the BUC and LNB). The output frequency of the LBST is 950 to 2050 MHz. It does not offer a 70 MHz output that is included in the standard unit. The LBST can supply voltage and 10 MHz reference to the BUC and LNB via the IFL Cable. The output from the Tx Port consists of the L-Band output frequency, high-stability 10 MHz reference, and either 24 or 48 Volts to the BUC. The Rx Port consists of the L-Band input frequency, high-stability 10 MHz reference and 13, 15, 18, and 21 volts. The LBST has the capability to enable and disable the BUC/LNB voltages and 10 MHz reference via the front panel. In addition, monitoring features provide verification of system status. The LBST monitors both the current and the voltage at the output of the Tx and Rx Ports, thus allowing the user to monitor the status of both the indoor units and outdoor units.

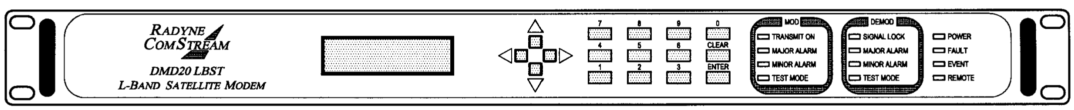

Figure 1-2. DMD20 LBST Universal Satellite Modem Front Panel

1.1 DMD20 Configurations

The DMD20 can be configured in the following different ways:

- features and options that are installed when the unit is ordered
- feature upgrades
- hardware options that the user can install at their own location
- options that are installed to a unit that is sent to a Radyne ComStream facility

1.1.1 Features/Options Installed at Time of Order

Features installed at the time of ordering are the options pre-installed/initialized in the factory prior to shipment. These can be reviewed from the front panel. Refer to Section 4, User Interfaces for information on how to view these features.

Factory installed options are chassis and board configurations that are introduced during manufacture.

1.1.2 Feature Upgrades

Feature Upgrades are a simple and quick way of changing the feature set of an installed modem. Feature upgrades are how most DMD20 options are implemented. Features may be purchased at any time by contacting a Radyne ComStream, Inc. salesperson. Refer to Section 4 and Appendix D, for information on how upgrade features.

1.1.3 Hardware Options

Hardware options (refer to Appendix A) are purchased parts that can be installed into the unit at the customer's site. A screwdriver is normally the only tool required. Please contact the Radyne ComStream, Inc. Customer Service Department for information not limited to availability and to shipping costs.

NOTE

Only authorized service personnel should handle and install optional hardware options.

1.1.4 Radyne ComStream Installed Options

Units may also be sent to the Radyne ComStream, Inc. facility for hardware option installation. Please contact the Radyne ComStream, Inc. Customer Service Department for information not limited to availability and to shipping costs.

1.2 Function Accessibility

All functions can be accessed with a terminal or personal computer via a serial link for complete remote monitoring and control capability.

Installation

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This section provides unpacking and installation instructions, and a description of external connections and backward alarm information.

2.0 Installation Requirements

The DMD20 Modem is designed to be installed within any standard 19-inch (48.26 cm) wide equipment cabinet or rack. It requires one rack unit (RU) of mounting space (1.75 inches/4.45 cm) vertically and 16.0 inches (40.64 cm) of depth. Including cabling, a minimum of 19.5 inches (49.53 cm) of rack depth is required. The rear panel of the modem is has power entering from the left and IF Cabling entering from the right (as viewed from the rear of the unit). Data and Control Cabling can enter from either side. The modem can be placed on a table or suitable surface if required.

! WARNING!!

There are no user-serviceable parts or configuration settings located inside the DMD20 Chassis. There is a potential shock hazard internally at the power supply module. DO NOT open the DMD20 Chassis under any circumstances.

! CAUTION!!

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 DMD20 configuration settings are unknown, where incorrect settings could disrupt existing communications traffic.

! CAUTION!!

The DMD20 contains a Lithium Battery. DANGER OF EXPLOSION exists if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local and national regulations.

2.1 Unpacking

The DMD20 Universal Satellite Modem was carefully packaged to avoid damage and should arrive complete with the following items for proper installation:

DMD20 Modem Unit
Power Cord, with applicable AC Connector
Installation and Operation Manual

2.2 Removal and Assembly

The DMD20 Modem Unit is shipped fully assembled. It does not require removal of the covers for any purpose in installation.

CAUTION!!

Always ensure that power is removed from the DMD20 before removing or installing any optional modules. Failure to do so may cause damage to the equipment.

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

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

2.3 Mounting Considerations

When mounted in an equipment rack, adequate ventilation must be provided. The ambient temperature in the rack should preferably 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 modems may be stacked one on top of the other to a maximum of 10 consecutive units before providing one (1) RU of space for airflow. Modems should not be placed immediately above a high-heat or EMF Generator to ensure the output signal integrity and proper receive operation.

Do not mount the DMD20 in an unprotected outdoor location where there is direct contact with rain, snow, wind or sun. The only tools required for rack mounting the DMD20 are four (4) customer supplied rack-mounting screws and the appropriate screwdriver. Rack mounting brackets are an integral part of the front bezel of the unit and are not removable.

2.4 DMD20 Initial Configuration Check

The DMD20 is shipped from the factory with preset factory defaults. Upon initial power-up, a user check should be performed to verify the shipped modem configuration. Refer to Section 4, User Interfaces to locate and verify that the following configuration settings are correct:

CAUTION!!

The DMD20 Interface Type (V.35, RS-422, RS-232, G.703, etc.) MUST be selected from the Front Panel BEFORE the mating connectors are installed. Failure to do so may cause damage to the Universal Interface Module. Power up the DMD20, select the appropriate interface type, and then install the mating connectors.

NOTE

Transmit (Tx) and Receive (Rx) Interface types are dependent upon the customer's order.

NOTE

Implementing Strap Code 26 can set the following modem configuration. Refer to Table 4-4 for an explanation and tabular listing of available Strap Codes. The Frequency and Modulator Output Power are set independently of the strap code.

Standard DMD20 Factory Configuration Settings

Modulator:

Data Rate:	2.048 Mbps
Mode:	Closed Network
Satellite Framing:	None
Scrambler:	V.35 (IESS)
Drop and Insert:	Disabled
Inner FEC:	1/2 Rate Viterbi
Outer FEC:	Disabled
Modulation:	QPSK
Frequency:	70.000000 MHz
Modulator Output Power:	-20 dBm

Demodulator:

Data Rate:	2.048 Mbps
Mode:	Closed Network
Satellite Framing:	None
Scrambler:	V.35 (IESS)
Drop and Insert:	Disabled
Inner FEC:	1/2 Rate Viterbi
Outer FEC:	Disabled
Modulation:	QPSK
Frequency:	70.000000 MHz

To lock up the modem, enter 'IF Loopback Enable' under the Test Menu, or connect a Loopback Cable from J1 to J2 on the rear panel of the modem.

2.5 Modulator Checkout

The following descriptions assume that the DMD20 is installed in a suitable location with prime AC power and supporting equipment available.

2.5.1 Initial Power-Up

CAUTION!!

Before initial power up of the DMD20, 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 on the unit by placing the Rear Panel Switch (located above the power entry connector) to the On Position. Upon initial and subsequent power-ups, the DMD20 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 will illuminate.

The initial field checkout of the modem 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 modem's parameters, but requires a separate terminal or computer running a Terminal Program. The Terminal Mode is enabled from the front panel in the System M&C Submenus.

2.5.2 Factory Terminal Setup

The factory terminal setup is as follows:

Emulation Type:	VT-100 (can be changed)
Baud Rate:	19.2 K (Can be changed via Front Panel)
Data Bits:	8
Parity:	No Parity (Fixed)
Stop Bits:	1 Stop Bit

2.6 Storage

It is recommended that the unit be stored in its original sealed packing. The unit should be stored in a dry location where the temperature is stable, away from direct contact with rain, snow, wind, sun, or anything that may cause damage.

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Theory of Operation

3

3.0 DMD20 Hardware

The DMD20 is based on a two printed circuit card (minimum configuration) design with additional optioned printed circuit cards available for additional features. The minimum configuration consists of an L-Band/IF Assembly and a Digital Baseband Assembly. The optional printed circuit cards include a Turbo Codec printed circuit card and one of several types of Interface printed circuit card (refer to Appendix A). A block diagram of the DMD20 is shown in Figure 3.1.

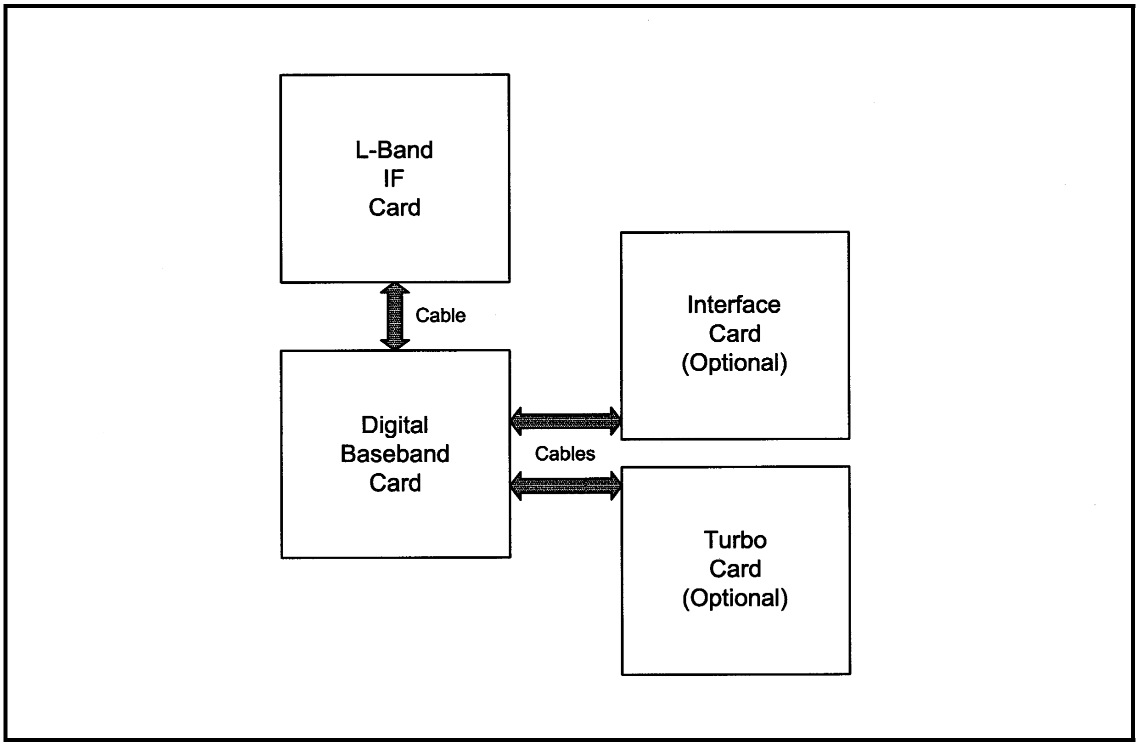


Figure 3-1. DMD20 Block Diagram

3.0.1 DMD20 L-Band/IF Printed Circuit Card

The L-Band/IF Printed Circuit Card consists of an analog modulation function, an analog complex downconversion, and two wide-band digital synthesizers. The block diagram of the L-Band/IF Assembly is shown in Figure 3-2.

In the modulator, analog in-phase (I) and quadrature (Q) signals are generated on the Digital Baseband Printed Circuit Card, routed to the L-Band/IF Printed Circuit Card, and modulated at the desired frequency. The L-Band or 70/140 modulated signal is then passed through a microprocessor controlled variable attenuator providing gain control of the output signal.

In the complex downconverter, the signal for demodulation is amplified and sent through a variable wideband attenuator for AGC. The gain-controlled signal is then passed through a complex downconverter to a low IF.

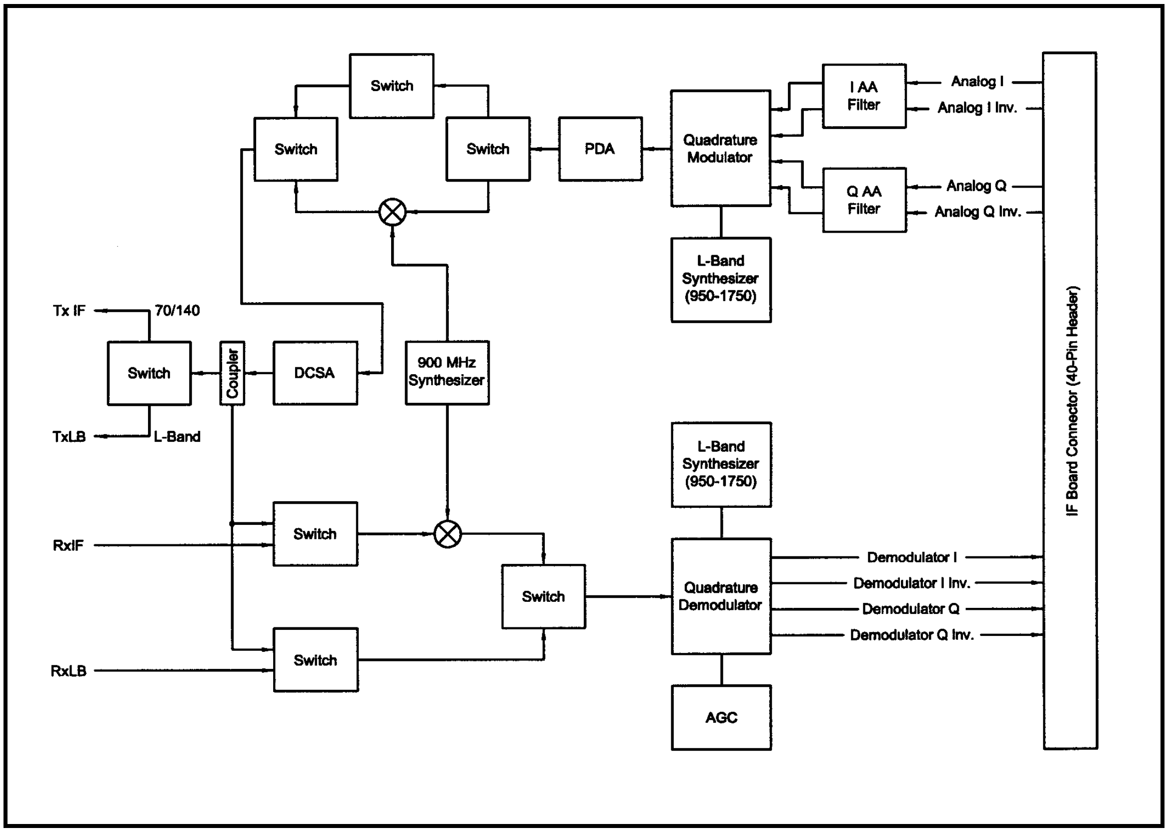


Figure 3-2. IF Card Block Diagram

3.0.2 DMD20 Baseband Processing Printed Circuit Card

The advent of million-plus gate count FPGAs, advanced logic synthesis tools, and DSPs providing hundreds of MIPs enabled the design of a software configurable modem. Large, fast FPGAs now provide designers with what is essentially an on the fly programmable ASIC. High speed, complex digital logic functions that previously could only be implemented in dedicated integrated circuits are now downloaded from a micro-controller through a serial or peripheral interface. When a new digital logic function is needed, a new configuration file is loaded into the FPGA. There is no limit to the number of digital logic configurations available to the FPGA, aside from the amount of Flash memory available to the system microprocessor for storage of configuration files.

The DMD20 Baseband Processing Printed Circuit Card provides a flexible architecture that allows many different modes of terrestrial and satellite framing, various FEC options, digital voice processing, and several different modulation/demodulation formats. Also included on the Baseband Printed Circuit Card are three synchronous interfaces, an EIA-530 Interface supporting RS-422, V.35, and RS-232. All three interfaces are provided on the same DB-25 Connector, and are selectable from the front panel.

A block diagram of the Baseband Processing Card is shown in Figure 3-3.

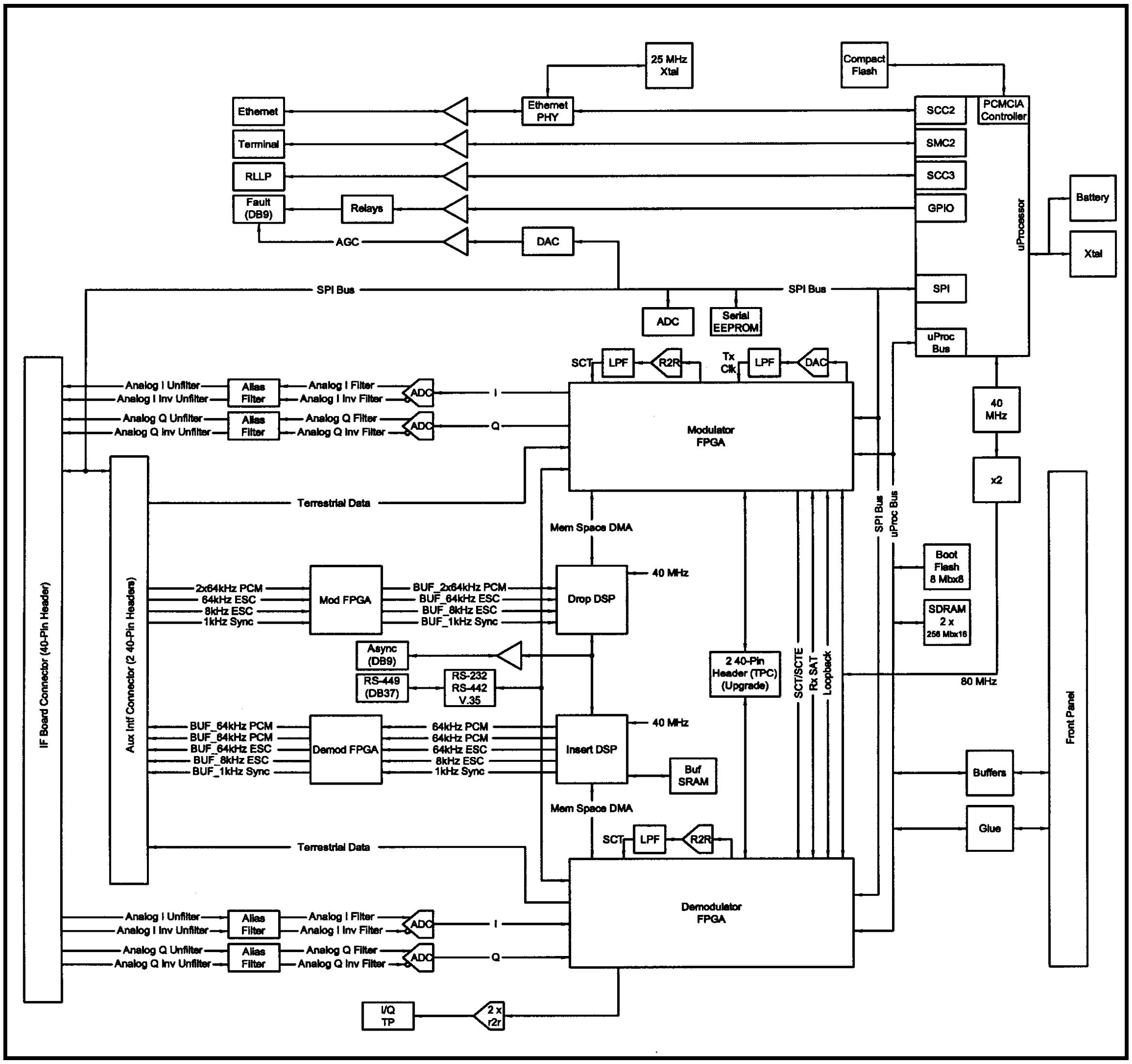


Figure 3-3. DMD20 Baseband Processing Card Block Diagram

The Baseband Printed Circuit Card also contains the Monitor and Control (M&C) Circuitry responsible for:

Programmable part setup and initialization
Continuous control and adjustment of some functions
Calibration
Monitoring fault status
Calculating and displaying measurements
Calculations
User monitor and control interface including front panel and remote
Unit’s configuration and feature set

The M&C System is based on a powerful microprocessor with a large amount of Flash memory. Several bus architectures are used to interconnect the M&C to all components of the DMD20. Communication to the outside world is done via connections to the remote port, terminal port, Ethernet port, and alarm ports. The M&C runs off of software programmed into its Flash memory. The memory can be reprogrammed via the Ethernet port to facilitate changes in software.

3.0.3 Enhanced Interface Printed Circuit Card

The normal terrestrial data for the Baseband Processing Card can be re-routed to the enhanced interface card. The enhanced interface card adds a variety of connections to the modem for additional applications

3.1 DMD20 Functional Block Diagram

Figure 3-4 represents the DMD20 Functional Blocks. The modem is shown in a typical application with customer data, Tx/Rx RF equipment and an antenna.

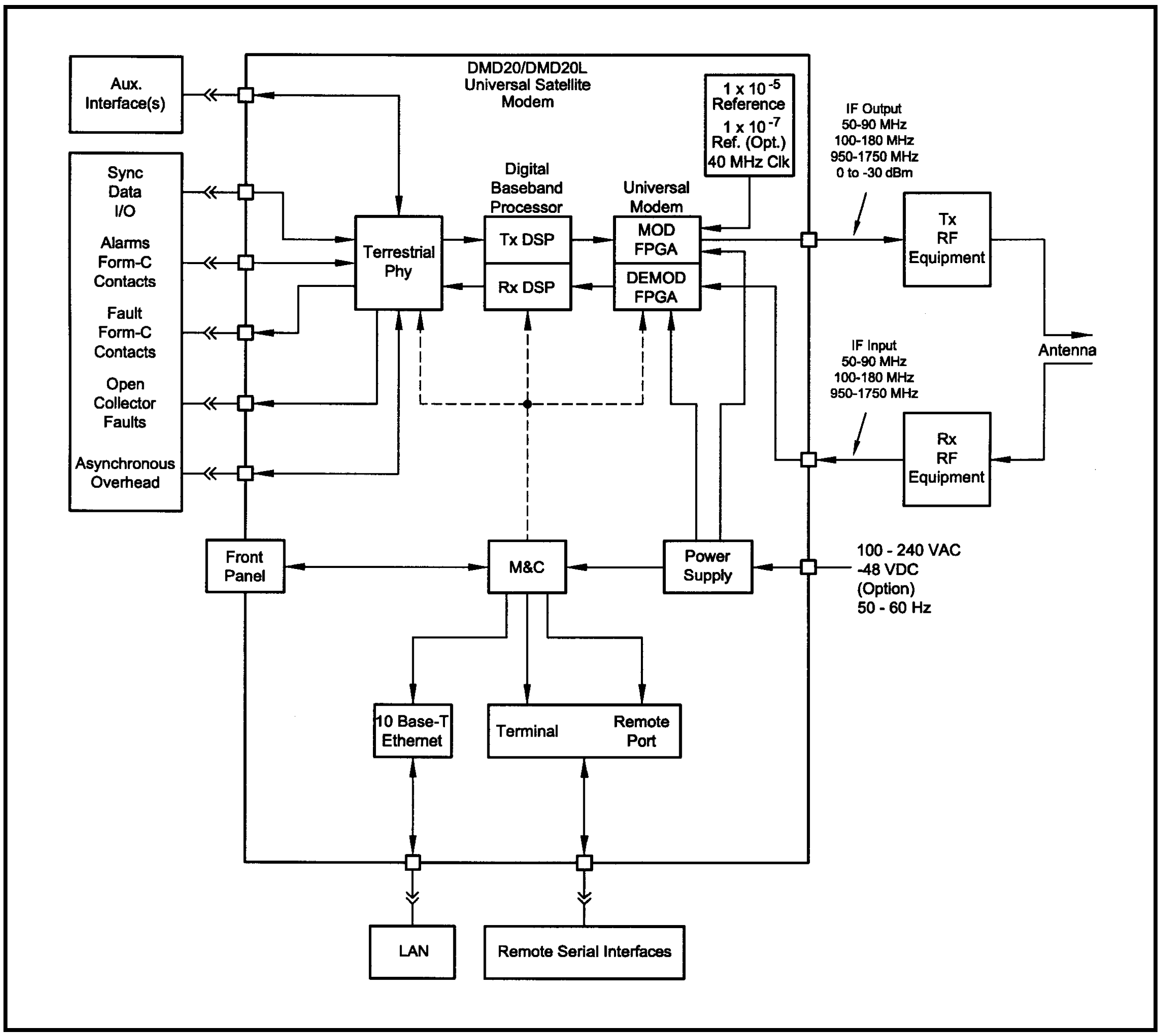


Figure 3-4. DMD20 Universal Satellite Modem Functional Block Diagram

3.1.1 Front Panel

The Front Panel includes a 2 x 16 backlit LCD Display, Indicator LEDs, and a Numeric Keypad (refer to Section 4.1).

3.1.2 Baseband Processing

The Baseband Processor performs all of the functions required for an IBS/IDR Framing Unit, a Reed-Solomon Codec, and an E1/T1 Drop and Insert System. In addition, the Baseband Processing Section provides for transmit clock selection and rate adaptation as well as a rate adapter and Plesiochronous/Doppler (PD) Buffer in the receive direction. A multiplexer is also provided for the SCT Clock Source for Loop Timing Applications. The transmit and receive paths may be configured independently under processor control.

3.1.3 Tx Baseband Processing

The Tx Data and Clock enters the Baseband Processor, passes through a Rate Adapting FIFO and enters the Framer/Drop Processor. In Closed-Net Mode, the data passes through the framer unaltered. In IDR, IBS, and D&I Modes, the framer adds the appropriate framing and ESC as defined in IESS-308 and 309. In D&I Mode, the framer acquires the terrestrial framing structure, E1 or T1, and synchronizes the Drop Processor. The Drop Processor extracts the desired time slots from the terrestrial data stream and feeds these channels back to the framer. The framer then places the ‘dropped’ terrestrial time slots into the desired satellite channel slots. The data is then sent to the Reed-Solomon Encoder.

The Reed-Solomon Encoder, encodes the data into Reed-Solomon Blocks. The blocks are then interleaved and synchronized to the frame pattern as defined by the selected specification (IESS-308, IESS-309, DVB, etc.). After Reed-Solomon Encoding, the composite data and clock are applied to the BB Loopback Circuit.

3.1.4 Rx Baseband Processing

The Receive Processor performs the inverse function of the Tx Processor. Data received from the satellite passes through the BB Loopback Circuit to the Reed-Solomon Decoder to the Deframer. The Deframer acquires the IBS/IDR/DVB frame, synchronizes the Reed-Solomon Decoder and extracts the received data and overhead from the frame structure, placing the data into the PD Buffer, sending the overhead data to the UIM. In Closed-Net Mode, the data is extracted from the buffer and is sent to the UIM. Backward Alarm indications are sent to the M&C Subsystem. In Drop and Insert Mode, the Insert Processor synchronizes to the incoming terrestrial T1/E1 Data Stream, extracts satellite channels from the PD Buffer, and then inserts them into the desired terrestrial time slots in the T1/E1 Data Stream.

3.1.5 Clock Selection

As shown in Figure 3-5, both the Tx Clock and the Buffer Clock source may be independently locked to one of the following:

SCT (Internal Oscillator)
SCTE (External Tx Terrestrial Clock)
EXC Clock (External Clock Source)
Rx Satellite Clock (Loop Timing)

Additionally, for loop timing applications the SCT Clock Source can be selected to be Rx Satellite Clock.

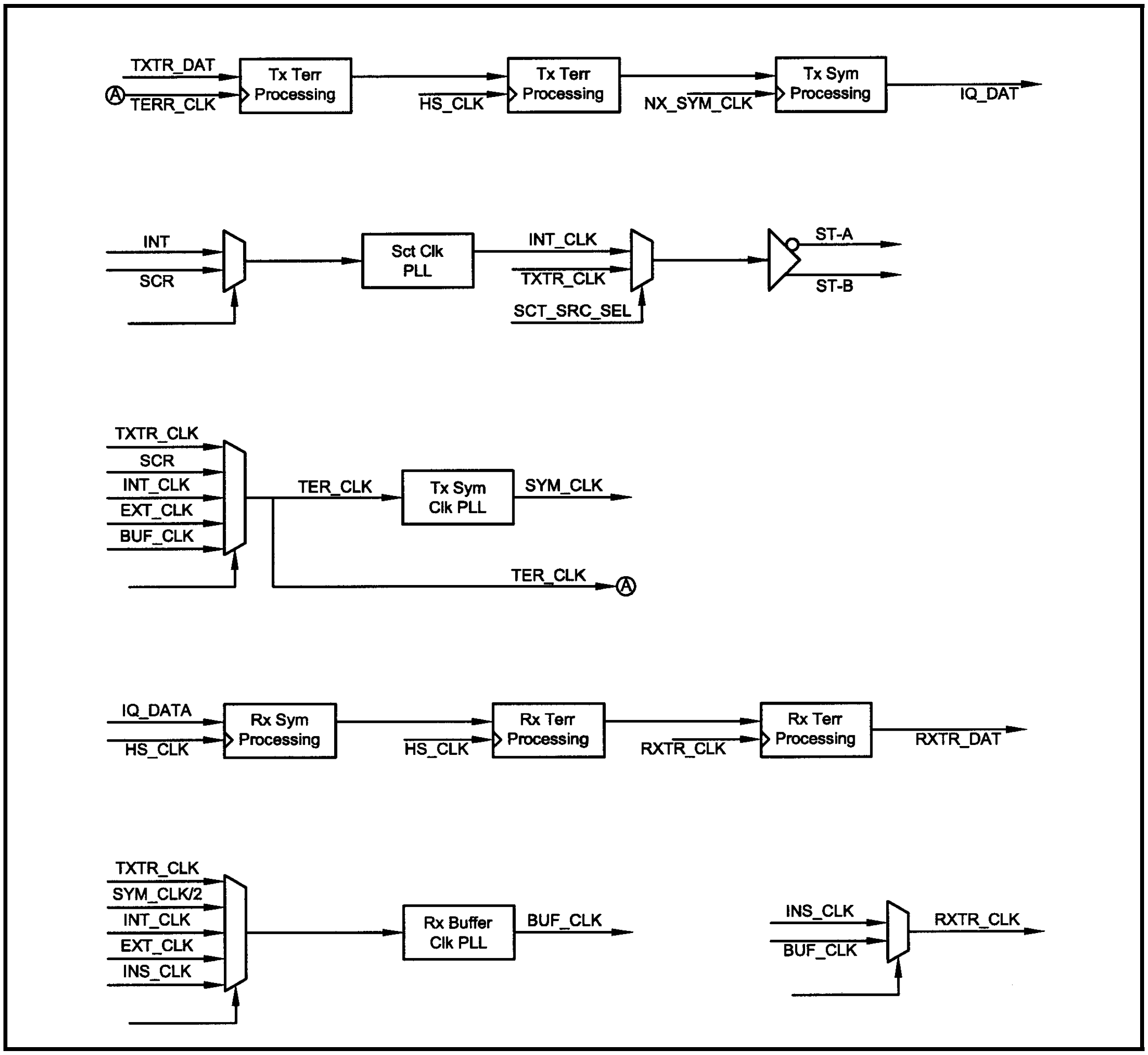


Figure 3-5. DMD20 Clock Logic Rx Baseband Processing

3.1.6 Monitor & Control (M&C) Subsystem

Also contained on the BB Card is the M&C Subsystem. The M&C contains a high-performance microprocessor and is responsible for overall command and control of modem functions. The M&C is constantly monitoring all subsystems of the modem by performing a periodic poll routine and configures the modem by responding to commands input to the system. During each poll cycle, the status of each of the subsystems is collected and reported to each of the external ports and Front Panel. Performance statistics such as Eb/No, buffer fill %, etc. are compiled. If faults are detected, the M&C will take appropriate actions to minimize the effect of such faults on the system (refer to the Fault Matrices in Section 6).

The M&C subsystem contains the following features:

3.1.6.1 Remote/Terminal Port

This port functions as the Modem Remote Port or Terminal Port. This port supports an asynchronous control protocol as described in Section 4. It may be configured to support either RS-232 or RS-485 signal levels. This port is intended for use in computer-based remote M&C. All functions of the modem may be monitored and controlled from this port via a common terminal connected to the Terminal Port. This function is front panel selectable.

3.1.6.2 Async Port

This port is dedicated for ES-ES Communications. The port may be configured for a number of communications protocols. Overhead data to/from the UIM is routed to/from the framer/deframer. This port may be configured to support either RS-232 or RS-485 signal levels. This port is also used by SCC Framing for the in-band data.

3.1.6.3 Ethernet Port

This port is dedicated for Ethernet Communications. The port is configured for 10 Base-T communications protocols.

3.1.6.4 Clock

The time and date is kept in order to ‘time-tag’ system events.

3.2 Earth Station to Earth Station Communications Port

The modem contains a selectable RS-232, or RS-485 Asynchronous Communications Port for Earth Station-to-Earth Station Communications. The baud rate and protocol can be selected from the Front Panel.

3.3 Terrestrial Loopback

The modem provides for terrestrial loopback. For Tx Terr Loopback the Tx Data port is looped back to the Rx Data port after the interface driver/receiver. For RX Terr Loopback, the Receive Data from the satellite is looped back for retransmission to the satellite, providing a far end loopback. Tx/Rx Loopback provides both loopbacks simultaneously. Refer to Figures 3-6 through 3-8 for loopback functional block diagrams.

3.4 Modem Status

The modems M&C system is connected to most of the circuitry on any board contained in the chassis. These connections provide status on the working condition of the circuitry as well as providing the data required for the various measurements the modem provides. The M&C processes this information and generates status indications as well as alarms when necessary. Detailed status information is available via the modems various user interfaces (front panel, remote and terminal). A summary of this information can be connected to external equipment, switches or alarms via the open collector and/or form-C fault connections.

Form-C Contacts:

The UIM provides three Form-C Relays under processor control that appear at J11.

Mod Fault:	De-energized when any transmit side fault is detected.
Demod Fault:	De-energized when any receive side fault is detected.
Common Fault:	De-energized when any fault that is not explicitly a Tx or Rx Fault such as an M&C or Power Supply Fault.

Open Collector Faults:

The UIM provides two Open Collector Faults that appear at Pins 28 & 10 on J8.

Mod Fault:	Will sink up to 20 ma (maximum) until a transmit or common fault is detected. Will not sink current if a fault is detected.
Demod Fault:	Will sink up to 20 ma (maximum) until a receive or common fault is detected. Will not sink current if a fault is detected.

The open collector faults are intended for use in redundancy switch applications in order to provide quick status indications.

3.5 Baseband Processor Card

The Baseband Processor Card (BB Card) contains two major subsystems – the Baseband Processing System and the Monitor and Control Subsystem.

3.5.1 Baseband Processing

The Baseband Processor performs all of the functions required for an IBS/IDR Framing Unit, a Reed-Solomon Codec, an E1/T1 Drop and Insert System, a Turbo Codec, and Sequential/Viterbi. In addition, the Baseband Processing Section provides for Transmit clock selection and rate adaptation as well as a rate adapter and Plesiochronous/Doppler (PD) Buffer in the receive direction. A multiplexer is also provided for the SCT Clock Source for Loop Timing Applications. The transmit and receive paths may be configured independently under processor control.

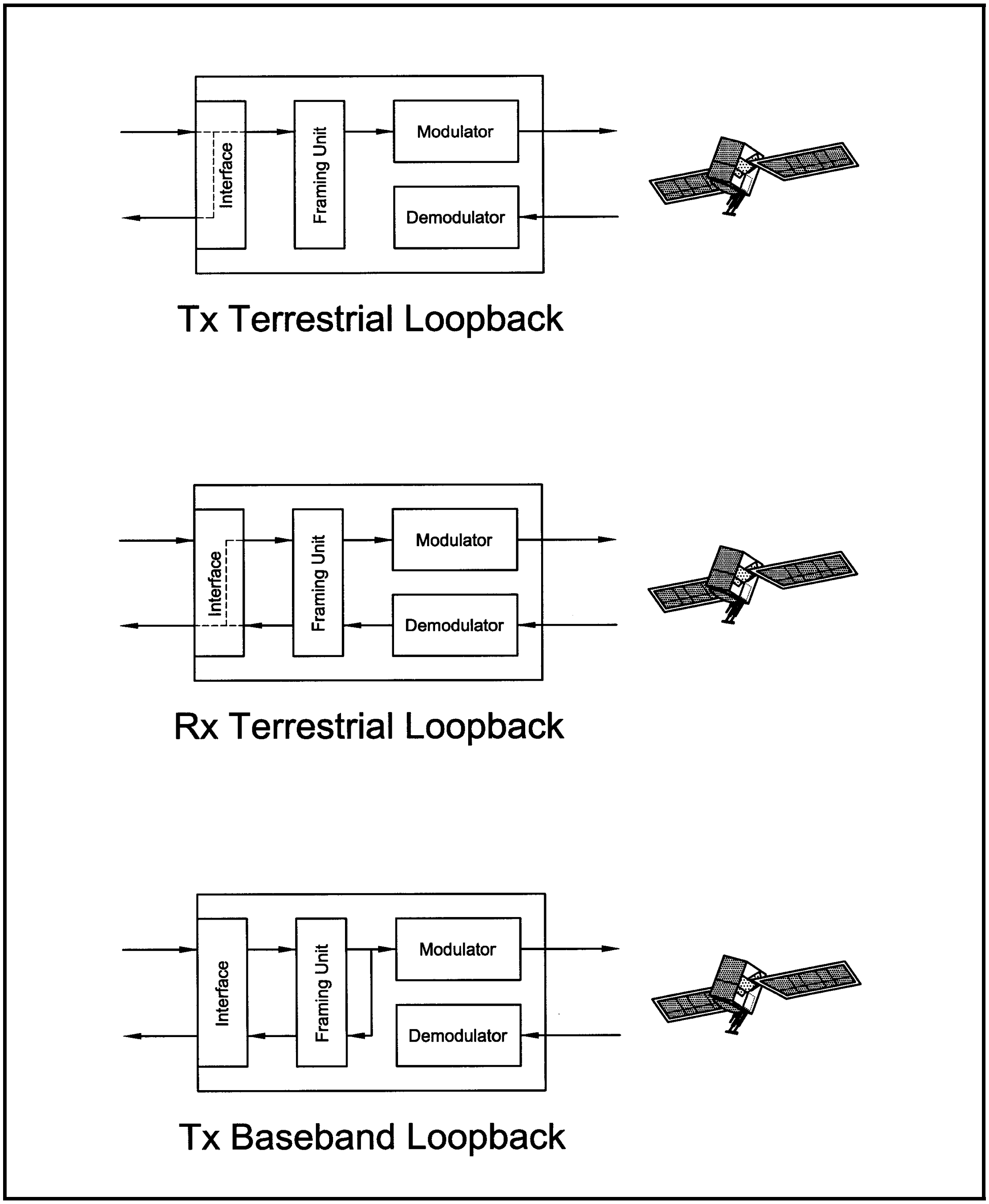


Figure 3-6. Loopback Functional Block Diagram

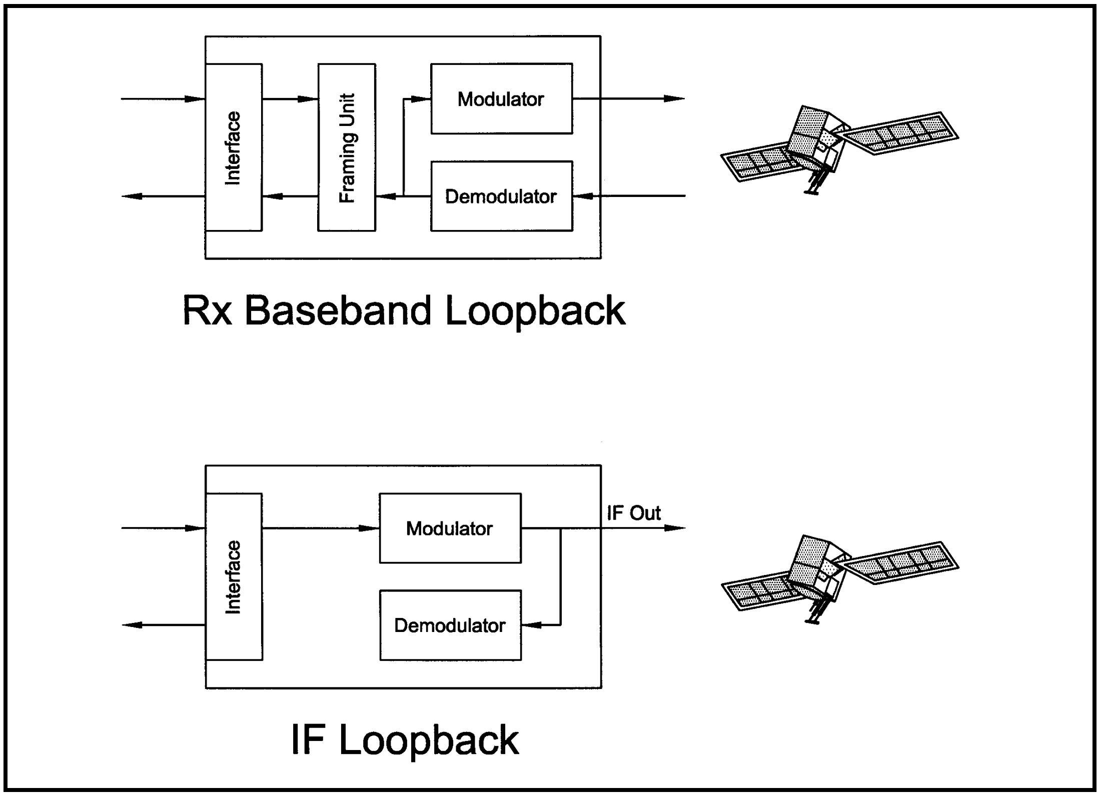


Figure 3-7. Loopback Functional Block Diagram

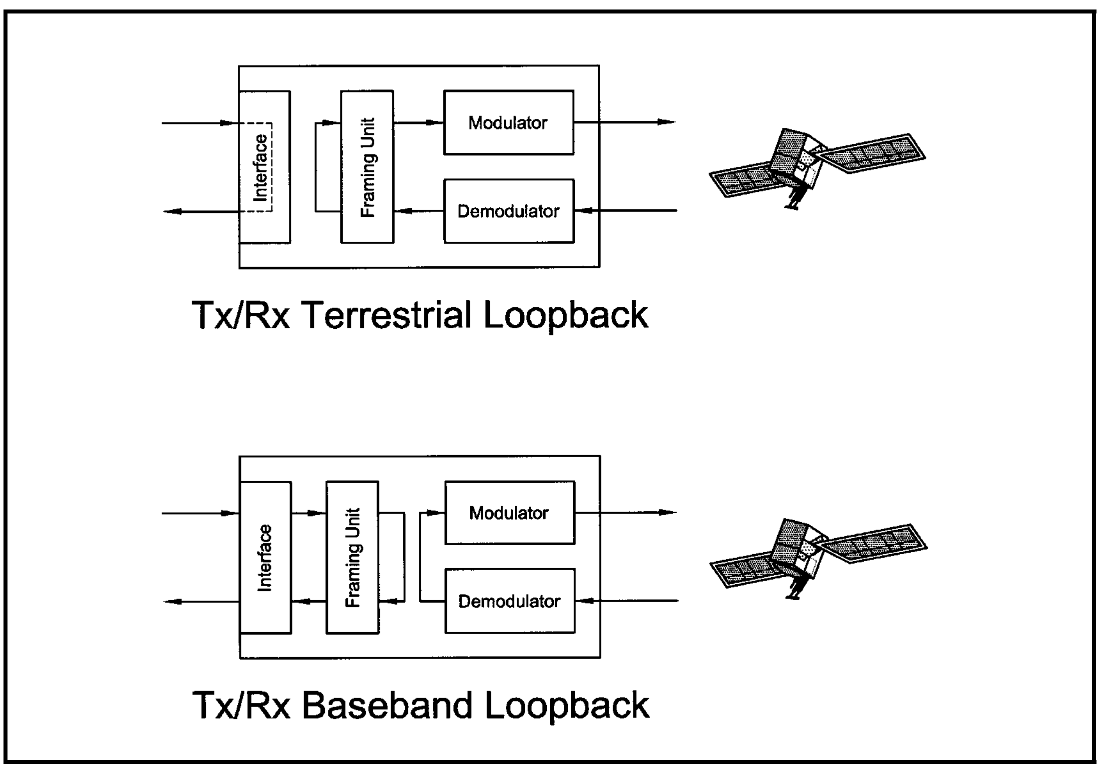


Figure 3-8. Loopback Functional Block Diagram

3.6 DMD20 Clocking Options

The following paragraphs define the types of clocking options available to the user at the Front Panel of the DMD20:

3.6.1 SCTE: Serial Clock Transmit External

This clock is the Transmit Terrestrial Clock associated with the interface. With the G.703 Interface selected, SCTE is the clock that is recovered from the G.703 data stream. SCTE is sometimes referred to as Tx Terrestrial Timing and for Synchronous Interfaces such as RS-422, SCTE is sometimes referred to as TT (Terminal Timing).

3.6.2 SCT: Serial Clock Transmit

This clock is an internally generated clock that is output from the modem. The clock is generally used by the Terrestrial Terminal equipment for clocking the transmit data. The frequency of the clock is set the same as the Transmit Terrestrial Clock rate if internal is selected, or is the receive clock from the Demodulator if SCR is selected. SCT is sometimes referred to as Internal Timing or ST (Send Timing).

3.6.4 EXT CLK: External Clock

This is an independent clock source. This clock is most often used if there is a station master clock. The EXT EXC can be selected, in the Interface/General Menu, to be None, BNC EXC, or IDI. IDI is used ONLY for D&I cases where external framing is selected. In this case, the EXT EXC must be set to IDI where the Receive Buffer Clock is derived from the external Receive T1 or E1 Trunk.

3.6.5 BNC EXC: BNC External Clock

Unbalanced external clock input into a BNC connector. This clock can be used to source the EXT CLK.

Clock specification:

Frequency:	1 MHz – 20 MHz
Level:	0.5 Vp-p – 5 Vp-p

3.6.6 IDI: Insert Data In

This clock source is only used as an external frame source selected in D&I Mode. If External Frame Source is selected, then IDI ***must*** be selected for the buffer clock. For this case, a Receive T1/E1 Trunk is input and a buffer clock is derived.

3.6.7 SCR: Serial Clock Receive

This Receive Clock is recovered from the satellite's receive signal from the satellite. SCR is sometimes referred to as Receive Clock, Satellite Clock, or as RT (Receive Timing).

3.6.8 EXT IF REF: External IF Reference

This is not actually a clock, but does have some clocking implications. When the external reference is used, the master oscillator within the DMD20 is locked to the external reference, and the internal accuracy and stability of the DMD20 assumes that of the External Reference. Therefore, not only are the transmit frequencies of the DMD20 locked to the external reference, but the modem's internal SCT Oscillator is locked to the external reference as well.

3.7 Transmit Timing

As shown in Figure 3-7, Transmit Terrestrial Data enters the modem and is clocked into a dejitter FIFO. Data is clocked out of the FIFO by the Modulator Clock. The Modulator Clock and Phase-Locked Loop (PLL), in conjunction with the Dejitter FIFO, reduces the input jitter. Jitter reduction exceeds the jitter transfer specified in CCITT G.821.

3.7.1 EXT CLK as TX Clock Source (RS-422 or V.35 Interface)

Data must be clocked into the modem by either the SCTE or SCT Source. If EXT CLK is selected as the Tx Clock Source, then SCTE must be supplied to the modem. The output of the dejitter buffer will be clocked with EXT CLK. This case should only be used if SCTE has excessive jitter and will degrade link performance.

3.7.2 SCT or SCTE

If SCT is selected, then only data that is synchronous to the SCT Clock is required to be supplied to the modem. It is intended for the terminal equipment to use the SCT as its clock source. The Autophase Circuit will automatically ensure that the data is clocked correctly into the modem. Therefore, a return clock is not necessary. The Clock Polarity should be set to Auto.

If SCTE is selected, then SCTE ***must*** be supplied to the modem. The Clock Polarity should be set to AUTO.

3.7.3 G.703 Interface

If the G.703 Interface is selected, then the Tx Clock Source will default to SCTE and the Clock Polarity will default to Auto.

3.7.4 Ethernet Data Interface (Optional)

If the Ethernet Data Interface is selected, then the Tx Clock Source will default to SCTE and the Clock Polarity will default to Normal.

3.8 Receive Timing

Any of the clocking selections, SCTE, SCT, EXT CLK, or RxSat (SCR) may be selected as the Buffer Clock. Data will be clocked out of the buffer at the data rate synchronous to the selected clock source.

3.9 Loop Timing

If loop timing is desired (i.e.; the modem timing is slaved to the far end master station), the modem clocks can be configured as follows:

3.9.1 Transmit (RS-422 or V.35 Interface)

Set SCT Source to 'SCR'. The Tx Terminal Equipment must clock the TX Data with the SCT Clock and return data and SCTE (Optional). If SCTE is returned to the modem from the terminal equipment, set TX CLK to SCTE. If SCTE is not returned to the modem, set TX CLK to SCT. The TX CLK PHASE should be set to AUTO.

3.9.2 G.703 Interface or Asymmetrical Data Rates

Loop timing with a G.703 Interface or Asymmetrical Data Rates requires external equipment at the remote end that is capable of using the recovered RD Clock as source timing for (SCTE) SD. The modem will not manipulate the clock frequency. Therefore, the transmit and receive clock rates must be equal in order for the modem to perform loop timing.

3.9.3 Receive

Select the Buffer clock to RxSAT (SCR).

3.10 Drop and Insert (D&I)

The Radyne ComStream DMD20 Drop and Insert (D&I) Function provides an interface between a full T1 or E1 Trunk whose framing is specified in CCITT G.704 and a fractional Nx64 Kbps Satellite Channel that conforms to the IBS and small IDR Framing Structures. The Drop function allows the user to select the terrestrial T1 or E1 timeslots that are to be dropped off for transmission over the link in the specified satellite channels. The Insert function allows the user to select the T1 or E1 timeslots into which the received satellite channels are to be inserted. The two functions are completely independent allowing maximum flexibility in choosing configurations. The four-port G.703 Interface allows one or more modems to be looped together using the same T1 or E1 trunk.

The Transmit Data Trunk is brought into the modem via the Send Data In (SDI) Port. From there, the TX Baseband Processor extracts the selected timeslots from the G.704 Frame and prepares them for transmission. The original trunk data is sent out of the modem unaltered via the Send Data Out (SDO) Port. The Receive Data Trunk is brought into the modem via the Insert Data In (IDI) Port. The data is buffered inside the modem and the RX Baseband Processor inserts satellite data into the selected timeslots in the G.704 Frame. The modified terrestrial trunk is then output via the Receive Data Out (RDO) Port.

Figure 3-10 shows two modems looped together. This configuration could be simplified to just use one modem, or extended to use more than two modems. Figure 3-11 shows an alternative method of looping where all of the drop (transmit) data is processed prior to performing any insert (receive) processing. In both configurations, the terrestrial trunk is providing the timing for the satellite transmission and for the terrestrial receive.

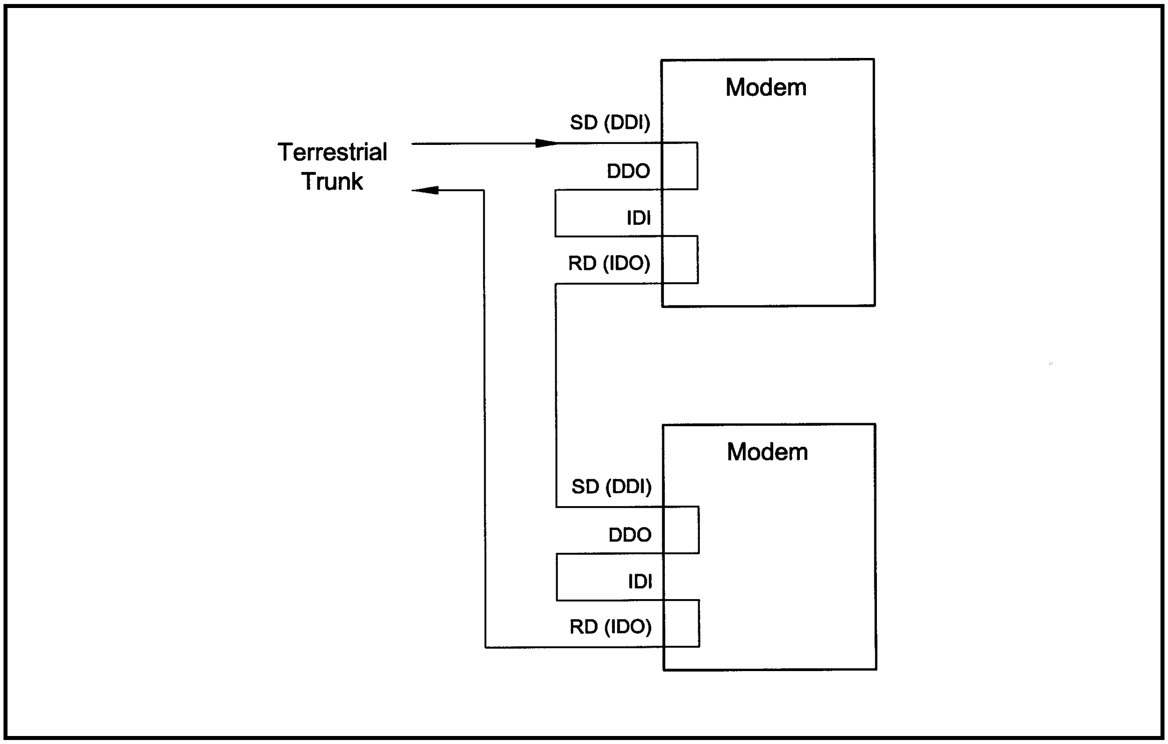


Figure 3-10. Looped Modems

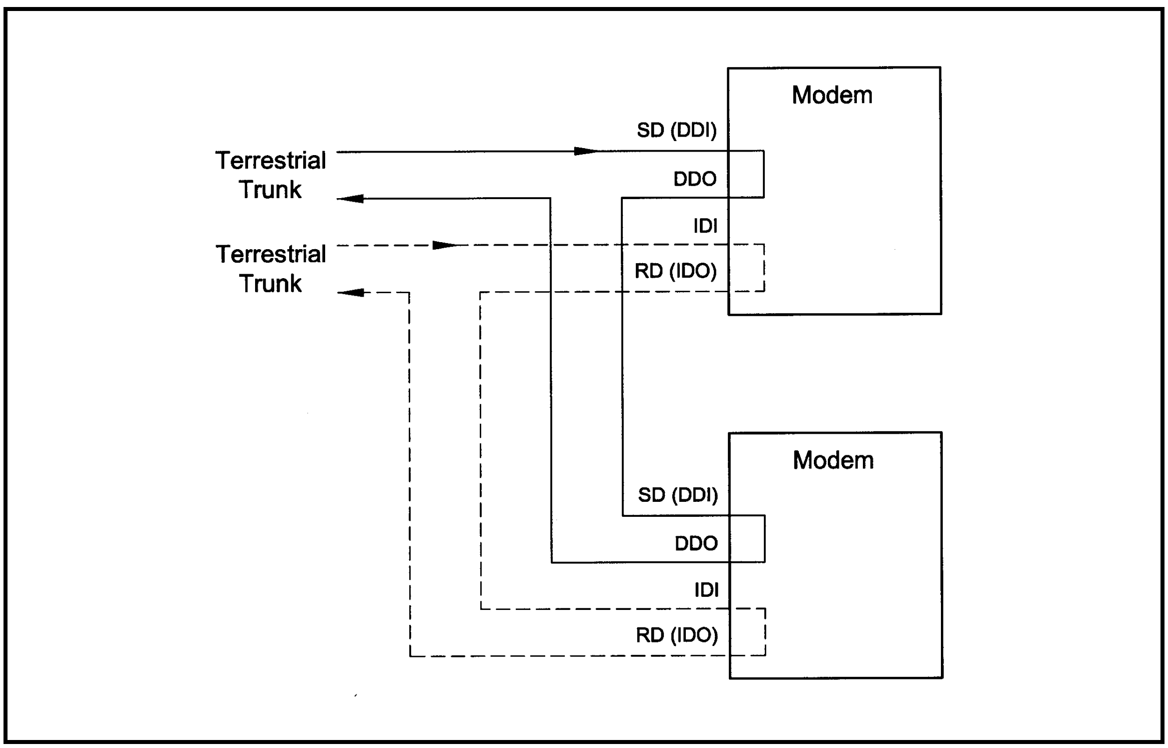


Figure 3-11. Looped Modems with Separate D&I Trunks

3.10.1 Drop Only

When Drop is enabled and Insert is disabled, the DMD20 performs a drop-only function. Framed E1 or T1 Data is input via the Send Data In Port, the selected timeslots are dropped into the IBS frame structure, and the unaltered terrestrial data is output via the Send Data Out Port (refer to Figure 3-12).

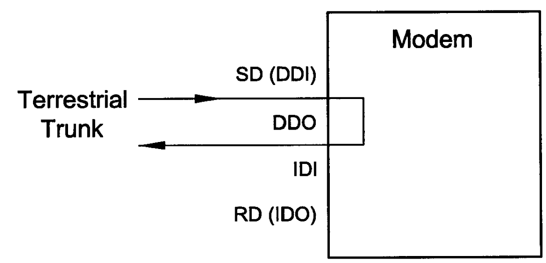


Figure 3-12. Drop Only

3.10.2 Insert Only

When Insert is enabled and Drop is disabled, the DMD20 performs an insert-only function. If framed terrestrial E1 or T1 Data is available, it should be input via the Insert Data In Port. The Terrestrial Data is buffered inside the Modem. The RX Baseband Processor inserts satellite data into the selected timeslots in the G.704 Frame and the modified terrestrial data is then output via the Receive Data Out Port (refer to Figure 3-13).

If framed terrestrial data is not available, selection of the Internal T1/E1 frame source will cause the modem to generate the required G.704 Frame. The Satellite Data will be inserted into the selected timeslots, and the resulting terrestrial data will be output via the Receive Data Out Port. Any non-inserted timeslots in the G.704 Frame will be filled with the appropriate Idle Code (refer to Figure 3-14).

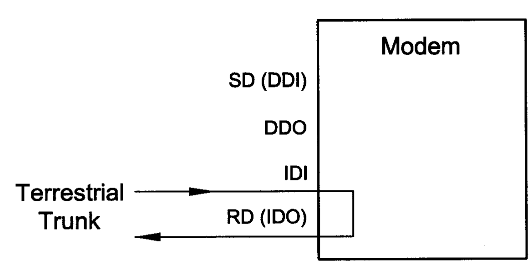


Figure 3-13. Insert Only with Eternal Frame Source

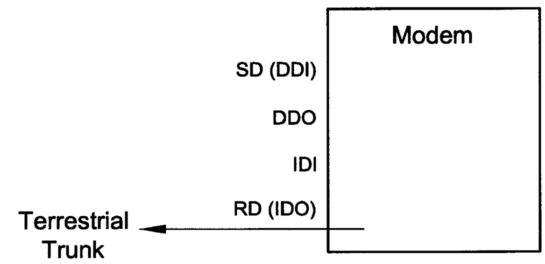


Figure 3-14. Insert Only with Internal Frame Source

3.11 Mode Selection

The DMD20 D&I can be easily configured to support several commonly used terrestrial data formats. For E1 Data, the user can choose between PCM-30, PCM-30C, PCM-31 and PCM-31C. For T1 Data, the user can choose between T1-D4, T1-ESF, and SLC-96. The following paragraphs provide more information on the various mode selection capabilities of the DMD20.

3.11.1 PCM-30

The PCM-30 Mode of Operation supports an E1 Interface with Multiframe Alignment (MFAS) and Channel Associated Signaling (CAS). The user may independently program n timeslots to drop and n timeslots to insert where n = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, or 30. In addition to the selected drop timeslots, the Transmit Function also extracts the appropriate ABCD signaling bits from terrestrial timeslot 16 for transmission in IBS Frame as required. Conversely, the Receive Function extracts received ABCD signaling bits from the IBS Frame and inserts them in timeslot 16 of the appropriate terrestrial frame. This transmission and reception of ABCD signaling based upon the drop and insert timeslots is performed automatically and is transparent to the user. In PCM-30 mode, the user may *not* select timeslot 16 as a Drop or Insert Timeslot.

3.11.2 PCM-30C

The PCM-30C Mode of Operation supports an E1 Interface with Multiframe Alignment (MFAS) and Channel Associated Signaling (CAS). In addition, the Drop function verifies the received terrestrial CRC checksum and the Insert function calculates the required CRC checksum. The user may independently program n timeslots to drop and n timeslots to insert where n = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, or 30. In addition to the selected Drop timeslots, the Transmit Function also extracts the appropriate ABCD signaling bits from terrestrial timeslot 16 for transmission in IBS Frame as required. Conversely, the Receive Function extracts received ABCD signaling bits from the IBS frame and inserts them in timeslot 16 of the appropriate terrestrial frame. This transmission and reception of ABCD signaling based upon the Drop and Insert timeslots is performed automatically and is transparent to the user. *In PCM-30C Mode*, *the user may not select timeslot 16 as a Drop or Insert Timeslot*.

3.11.3 PCM-31

The PCM-31 Mode of Operation supports an E1 Interface with no Multiframe Alignment (MFAS) or Channel Associated Signaling (CAS). The user may independently program n timeslots to drop and n timeslots to insert where n = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, or 30. Because there is no implied ABCD signaling, the user is free to select timeslot 16 as a Drop *or* Insert Timeslot.

3.11.4 PCM-31C

The PCM-31C Mode of Operation supports an E1 Interface with no Multiframe Alignment (MFAS) or Channel Associated Signaling (CAS). In addition, the Drop Function verifies the received terrestrial CRC checksum and the Insert Function calculates the required CRC checksum. The user may independently program ‘n’ timeslots to drop and ‘n’ timeslots to insert where ‘n’ = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, or 30. Because there is no implied ABCD signaling, the user is free to select timeslot 16 as a Drop *or* Insert Timeslot.

3.11.5 T1-D4/T1-D4-S

The T1-D4 Mode of Operation supports a T1 Interface with 12 frames per multiframe. The user may independently program n timeslots to drop and n timeslots to insert where n = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, or 30. In the DMD20, Robbed Bit Signaling (RBS) is handled without any need for operator intervention and is transparent to the user.

3.11.6 T1-ESF/T1-ESF-S

The T1-ESF Mode of Operation supports a T1 Interface with 24 frames per multiframe. The CRC-6 checksum is automatically checked by the Drop Function and generated by the Insert Function and placed in the appropriate F-bit positions in the terrestrial multiframe. The user may independently program n timeslots to drop, and n timeslots to insert, where n = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, or 30. In the DMD20, Robbed Bit Signaling (RBS) is handled without any need for operator intervention and is transparent to the user.

3.12 Multidestinational Systems

Because the Drop and Insert Functions are completely independent, the DMD20 easily supports multidestinational communications. Figure 3-15 illustrates a Multidestinational System with one Hub site and three remote sites. At the Hub site, thirty channels are being transmitted to all three remote sites and a fractional set of channels is being received from each remote site. At the other end of the link, each remote site is transmitting a fractional E1 to the Hub site as well as receiving all 30 channels from the Hub site. It also identifies those channels intended for it, and inserts them into the terrestrial data stream.

3.13 Drop and Insert Mapping

The following displays under Interface D&I Setup (both Tx and Rx), are editing displays only:

SATCh TS
Enter to Edit

Any changes made in these displays are made on the screen, **but *are not* entered into the modem**. Once these menus are configured, the Mapping Menu must be used to actually enter the settings into the modem.

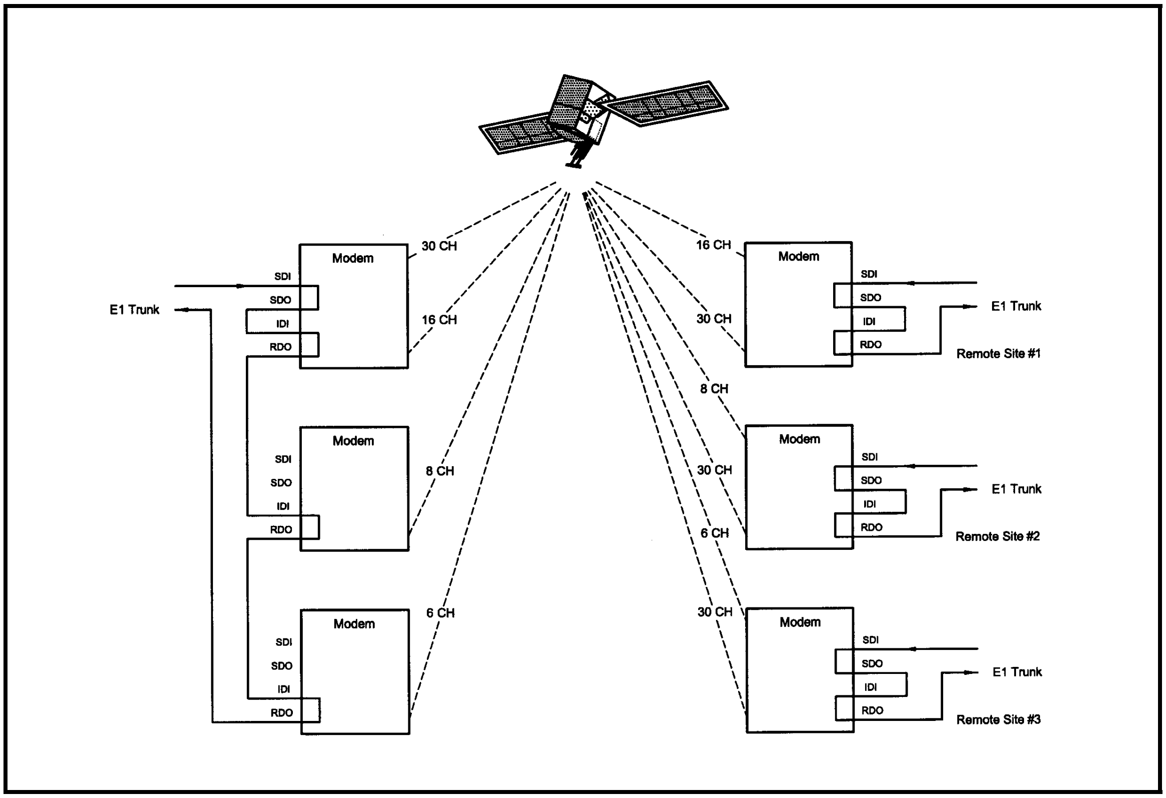


Figure 3-15. Multidestinational Communications

Example :

For a modem w/ Drop & Insert enabled at a data rate of 256 (with timeslots assigned 1 - 1, 2 - 2, etc.). At a data rate of 256, the modem will allow 4 channels to assign timeslots. Under the Tx Menu, assign the timeslots that are to be used to the 4 channels. CH1 is assigned to TS1 (Timeslot #1), CH2 to TS 2, CH3 to TS3 and CH4 to TS4, <ENTER> must be depressed after assigning each individual TS. Once the timeslots are assigned to the channels, use the Left or Right Arrow Key to scroll to the Mapping Menu. This menu will appear in the following way:

Map Copy
********* **********

This is the menu where the channel assignments are actually entered into the modem. To do this, perform the following steps:

For the Transmit Side:

1. Push <ENTER> to get the flashing cursor.

2. Use the Up Arrow Key to make the left portion of the display read “TX EDIT”.

3. Use the Right or Left Arrow Keys to switch the flashing cursor to the right portion of the display.

4. Use the Up or Down Arrow Key to until the right hand portion displays “TX ACTIVE”.

5. The mapping display should now look like this:

Map Copy
TX EDIT > TX ACTIVE

6. Push <ENTER> to enter this command. This tells the modem to configure to the settings that were assigned in the Channel/Timeslot display.

For the Receive Side:

1. With Rx Side Channels configured as follows: CH1 to TS1, CH2 to TS2, CH3 to TS3, and CH4 to TS4.

2. After the timeslots are assigned properly, scroll to the Mapping Menu and use the above procedure to enter the settings into the modem.

3. Set the display to read:

Map Copy
RX EDIT > RX ACTIVE

4. Press <ENTER> to enter the settings into the modem.

To View the current Timeslot Assignment:

1. If there is a question of the channels not being entered properly, the Mapping Menu may be used to see how the channels/timeslots are configured in the modem.

2. Use <ENTER> and the Arrow Keys to make the mapping menu read (for the Tx Side):

Map Copy
TX ACTIVE > TX EDIT

3. Press <ENTER>. The modem has now copied the current Tx Settings to the Tx Channel/Timeslot Display.

4. For the Rx Side:

Map Copy
RX ACTIVE > RX EDIT

5. Press <ENTER>. The modem has now copied the current Rx Settings to the Rx Channel/Timeslot display).

NOTE

It is not mandatory to assign timeslots in sequential order, although the lowest timeslot must be entered in the lowest channel. For example: timeslots may be assigned 1 - 2, 2 - 5, etc. but not 1 - 5, 2 - 2.

3.14 Reed-Solomon Codec

NOTE

Refer to Figures 3-16, 3-17, and Table 3-1.

Utilizing a Reed-Solomon (R-S) Outer Codec concatenated with a Convolutional Inner Codec is an effective way to produce very low error rates even for poor signal-to-noise ratios while requiring only a small increase in transmission bandwidth. Typically, concatenating an R-S Codec requires an increase in transmission bandwidth of only 9 – 12% while producing a greater than 2 dB improvement in E_b/N_o. R-S is a block Codec where K data bytes are fed into the encoder which adds 2t = (N – K) check bytes to produce an N byte R-S block. The R-S decoder can then correct up to “t” erred bytes in the block.

3.14.1 Reed-Solomon Operation in the DMD20

When the Reed-Solomon Codec is enabled, data is fed to the R-S Encoding Section of the DMD20 where it is scrambled, formed into blocks, R-S encoded, and interleaved. Unique words are added so that the blocks can be reformed in the Receiving Modem (Refer to Figures 3-13 and 3-14). Data is then sent to the modulator where it is convolutionally encoded, modulated and transmitted to the satellite.

When the signal is received and demodulated by the Receiving Modem, it is fed to a Viterbi Decoder for the first layer of error correction. After error correction is performed by the Viterbi Decoder, the unique words are located and the data is deinterleaved and reformed into blocks. The R-S Decoder then corrects the leftover errors in each block. The data is then descrambled and output from the R-S Section.

3.14.2 Reed-Solomon Code Rate

The R-S Code Rate is defined by (N, K) where N is the total R-S block size in bytes - data + check bytes - and K is the number of data bytes input into the R-S Encoder. The transmission rate expansion required by the R-S Codec is then defined by N/K. The DMD20 automatically sets the correct R-S code rate for IDR/IBS open network operation in accordance with the data shown in Table 3-1. In Closed Net Mode, the DMD20 allows the following N and K setting: (126, 112), (219, 201), (194, 178), (225, 205).

Variable Reed-Solomon rates are available on the optional AS/5167 Super Card. Refer to Appendix A for further information.

3.14.3 Interleaving

The DMD20 allows for interleaving depths of 4 or 8 R-S Blocks. This allows burst errors to be spread over 4 or 8 R-S blocks in order to enhance the error correcting performance of the R-S Codec. For Intelsat Network Modes, the DMD20 automatically sets the interleaving depth to 4 for QPSK or BPSK, or 8 for 8PSK. In Closed Network Mode, the interleaver depth can be manually set to 4 or 8, and in DVB Network Mode, the DMD20 automatically sets the interleaver depth to 12.

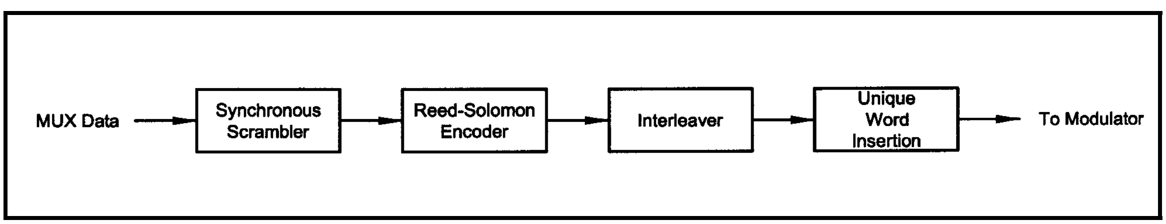


Figure 3-16. Reed-Solomon Encoder Functional Block Diagram

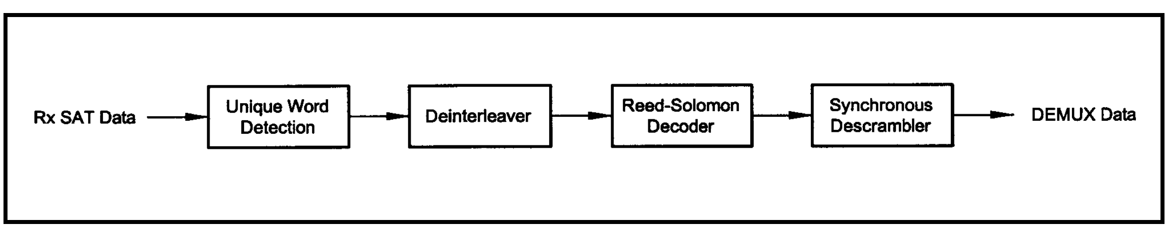


Figure 3-17. Reed-Solomon Decoder Functional Block Diagram

Table 3-1. Reed-Solomon Codes

Type of Service	Data Rate (Kbps)	R-S Code (n, k, t) [1]	Bandwidth Expansion [(n/k) -1]	Interleaving Depth	Maximum [2] R-S Codec Delay (ms)
Small IDR (With 16/15 O/H)	64	(126, 112, 7)	0.125	4	115
	128	(126, 112, 7)	0.125	4	58
	256	(126, 112, 7)	0.125	4	29
	384	(126, 112, 7)	0.125	4	19
	512	(126, 112, 7)	0.125	4	15
	768	(126, 112, 7)	0.125	4	10
	1024	(126, 112, 7)	0.125	4	8
	1536	(126, 112, 7)	0.125	4	5
IDR (With 96 Kbps O/H)	1544	(225, 205,10)	0.0976	4	9
	2048	(219, 201, 9)	0.0896	4	7
	6312	(194, 178, 8)	0.0899	4	2
	8448	(194, 178, 8)	0.0899	4	<2
8PSK	1544	(219, 201, 9)	0.0896	8	18
	2048	(219, 201, 9)	0.0896	8	13
	6312	(219, 201, 9)	0.0896	8	4
	8448	(219, 201, 9)	0.0896	8	3
DVB	All	(204, 188, 8)	0.0851	12	-

1. n = code length, k = information symbols and t = symbol error correcting capability.
2. Design objective.

3.15 DMD20 Automatic Uplink Power Control (AUPC Operation)

The DMD20 Modem has an optional built-in provision for Automatic Uplink Power Control (AUPC). AUPC attempts to maintain a constant E_b/N_o at the receive end of an SCPC link. This is especially useful when operating over a satellite at Ku-Band Frequencies in locations with high rainfall periods.

NOTE

Implementing Strap Code 26 can set the following modem configuration. Refer to Table 4-4 for an explanation and tabular listing of available Strap Codes. The Frequency and Modulator Output Power are set independently of the strap code.

The IBS Async Framer Data Mode provides a service channel between the two sites of a link permitting the modem processors to send messages and get responses over this channel. AUPC can be set to operate on either or both directions of a link but always requires a bi-directional channel. Therefore, both the Modulator and Demodulator interface mode must be set to IBS Async for the AUPC Menus to be visible and for the AUPC function to operate properly. The AUPC Functions and their descriptions are shown on Table 3-2.

Table 3-2. AUPC Functions

Function	Description
AUPC ENABLE/DISABLE	Enables/Disables the AUPC to function locally
AUPC Eb/No	Desired E_b/N_0 of remote modem
AUPC MIN LVL	Sets minimum output power to be used
AUPC MAX LVL	Sets maximum output power to be used
AUPC DEF LVL	Sets default output power to be used

The AUPC Menus are located under the Modulator Menu as shown in Section 4. The EFAUPC Menu displays when EFAUPC Framing is enabled.

The basic AUPC Operation is described as follows:

Assume that the two modems, one at each end of the link, are set to AUPC operation. Only one direction is discussed, but the same functions could be occurring in both directions simultaneously. Modem “A” is transmitting to modem “B” under normal conditions and modem “B” has a receive E_b/N_o of 7.5 dB. Modem “A” has been set to an AUPC E_b/N_o on the Front Panel of 7.5 dB, and is currently outputting –15 dBm. Next, it begins raining at location “B”, and the E_b/N_o drops to –7.0 then –6.8 dB. Modem “B” is constantly sending update messages to “A” and reports the current E_b/N_o. When “A” sees the drop in E_b/N_o, it slowly begins to raise the output power, and raises it again when it sees further drops. As the rain increases in intensity, and the E_b/N_o decreases again, “A” continues to increase its power level to compensate, and when the rain diminishes and quits, it lowers its power level to compensate. The operation is therefore a feedback control loop with the added complication of a significant time delay.

There are safeguards built into the AUPC System. First, the Modulator has two additional parameters, which allow control of the Maximum and Minimum Power Output Levels. Second, a default power level is specified which takes precedence over the output power level during signal loss or loss of AUPC Channel Communication. The default power level should normally be set to a high enough level to reestablish communication regardless of rain fade. The other controls are built into the operating control software to limit response times and detect adverse operating conditions.

3.16 Asynchronous Overhead Operation (Framing/Multiplexer Capability)

The Asynchronous Framing/Multiplexer is capable of multiplexing a relatively low-speed overhead channel onto the terrestrial data stream resulting in a slightly higher combined or aggregate data rate through the modem. The overhead channel is recovered at the far end. This added channel is termed variously “An Overhead Channel”, ”Service Channel”, “Async Channel” or in IESS terminology an “ES to ES Data Channel.” The basic frame structure used by the multiplexer is that specified in the IESS-309 Standard, resulting in a 16/15 Aggregate t0 through-Data Ratio.

For Regular Async: (Standard IBS), the Baud Rate is approximately 1/2000 of the Data Rate listed in Table 3-3.

For Enhanced Async: (IBS Async.), the Baud Rate is selectable, but Data Rate is limited.

The maximum Baud Rate is 19,200 bps for IBS Async. Two software-controlled modes are designed into the card to best utilize the available bits; “Standard IBS” and “IBS (Async)”. The characteristics of the Channel Interface is also determined by the standard or Async mode.

The Async Channel can be set under software-control to either RS-232 or RS-485 mode. The pin assignments for both modes are shown in Table 5-3. The “RS-485” Setting controls the output into tri-state when the modem is not transmitting data, allowing multiple modem outputs to be connected together.

Table 3-3.

Kbps	Baud Rate Example for Standard IBS	Kbps	Baud Rate Example for Enhanced Mode
128	64	9.6	300
256	128	19.2	600
384	192	32	600
512	256	64	1200
640	320	128	2400
768	384	192	4800
896	448	256	4800
1024	512	320	9600
1152	576	384	9600
1280	640	448	9600
1408	704	512	9600
1536	768	576	9600
1664	832	640	19200
1792	896	704	19200
1920	960	768	19200
1920	960	768	19200

2048	1024	832	19200
		896	19200
		960	19200
		1024	19200
		1088	19200
		1152	19200
		1216	19200
		1280	19200
		1344	19200
		1408	19200
		1472	19200
		1536	19200
		1600	19200
		1664	19200
		1728	19200
		1792	19200
		1856	19200
		1920	19200
		1984	19200
		2048	19200

3.17 Standard IBS Mode

In the first or "Normal" mode, all bit assignments are per the IBS standard. The bits of Overhead Housekeeping byte 32 are implemented as shown in Table 3-4 below:

Table 3-4.		
Bit 1	ES to ES Data Channel	This bit is routed directly to the ES to ES Data Channel. Its data rate is 1/512th of the aggregate rate (or 1/480th of the through terrestrial data rate), and is normally used to super-sample an asynchronous data channel.
Bit 2	Frame Alignment	Part of the Frame Alignment word.
Bit 3	Backward Alarm	Transmit and Receive with main processor to activate Main Alarm/LED.
Bit 4	Multiframe Message	As per IBS.
Bits 5 and 6	Spare	Not currently utilized.
Bits 7 and 8	Encryption Utilization	Not currently utilized.

The ratio of the Through Terrestrial Data Channel Rate to the aggregate rate is 15/16. The standard transmit and receive channels of the ES to ES Data Channel in Standard IBS Mode are raw channels operating at the specific bit rate as controlled by the data channel rate, without buffering. In addition, no clocks are provided with this channel. Since it would be rare that the data rate provided was exactly that required for a standard rate device, the only method of communicating using this channel is to allow it to super-sample the user data.

3.18 Asynchronous Multiplexer Mode

Since many of the frame bits in the standard IBS mode are not used, an “Enhanced” Multiplexer Mode has been implemented that can be engaged under software control. Since this mode changes the use of many of the framed non-data bits, this mode is only usable when the DMD20 is at both ends of a link. In this mode, the overhead signaling bytes 16 and 48 can be used to implement a significantly higher speed ES to ES Data Channel under software control. When implemented, this rate is 16 times that of the normal IBS standard, or 1/30th of the terrestrial data rate (1/32nd of the aggregate rate).

NOTE

The IBS Async mode MUST be selected for true Asynchronous channel operation to be available.

3.19 ESC Backward Alarms

When running in IDR Mode and if the modem has the ESC Option, there will be four Backward Alarms available for use by the earth stations at each end of the link (both ends must have the ESC option). These alarms are accessed via the ESC ALARMS Port. The four alarms are controlled by four relays, each having a normally open, normally closed, and a common connection. The common connections of these relays (referred to as Backward Alarm Inputs) can be connected to whichever system on the earth station that the user wishes to trigger the backward alarm. When ground is applied to the Common (Input) Connection of one of these relays, that relay and associated backward alarm will then be in a “no fault” state. When the ground is removed, the relay and the associated Tx Backward Alarm will toggle to the faulted state. When in the faulted state, the receive end of the link will receive that backward alarm that is initiated at the transmit end of the link.

The user can connect whichever systems on the earth stations that they desire to these Backward Alarms Relays as long as they will supply ground to the Backward Alarm Relay Input in the “no fault” condition and the ground will be removed in the “faulted” condition.

For example: the user could connect the Demod Summary Fault of the modem to the Backward Alarm 1 Input, so that if the demod went into Major Alarm (such as a Carrier Loss), Backward Alarm 1 would be transmitted to the receive end of the link. At the receive end, it would show up as Rx Backward 1 (Receive Backward Alarm 1).

3.19.1 To Disable the ESC Backward Alarms

If the ESC ALARMS Port will not be used and the Backward Alarm Indications are to be disabled, set the Backward Alarm mask to “FORCE OFF”.

User Interfaces

4

4.0 User Interfaces

There are three user interfaces available for the DMD20. These are:

- Front Panel Interface
- Remote Port Interface
- Terminal Interface.

4.1 Front Panel User Interface

The Front Panel of the DMD20 allows for complete control and monitor of all DMD20 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 four functional areas: the LCD Front Panel Display, the Cursor Control Arrow Keys, the Numeric Keypad, and the Front Panel LED Indicators, each described below in Table 4-1.

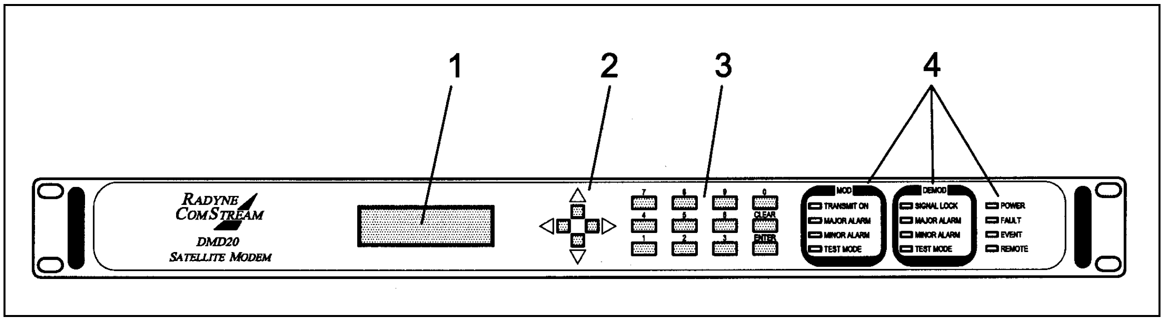


Figure 4-1. DMD20 Front Panel

Table 4-1.		
Item Number	**Description**	**Function**
1	LCD Front Panel Display	Displays DMD20 operating parameters and Configuration data
2	Cursor Control Arrow Keys	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 4.1.4 below for an itemized description of these LEDs

4.1.1 LCD Front Panel 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 Cursor Control Arrow Keys

A set of ‘Arrow’ or ‘Cursor’ keys (↑), (↓), (→), (←), is used to navigate the parameter currently being monitored or controlled. Table 4-2 describes the functions available at the Front Panel.

4.1.3 Numeric Keypad

A 10 Key Numeric Keypad with 2 additional keys for the ‘Enter’ and ‘Clear’ function allows the entry of data into the system. Table 4-2 describes the functions available at the Front Panel.

Table 4-2. 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

4.1.4 Front Panel LED Indicators

Eight LEDs on the DMD20 Front Panel (Refer to Table 4-3) indicate the status of the DMD20'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 4-3.

LED	Color	Function
Modem LED Indicators		
Power	Green	Indicates that the unit is turned on.
Fault	Red	Indicates a hardware fault for the unit.
Event	Yellow	Indicates that a condition or event has occurred that the modem has stored in memory. The events may be viewed from the Front Panel or in the Terminal Mode.
Remote	Green	Indicates that the unit is in the process of updating firmware with FTP.
Modulator LED Indicators		
Transmit On	Green	Indicates that the transmitter is on.
Major Alarm	Red	Indicates that the Transmit Direction has failed, losing traffic.
Minor Alarm	Yellow	Indicates that a Transmit Warning Condition exists.
Test Mode	Yellow	Indicates that the transmitter is involved in a current Test Mode activity.
Demodulator LED Indicators		
Signal Lock	Green	Indicates that the receiver locked to an incoming carrier and data, including FEC Sync.
Major Alarm	Red	Indicates that the Receive Direction has failed, losing traffic.
Minor Alarm	Yellow	Indicates that a Receive Warning Condition exists.
Test Mode	Yellow	Indicates that the receiver is involved in a current Test Mode activity.

4.2 Parameter Setup

The four Cursor Control Arrow Keys 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 4-2), 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>.

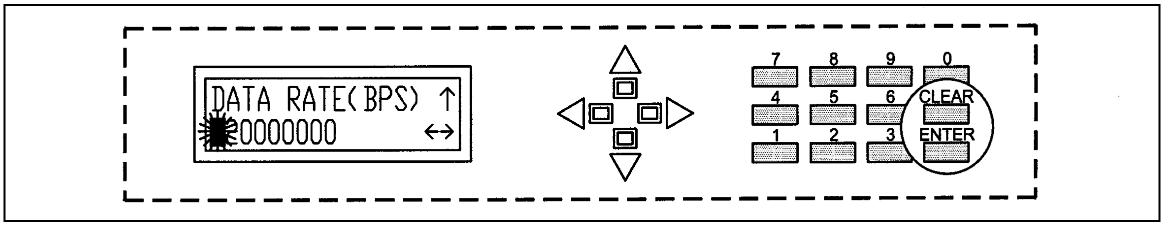


Figure 4-2. Entering New Parameters

Following a valid input, the DMD20 will place the new setting into the nonvolatile EEPROM making it available immediately and available the next time the unit is powered-up.

4.3 Front Panel Control Screen Menus

The DMD20 Front Panel Control Screens are broken down into sections under several Main Menus.

NOTE

Menus items for LBST only will be in shaded text.

4.3.1 Main Menus

MODULATOR

DEMODULATOR

INTERFACE

MONITOR

ALARMS

SYSTEM

TEST

4.3.2 Modulator Menu Options and Parameters

NETWORK SPEC **{IDR, IBS, DROP & INSERT, CLOSED NET}**

Used with IDR, or IBS Interface Only.
The Network Spec Command sets a number of parameters within the modem to meet a set specification. The purpose is to eliminate keystrokes and potential compatibility problems.

Additionally, data rates not covered by the given network specification of operation will not be allowed. If the mode of operation is selected after the data rate has been entered, then the data rate must be compatible with the desired mode of operation or the mode will not be allowed. The following parameters are set for the given mode of operation and cannot be changed while the unit is in the given mode of operation:

IDR:

(IESS-308)

For Data rates 1.544, 2.048, 6.312, 8.448 Mbps

Framing Type:	96 Kbps (IDR)
Scrambler Type:	V.35
Spectrum Mask:	Intelsat

For Data Rates < 1.544

Framing Type:	1/15 (IBS)
Scrambler Type:	IESS-309
Spectrum Mask:	Intelsat

IBS:

(IESS-309)

For Data Rates $\leq$ 2048

Framing Type:	1/15 (IBS)
Scrambler Type:	IESS-309
Spectrum Mask:	Intelsat

Drop & Insert:

Data Rates:	n x 64 n = 1, 2, 3, 4, 5, 6, 8, 10,12, 15, 16, 20, 24, 30
Framing Type:	1/15 (IBS)
Scrambler Type:	IESS-309
Spectrum Mask:	Intelsat

DVB:

Data Rates:	All Rates
Framing Type:	DVB
Scrambler Type:	DVB
Spectrum Mask:	DVB 0.25, 0.35

Closed Net:

All possible combinations allowed, however, DVB settings requires the DVB network spec. Activates the AUPC Menu.

STRAP CODE

{Refer to Strap Code Guide, Table 4-4}
The Strap Code is a quick set key that sets many modem parameters. Consult the strap code guide for available strap codes. Parameters set by strap code:

Data Rate
Inner Code Rate
Satellite Framing
Scrambler
Drop and Insert
Outer Code Rate (Reed-Solomon)
Modulation
Network Spec

IF (menu)

FREQUENCY (MHz)

{50 – 90 MHz, 100 – 180 MHz, or 950 - 1750 MHz (AS/5100 Card Rev. A/B), or 950 – 2050 MHz (AS/5100 Card Rev. C and LBST)}
Allows the user to enter the Modulator IF Output Frequency of the modem in 1 Hz increments.

UPLINK FREQ

Displays the output frequency of the BUC also referred to as Satellite uplink frequency. The user must enter the BUC LO and OSC SIDE BAND before using this menu. The UPLINK FREQUENCY is a calculated measurement of both the BUC LO and OSC SIDE BAND. Once the menus are entered correctly, the user can control the uplink Frequency from this menu.

POWER (dBm)

{0 to -25 dBm}
Allows the user to enter the Transmitter Power Level.

CARRIER

{ON, OFF, AUTO, VSAT, RTS}
Allows the user to select the carrier type. Refer to Appendix E for further information.

SPECTRUM	**{NORMAL, INVERTED}** Allows the user to invert the direction of rotation for PSK Modulation. Normal meets the IESS Specification. **LBST:** Spectral inversion may be required if the BUC LO is higher in frequency than the BUC output frequency. When BUC LO is higher than the BUC output frequency, this creates a spectral inversion and the IF Spectrum must be again inverted to compensate.
MODULATION	**{QPSK, BPSK, OQPSK, 8PSK, 16QAM}** Allows the user to select the modulation type.
SPECTRAL MASK	**{0.25, 0.35}** Allows the user to set the spectral shape of Tx Data Filter.

DATA (menu)

DATA RATE (bps)	**{Refer to Technical Specs for Data Rates}** Allows the user to set the Data Rate in bps steps via the Front Panel Arrows or Keypad.
SYMB RATE (sps)	Allows the user to view the Symbol Rate.
INNER FEC	**{1/2 Rate VIT, 3/4 Rate VIT, 7/8 Rate VIT, Optional encoders 1/2 Rate SEQ, 3/4 Rate SEQ , 7/8 Rate SEQ , 2/3 Rate TRE (8PSK), 3/4 Rate Turbo (.793), 1/2 Rate Turbo (.495), 1/3 Rate Turbo (.325), 3/4 Rate CSC, 2/3 Rate VIT (DVB), 5/6 Rate VIT (DVB), 3/4 Rate TRE (DVB), 5/6 Rate TRE (DVB), 7/8 Rate TRE (DVB), 8/9 Rate TRE (DVB)}** Allows the user to select the Tx Code Rate and Type.
DIFF CODING	**{ENABLED, DISABLE}** Allows the user to enable or disable the Differential Encoder. Having the encoder enabled ensures proper phase lock. May not be adjustable in some modes.
SCRAMBLER SEL	**{NONE, V.35-IESS, V.35 CITT, V.35 EF, IBS w/Optional Framing and optional Reed-Solomon, Reed-Solomon Scrambler w/Optional Framing, CCITT, V.35FC, OM-73, V.35EF_RS, TPC SCRAMBLER (Turbo Codec), DVB, EDMAC}** Allows the user to select the descrambler type.
SCRAMBLER CTRL	**{ENABLED, DISABLE}** Allows the user to enable or disable scrambler operation.
SAT FRAMING	**{1/15 (IBS), 1/15 (Async), 96 Kbps (IDR), DVB, EDMAC, EFAUPC, SCC, None}** ***Used with IDR, IBS, or Asynchronous Interface Only.*** Allows the user to select the framing type.

NOTE

When SCC Framing is selected above, the following two screens are available.

SCC CTL RATIO **{1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7}**
Allows the user to simulate the framing used by the ComStream Satellite Control Channel Option (Pass Thru Mode only). The SCC CTL RATIO is the ratio of overhead in-band data to synchronizing words.

SCC INBAND RATE **{300 to 200000}**
Allows the user to request the rate of in-band data for the overhead channel.

TERR FRAMING **{NONE, 188, 204} DVB Only**

DATA POLARITY **{INV. TERR & BASE, INV. BASEBAND, INV.TERR DATA, NONE}**
Allows the user to invert the Tx Data polarity.

SYMBOL PAIR **{NONE, SWAPPED}**
Allows the user to swap the I & Q Channels.
(BPSK Mode Only)

ESC OVERHEAD **{VOICE X2, DATA 64KBPS}**
IDR ESC Channel used for Voice or 64 K data channel.

AUPC (menu) Displays when IBS Framing is selected for the Modulator and Demodulator.

AUPC MODE **{DISABLED, RADYNE}**
Displays the AUPC Mode.

AUPC Eb/No Allows the user to enter the target Eb/No value.

AUPC MIN LVL **{variable through power range}**
Allows the user to set the minimum Transmit Power. The minimum Transmit Power is the lowest power setting that will be used when the remote modem commands a decrease of the Transmit Power.

AUPC MAX LVL **{variable through power range}**
Allows the user to set the maximum Transmit Power. The maximum Transmit Power is the highest power setting that will be used when the remote modem commands an increase of the Transmit Power.

AUPC DEF LVL	**{variable through power range}** Allows the user to set the default Transmit Power. The nominal Transmit Power is the setting that will be used when the remote modem indicates that its receiver has lost lock.
REED-SOLOMON (menu)	These selections are visible only when the Reed-Solomon Option is installed.
ENABLE/DISABLE	**{ENABLED, DISABLE}** Allows the user to Enable/Disable the Reed-Solomon Encoder.
RS RATE	**{Refer to Table 3-1 for valid n/k values}** Displays the currently used n, k Reed-Solomon Codes. In Closed Net Mode, the user may select custom R-S Codes.
INTERLVR DEPTH	**{4, 8, 12}** Allows the user to select the Reed-Solomon interleaver depth. In Closed Net Mode, a depth of 4 or 8 may be selected.
ODU-BUC (menu)	
LO FREQ (MHz)	Allows the user to enter the Local Oscillator frequency of the BUC LO in order for the uplink frequency to be displayed correctly (refer to the BUC manufacturer's specifications).
OSC SIDE BAND	**{LOW SIDEBAND, HIGH SIDEBAND}** Allows the user to select the location of the LNB LO. The user must enter the location of the LNB LO in order for the UPLINK FREQUENCY to be displayed correctly. The LNB LO can be either higher or lower in frequency than the LNB output frequency. If the LNB LO is higher in frequency then the user must enter HIGH SIDEBAND.
10 MHz BUC REF	**{ENABLED, DISABLED}** Allows the user to enable or disable the 10 MHz BUC reference clock.
BUC VOLTAGE	**{ENABLED, DISABLED}** Allows the user to enable or disable the BUC supply voltage.
CAR DLY (SEC)	**{0 to 255}** Allows the user to select the time delay after power-up before the Tx Carrier may be enabled. This allows time for the BUC to stabilize.

4.3.3 Demodulator Menu Options and Parameters

NETWORK SPEC

{IDR, IBS, DROP & INSERT, CLOSED NET}
Used with IDR, or IBS Interface Only.
The Mode Command sets a number of parameters within the modem to meet a set specification. The purpose is to eliminate keystrokes and potential compatibility problems. Additionally, data rates not covered by the given mode of operation will not be allowed. If the mode of operation is selected after the data rate has been entered, then the data rate must be compatible with the desired mode of operation or the mode will not be allowed. The following parameters are set for the given mode of operation and cannot be changed while the unit is in the given mode of operation:

IDR:

(IESS-308)
For Data rates 1.544, 2.048, 6.312, 8.448 Mbps

Framing Type:	96 Kbps (IDR)
Descrambler type:	V.35
Spectrum Mask:	Intelsat

For Data Rates < 1.544 Mbps

Framing Type:	1/15 (IBS)
Descrambler Type:	IESS-309
Spectrum Mask:	Intelsat

IBS:

(IESS-309)
For Data Rates $\leq$ 2.048 Mbps

Framing Type:	1/15 (IBS)
Descrambler Type:	IESS-309
Spectrum Mask:	Intelsat

Drop & Insert:

Data Rates:	n x 64, n = 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 30
Framing Type:	1/15 (IBS)
Descrambler Type:	IESS-309
Spectrum Mask:	Intelsat

DVB:

Data Rates:	All Rates
Framing Type:	DVB
Scrambler Type:	DVB
Spectrum Mask:	DVB 0.25, 0.35

Closed Net:

All possible combinations allowed, however, DVB settings requires the DVB network spec.

STRAP CODE

{Refer to Strap Code Guide, Section 4.3, Table 4-4}
The Strap Code is a quick set key that sets many modem parameters. Consult the strap code guide for available strap codes. Parameters set by strap code:

Data Rate
Inner Code Rate
Satellite Framing
Scrambler
Drop and Insert
Outer Code Rate (Reed-Solomon)
Modulation
Network Spec

IF (menu)

FREQUENCY (MHz)

{50 – 90 MHz, 100 – 180 MHz, or 950 - 1750 MHz (AS/5100 Card Rev. A/B), or 950 – 2050 MHz (AS/5100 Card Rev. C and LBST)}
Allows the user to enter the Modulator IF Frequency in 1 Hz increments.

DWNLNK FREQ (MHz)

Displays the input frequency into the LNB from the satellite, also referred known as Satellite downlink frequency. The user must enter the LNB LO and OSC SIDEBAND of the LNB before using this menu. The DOWNLINK FREQUENCY is a calculated measurement of both the LNB LO and OSC SIDE BAND. Once the menus are entered correctly, the user can control the downlink Frequency from this menu.

SPECTRUM

{NORMAL INVERTED}
Allows the user to invert the direction of rotation for PSK Modulation. Normal meets the IESS Specification.
LBST: Spectral inversion may be required if the LNB LO is higher in frequency than the LNB input frequency from the satellite. When LNB LO is higher in frequency than the LNB input frequency, this creates a spectral inversion and the IF Spectrum must be inverted to compensate for the inversion.

MODULATION

{QPSK, BPSK, OQPSK, 8PSK, 16QAM}
Allows the user to select the demodulation type.

SPECTRAL MASK

{INTELSAT}
Allows the user to set the spectral shape of Tx Data Filter.

SWEEP RANGE (kHz)

{±0 to 255 kHz}
Allows the user to set the acquisition range for the demodulator

SWEEP DELAY (Sec)

{0.0 – 900.0 sec}
Allows the user to set the reacquisition delay time in 1/10th second increments.

REACQ RANGE (Hz)	**{0 – 32000 Hz}** Allows the user to set the reacquisition sweep in 1 Hz increments.
EB/NO ALARM	**{variable}** Allows the user to set the desired E_b/N_o for the local receiver. This setting is compared against the receive E_b/N_o and commands to the remote modem to increase or decrease Transmit Power accordingly are sent.

DATA (menu)

DATA RATE (bps)	**{Refer to Technical Specs for Data Rates}** Allows the user to set the Data Rate in bps steps via the Front Panel Arrows or Keypad.
SYMB RATE (sps)	Allows the user to view the Symbol Rate.
INNER FEC	**{1/2 Rate VIT, 3/4 Rate VIT, 7/8 Rate VIT, NONE Optional encoders 1/2 Rate SEQ, 3/4 Rate SEQ , 7/8 Rate SEQ , 2/3 Rate TRE (8PSK), 3/4 Rate Turbo (.793), 1/2 Rate Turbo (.495), 1/3 Rate Turbo (.325), 3/4 Rate CSC, 2/3 Rate VIT (DVB), 5/6 Rate VIT (DVB), 3/4 Rate TRE (DVB), 5/6 Rate TRE (DVB), 7/8 Rate TRE (DVB), 8/9 Rate TRE (DVB)}** Allows the user to select the Tx Code Rate and Type.
DIFF CODING	**{ENABLED, DISABLE}** Allows the user to enable or disable the Differential Decoder. Having the decoder enabled ensures proper phase lock. May not be adjustable in some modes.
SCRAMBLER SEL	**{NONE, V.35-IESS, V.35 CITT, V.35 EF, IBS w/Optional Framing and optional Reed-Solomon, Reed-Solomon Scrambler w/Optional Framing, CCITT, V.35FC, OM-73, V.35EF_RS, TPC SCRAMBLER (Turbo Codec), DVB, EDMAC}** Allows the user to select the descrambler type.
SCRAMBLER CTRL	**{ON, OFF}** Allows the user to enable or disable the descrambler operation.
SAT FRAMING	**{1/15 (IBS), 1/15 (Async), 96 Kbps (IDR), EDMAC, EFAUPC, SCC, None}** ***Used with IDR, IBS, or Asynchronous Interface Only.*** Allows the user to select the Framing Type.

NOTE

When SCC Framing is selected above, the following two screens are available.

SCC CTL RATIO	**{1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7}** Allows the user to simulate the framing used by the ComStream Satellite Control Channel Option (Pass Thru Mode only). The SCC CTL RATIO is the ratio of overhead in-band data to synchronizing words.
SCC INBAND RATE	**{300 to 200000}** Allows the user to request the rate of in-band data for the overhead channel.
TERR FRAMING	**{NONE, 188, 204} DVB only**
DATA POLARITY	**{INV. TERR & BASE, INV. BASEBAND, INV.TERR DATA, NONE}** Allows the user to invert the Rx Data polarity.
SYMBOL PAIR	**{NONE, SWAPPED}** Allows the user to swap the I & Q Channels. **(BPSK Mode Only)**
ESC OVERHEAD	**{VOICE X2, DATA 64KBPS}** IDR ESC Channel used for Voice or 64 K data channel.
REED-SOLOMON (menu)	These selections are visible only when the Reed-Solomon Option is installed.
ENABLE/DISABLE	**{ENABLED, DISABLED}** Allows the user to Enable/Disable the Reed-Solomon Encoder.
RS RATE	**{Refer to Table 3-1 for valid n/k values}** Displays the currently used n, k Reed-Solomon Codes. In Closed Net Mode, the user may select custom R-S Codes.
INTERLVR DEPTH	**{4, 8, 12}** Allows the user to select the Reed-Solomon interleaver depth. In Closed Net Mode, a depth of 4 or 8 may be selected.

ODU-LNB (menu)

LO FREQ (MHz)	Allows the user to enter the Local Oscillator frequency in MHz in order for the downlink frequency to be displayed correctly (refer to the LNB manufacturer's specifications).
OSC SIDE BAND	**{LOW SIDEBAND, HIGH SIDEBAND}** Allows the user to select the location of the LNB LO. The user must enter the location of the LNB LO in order for the UPLINK FREQUENCY to be displayed correctly. The LNB LO can be either higher or lower in frequency than the LNB output frequency. If the LNB LO is higher in frequency then the user must enter HIGH SIDEBAND.
10 MHz LNB REF	**{ENABLED, DISABLED}** Allows the user to enable or disable the 10 MHz BUC reference clock.
VOLTAGE SELECT	**{13 VDC, 15 VDC, 18 VDC, 20 VDC}** Allows the user to select the voltage required by the LNB (refer to the LNB manufacturer's specifications).
LNB VOLTAGE	**{ENABLED, DISABLED}** Allows the user to enable or disable the LNB supply voltage.

4.3.4 Interface Menu Options and Parameters

TX SETUP (menu)

CIRCUIT ID	Allows the user entry of a Tx Circuit Identifier. Circuits can be given up to an 11 Character alphanumeric identity such as LINK1.
TERR INTERFACE	**{RS422 SERIAL, M2P PARALLEL, DVB PARALLEL, G.703 E2, G.703 T2 BAL, G.703 T2 UNBAL, G.703 E1 BAL, G.703 E1 UNBAL, G.703 T1 AMI, G.703 T1 B8ZS, V.35, HSSI, ASI, ETHERNET}** Allows the user to select the Transmit Type.
ETH FLOW CONTROL	**{Disabled, Enabled}** Allows the user to disable or enable flow control. ***Only visible when Ethernet is selected as the interface type.***
ETH DAISY CHAIN	**{Disabled, Port 4}** Allows the user to disable the Ethernet Port Daisy Chaining or enable it on Port 4. ***Only visible when Ethernet is selected as the interface type.***
TX CLK SRC	**{SCTE, SCT, SCR, EXT CLK}** Allows the user to select the Transmit Clock Source.

TX CLK POL	**{AUTO, NORMAL, INVERTED}** Allows the user to select the Clock Polarity for the Tx Terrestrial Clock relative to the Tx Data. “Auto” detects wrong polarity and automatically corrects. If G.703 Interface is selected, this selection cannot be changed.
SCT CLK SRC	**{INTERNAL (SCT), SCR (Rx SAT CLK)}** Allows the user to select SCT Source to be either the SCT Oscillator or RX Satellite Clock. Rx SAT CLK is used for loop timing.
SCT CLK POLARITY	**{NORMAL, INVERTED}** Allows the user to select the SCT Clock polarity relative to the Tx Data.
DROP & INSERT (menu)	
DROP MODE	**{NONE, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C, T1-D4-S, T1-ESF-S.}** Allows the user to select any of the above.

RX SETUP (menu)

CIRCUIT ID	Provides entry of Rx Circuit Identifier. Circuits can be given up to an 11 Character alphanumeric Identity such as DLINK1
TERR INTERFACE	**{RS422 SERIAL, M2P PARALLEL, DVB PARALLEL, G.703 E2, G.703 T2 BAL, G.703 T2 UNBAL, G.703 E1 BAL, G.703 E1 UNBAL, G.703 T1 AMI, G.703 T1 B8ZS, V.35, HSSI, ASI, ETHERNET}** Allows the user to select the Receive Type.
BUFF SIZE (msec)	**{0 - 64 msecs}** Allows the user to set the Doppler Buffer Size in msec.
BUFFER CLK SRC	**{SCTE (External), SCT (Internal), Rx Sat, EXTCLK}** Allows the user to select the buffer clock source. Must set Buff size to zero to bypass.
BUFFER CLOCK POL	**{NORMAL, INVERTED}** Allows the user to select the Buffer Clock Polarity for the Tx Terrestrial Clock relative to the Tx Data. If G.703 Interface is selected, this selection cannot be changed.
DROP & INSERT (menu)	
INSERT MODE	**{NONE, T1-D4, T1-ESF, PCM-30, PCM-30C, PCM-31, PCM-31C, T1-D4-S, T1-ESF-S.}** Allows the user to select any of the above.
TERR STREAMING	**{BYTE, CONTINUOUS} ASI only**

GENERAL (menu)

EXT CLK SRC	**{NONE, BAL, BNC, IDI}** Allows the user to select the source for the external clock.
EXT FREQ (MHz)	**{Variable Through Data Rate}** Allows the user to select the external clock frequency in MHz.
REF FREQ SRC	**{INTERNAL, EXTERNAL}** Allows the user to select the Frequency Reference Source.
REF FREQ (MHz)	Allows the user to select the reference clock frequency in MHz.

TX ASYNC MODE (menu)

TX ASYNC MODE	**{ES-ES, ESC ENHANCED}** ES-ES is the normal IBS Async Channel. ESC Enhanced ca be selected in Closed Net and uses the Overhead Signaling bytes in the IBS Overhead to pass asynchronous data.
ES INTERFACE	**{RS-232, RS-485}** Allows the user to select the interface type.
ES BAUD RATE	**{150 - 19200}** Allows the user to select the baud rate in Enhanced Async Mode. Available rates are listed in Table 3-3.
ES BITS/CHAR	**{7,8}** Allows the user to choose between 7 or 8 bit data.

RX ES ENHANCED (menu)

RX ASYNC MODE	**{ES-ES, ESC ENHANCED}** ES-ES is the normal IBS Async Channel. ESC Enhanced ca be selected in Closed Net and uses the Overhead Signaling bytes in the IBS Overhead to pass asynchronous data.
ES INTERFACE	**{RS-232, RS-485}** Allows the user to select the interface type.
ES BITS/CHAR	**{7,8}** Allows the user to choose between 7 or 8 bit data.

4.3.5 AUPC Menu Options and Parameters

NOTE

AUPC Menus are only available when the Modulator is in 'Closed Net' Network Spec and Framing is 'EFAUPC 1/15'.

EF AUPC (menu)

LOCAL AUPC (menu)

The 'LOCAL AUPC CONFIGURATION' Menu contains the local configuration parameters for the AUPC Function.

AUPC ENABLE

{DISABLED, EFDATA}
Allows the user to enable or disable the Local AUPC Function of the local modem. The Local AUPC Function is the response to the commands for an increase or decrease of the Transmit Power in 0.5 dB steps. The command to change to the setting is indicated in the 'REMOTE CL ACTION' Menu upon receiver loss of lock of the remote modem.

NOMINAL TX POWER

{variable through power range}
Allows the user to set the nominal Transmit Power. The nominal Transmit Power is the setting that will be used when the remote modem indicates that its receiver has lost lock and commands a change to the setting indicated in the 'REMOTE CL ACTION' Menu. That change will only be implemented if the 'REMOTE CL ACTION' Menu is set to "NOMINAL".

MINIMUM TX POWER

{variable through power range}
Allows the user to set the minimum Transmit Power. The minimum Transmit Power is the lowest power setting that will be used when the remote modem commands a decrease of the Transmit Power.

MAXIMUM TX POWER

{variable through power range}
Allows the user to set the maximum Transmit Power. The maximum Transmit Power is the highest power setting that will be used when the remote modem commands an increase of the Transmit Power. It is the setting that will be used when the remote modem indicates that its receiver has lost lock and commands a change to the setting indicated in the 'REMOTE CL ACTION', Menu. That change will only be implemented if the 'REMOTE CL ACTION' Menu is set to "MAXIMUM".

TARGET Eb/No	Allows the user to set the desired E_b/N_o for the local receiver. This setting is compared against the receive E_b/N_o and commands to the remote modem to increase or decrease Transmit Power accordingly are sent.
TRACKING RATE	**{0.5 to 6.0}** Allows the user to set the rate at which the commands to increase or decrease Transmit Power are sent. Each command will result in a 0.5 dB increase or decrease in Transmit Power from the remote transmitter. The tracking rate is adjustable from 0.5 dB per minute to 6.0 dB per minute in 0.5 dB steps. The resulting 'command rate' is 1 command every minute to 1 command every five seconds.
LOCAL CL ACTION	**{HOLD, NOMINAL, MAXIMUM}** Allows the user to set the Transmit Power Setting to be used when the local modem receiver loses lock. The setting can be 'HOLD' (no action taken), 'NOMINAL' (the nominal Transmit Power Setting is used), and 'MAXIMUM' (the maximum Transmit Power Setting is used).
REMOTE CL ACTION	**{HOLD, NOMINAL, MAXIMUM}** Allows the user to set the Transmit Power Setting to be used when the remote modem receiver loses lock. The setting can be 'HOLD' (no action taken), 'NOMINAL' (the nominal Transmit Power Setting is used), and 'MAXIMUM' (the maximum Transmit Power Setting is used).
REMOTE AUPC (menu)	The 'REMOTE AUPC CONFIGURATION' Menu contains the remote configuration parameters for the AUPC Function.
AUPC ENABLE	**{OFF, ON}** Allows the user to enable or disable the AUPC Function of the remote modem. The remote AUPC Function is the response of the local modem to commands for an increase or decrease of the Transmit Power in 0.5 dB steps and the command to change to the setting indicated in the 'REMOTE CL ACTION' Menu of the remote modem upon receiver loss of lock.
LOOPBACK	Allows the user to enable or disable the Baseband Loopback Test Mode of the remote modem.
TX 2047 PATTERN	Allows the user to enable or disable the Transmit 2047 Pattern Test Mode of the remote modem.
REMOTE AUPC MONITOR	The 'REMOTE AUPC MONITOR' Menu contains the remote monitor status for the AUPC Function.

REMOTE 2047 BER: Reports the BER measurement of the receiver 2047 Pattern Test Mode of the remote modem. BER is reported from the $1x10^{-5}$ to $1x10^{-7}$ in tenth decade steps. If the pattern does not synchronize or is out of range, 'NO DATA' will be displayed.

4.3.6 Monitor Menu Options and Parameters

EVENTS Displays a history of events recorded in the event buffer. A maximum of 100 events may be stored in the buffer. Upon receipt of the 101st event, the first received event is automatically deleted, and so on, maintaining the maximum 100 events.

ERASE EVENTS.. PRESS CLEAR Allows the user to clear the contents of the Event Buffer by pressing <CLEAR> on the keypad..

INPUT LVL (dBm) Displays the estimated receive signal level as seen by the Demodulator.

EBNO (dB) Displays the estimated E_b/N_o as seen by the demodulator.

RAW BER Displays the estimated channel error rate (before decoding) measured by the modem.

CORRECTED BER The CBER display shows an estimated corrected bit error rate of the modem. Depending on the symbol rate the modem is running, the high-end performance scale of this display will vary (10 E^{-9}, 10^{-10} or 10^{-11}). At some symbol rates, a better than scale reading will appear as 0.0 x 10^{-00}. At other symbol rates, it will appear as E**. In either case, they both mean performance is better than the scale upper limit.

BIT ERRORS Displays the current error count from the Viterbi Decoder.

TOTAL PACKETS Displays the total number of Ethernet packets received from the satellite ***(Only visible when Ethernet is selected as the interface type).***

ERROR PACKETS Displays the number of erred Ethernet packets received from the satellite ***(Only visible when Ethernet is selected as the interface type).***.

PKT ERROR RATE Displays the satellite Packet Error Rate ***(Only visible when Ethernet is selected as the interface type).***.

PKT STATS RESET Allows the user to reset the Ethernet packet statistics by pressing <Enter> ***(Only visible when Ethernet is selected as the interface type).***.

LINK STATUS (menu) ***(the following sub-menus only display when Ethernet is selected as the interface type)***

NOTE

The status of the following ports may be one of the following:

Down:	***The link is down.***
Unresolved:	***Unable to agree on connection speed.***
10 Mbps Half:	***Connected at 10 Base-T Half Duplex.***
10 Mbps Full:	***Connected at 10 Base-T Full Duplex.***
100 Mbps Half:	***Connected at 100 Base-T Half Duplex.***
100 Mbps Full:	***Connected at 100 Base-T Full Duplex.***

PORT 1 STATUS **{See the note above}**
Displays the current status of LAN Port 1.

PORT 2 STATUS **{See the note above}**
Displays the current status of LAN Port 2.

PORT 3 STATUS **{See the note above}**
Displays the current status of LAN Port 3.

PORT 4 STATUS **{See the note above}**
Displays the current status of LAN Port 4.

WAN STATUS **{See the note above}**
Displays the current status of the WAN Port.

FREQ OFFSET (Hz) Displays the received carrier frequency offset as measured by the modem.

VOLTAGES (menu)

+1.5V RX SUPPLY Displays the measured voltage of the 1.5 Volt Rx power bus located inside the modem.

+1.5V TX SUPPLY Displays the measured voltage of the 1.5 Volt Tx power bus located inside the modem.

+3.3V SUPPLY Displays the measured voltage of the +3.3 Volt power bus located inside the modem.

+5V SUPPLY Displays the measured voltage of the +5 Volt power bus located inside the modem.

+12V SUPPLY Displays the measured voltage of the +12 Volt power bus located inside the modem.

+20V SUPPLY — Displays the measured voltage of the +20 Volt power bus located inside the modem.

-12V SUPPLY — Displays the measured voltage of the -12 Volt power bus located inside the modem.

LNB CURRENT — Displays the measured current of the LNB.

LNB VOLTAGE — Displays the measured voltage of the LNB.

BUC CURRENT — Displays the measured current of the BUC.

BUC VOLTAGE — Displays the measured voltage of the BUC.

RX BUFFER LEVEL — **{0 – 100%}**
Displays the status of the Doppler Buffer.

RX BUFFER RESET ((ENTER)) — Allows the user to re-center the Doppler Buffer when <ENTER> is pressed on the keypad.

4.3.7 Alarms Menu Options and Parameters

CAUTION!!

Masking alarms may cause undesirable modem performance.

CURRENT ALARMS (menu)

TX MAJOR (menu) — ***Status*** ***Edit Table***

FPGA CFG — **{Pass/Fail, Unmasked/Masked}**
Indicates a transmit FPGA configuration failure.

DSP CFG — **{Pass/Fail, Unmasked/Masked}**
Indicates a transmit DSP configuration failure.

SCT CLOCK PLL — **{Pass/Fail, Unmasked/Masked}**
Indicates that the Tx SCT Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration failure within the modem.

SYM CLOCK PLL — **{Pass/Fail, Unmasked/Masked}**
Indicates that the Tx Symbol Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a problem with the incoming clock to the modem (SCTE).

LB SYNTH PLL **{Pass/Fail, Unmasked/Masked}**
Indicates that the Tx L-Band Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.

IF SYNTH PLL **{Pass/Fail, Unmasked/Masked}**
Indicates that the Tx IF Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.

ETHERNET WAN Indicates that the interface card is faulted and will not pass data ***(displays only when the Ethernet Card is installed and the Ethernet Interface is selected).***

TX MINOR (menu)

TERR CLK ACT **{Pass/Fail, Unmasked/Masked}**
Indicates no Terrestrial Clock activity.

TERR DATA ACT **{Pass/Fail, Unmasked/Masked}**
Indicates no Tx Data activity.

TX TERR AIS **{Pass/Fail, Unmasked/Masked}**
Indicates that AIS has been detected in the Tx Data Stream.

DnI FRAME LOCK **{Pass/Fail, Unmasked/Masked}**
Indicates that the TX Oversample Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.

DnI M-FRAME LOCK **{Pass/Fail, Unmasked/Masked}**
Indicates that Tx Composite Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a problem with the incoming clock to the modem (SCTE).

TX DVB FRM LOCK **{Pass/Fail, Unmasked/Masked}**
Indicates that Tx input data stream framing does not match the user selected TX TERR FRAMING.

BUC CURRENT **{Pass/Fail, Unmasked/Masked}**
Indicates that current is either below or above the threshold limits of the LNB, as specified by the modem. Only active when voltage is enabled.

BUC VOLTAGE **{Pass/Fail, Unmasked/Masked}**
Indicates that the voltage is not functioning correctly when voltage is enabled.

RX MAJOR (menu)

FPGA CFG	**{Pass/Fail, Unmasked/Masked}** Indicates a receive FPGA hardware failure.
DSP CFG	**{Pass/Fail, Unmasked/Masked}** Indicates a receive DSP failure.
SIGNAL LOCK	**{Pass/Fail, Unmasked/Masked}** Indicates that the demod is unable to lock to a signal.
FRAME LOCK	**{Pass/Fail, Unmasked/Masked}** Indicates that the Framing Unit is unable to find the expected framing pattern.
MULTIFRAME LOCK	**{Pass/Fail, Unmasked/Masked}** This alarm will flash on during certain modem parameter changes. A solid indication points toward a problem with the incoming clock to the modem (SCTE).
LB SYNTH PLL	**{Pass/Fail, Unmasked/Masked}** Indicates that the Rx L-Band Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.
IF SYNTH PLL	**{Pass/Fail, Unmasked/Masked}** Indicates that the Rx IF Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.
ETHERNET WAN	Indicates that the interface card is faulted and will not pass data ***(displays only when the Ethernet Card is installed and the Ethernet Interface is selected).***

RX MINOR (menu)

BUFF UNDERFLOW	**{Pass/Fail, Unmasked/Masked}** Indicates that a Doppler Buffer underflow has occurred.
BUFF NEAR EMPTY	**{Pass/Fail, Unmasked/Masked}** Indicates that the Doppler Buffer is about to underflow.
BUFF NEAR FULL	**{Pass/Fail, Unmasked/Masked}** Indicates that the Doppler Buffer is about to overflow.
BUFF OVERFLOW	**{Pass/Fail, Unmasked/Masked}** Indicates that a Doppler Buffer overflow has occurred.
RX DATA ACTIVITY	**{Pass/Fail, Unmasked/Masked}** Indicates that there is no Rx Data activity.
SAT AIS	**{Pass/Fail, Unmasked/Masked}** Indicates that AIS has been detected in the receive satellite data stream.

DnI FRAME LOCK	**{Pass/Fail, Unmasked/Masked}** Indicates if drop/insert data is frame locked.
DnI M-FRAME LOCK	**{Pass/Fail, Unmasked/Masked}** Indicates if drop/insert data has multiframe lock.
INSERT CRC	**{Pass/Fail, Unmasked/Masked}** Indicates if the Circular Redundancy Check is passing in PCM-30C and PCM-31C Modes.
T1/E1 SIGNALING	**{Pass/Fail, Unmasked/Masked}** ***TBD***
IFEC LOCK	**{Pass/Fail, Unmasked/Masked}** Indicates that the Framing Unit is unable to find the expected framing pattern.
OFEC LOCK	**{Pass/Fail, Unmasked/Masked}** Indicates that the Reed-Solomon Decoder is not locked.
INTERLEAVER	**{Pass/Fail, Unmasked/Masked}** Indicates that the Reed Solomon Interleaver is not synchronized.
EBNO (dB)	**{Pass/Fail, Unmasked/Masked}** Indicates that the Eb/No is outside of limits.
IBS BER	**{Pass/Fail, Unmasked/Masked}** Indicates that there are more than one in 1000 bits in error in IBS Mode.
RX DVB FRM LOCK	**{Pass/Fail, Unmasked/Masked}** Indicates that the Rx Satellite Data Stream Framing is not DVB.
LNB CURRENT	**{Pass/Fail, Unmasked/Masked}** Indicates that current is either below or above the threshold limits of the BUC, as specified by the modem. Only active when voltage is enabled.
LNB VOLTAGE	**{Pass/Fail, Unmasked/Masked}** Indicates that voltage is not functioning correctly when voltage is enabled.

COMMON (menu)

TERR FPGA CFG **{Pass/Fail, Unmasked/Masked}**
Indicates an Interface Card FPGA configuration failure.

CODEC FPGA CFG **{Pass/Fail, Unmasked/Masked}**
Indicates Turbo Codec Card FPGA configuration failure.

CODEC DEV CFG **{Pass/Fail, Unmasked/Masked}**
Indicates Turbo Codec Card ASIC configuration failure.

VOLTAGES (menu)

+1.5V RX SUPPLY Displays the measured voltage of the 1.5 Volt Rx power bus located inside the modem.

+1.5V TX SUPPLY Displays the measured voltage of the 1.5 Volt Tx power bus located inside the modem.

+3.3V SUPPLY Displays the measured voltage of the +3.3 Volt power bus located inside the modem.

+5V SUPPLY Displays the measured voltage of the +5 Volt power bus located inside the modem.

+12V SUPPLY Displays the measured voltage of the +12 Volt power bus located inside the modem.

+20V SUPPLY Displays the measured voltage of the +20 Volt power bus located inside the modem.

EXT CLOCK ACT **{Pass/Fail, Unmasked/Masked}**
Indicates that the External Clock is not active.

EXT REF ACT **{Pass/Fail, Unmasked/Masked}**
Indicates no activity on the External Reference.

EXT REF LOCK **{Pass/Fail, Unmasked/Masked}**
Indicates that the External Reference PLL is not locked.

NOTE

Refer to Section 4.3.7, "CURRENT ALARMS (menu)" for an explanation of the Latched Alarms Menu Options and Parameters.

LATCHED ALARMS

The following alarms are latched in order to catch intermittent failures:

TX MAJOR (menu)

FPGA CFG

DSP CFG

SCT CLOCK PLL

SYM CLOCK PLL

LB SYNTH PLL

IF SYNTH PLL

TX MINOR (menu)

TERR CLK ACT

TERR DATA ACT

TX TERR AIS

DnI FRAME LOCK

DnI M-FRAME LOCK

DROP CRC

TX DVB FRM LOCK

BUC CURRENT

BUC VOLTAGE

RX MAJOR (menu)

FPGA CFG

DSP CFG

SIGNAL LOCK

FRAME LOCK

MULTIFRAME LOCK

LB SYNTH PLL

IF SYNTH PLL

RX MINOR (menu)

BUFF UNDERFLOW

BUFF NEAR EMPTY

BUFF NEAR FULL

BUFF OVERFLOW

RX DATA ACTIVITY

SAT AIS

DnI FRAME LOCK

DnI M-FRAME LOCK

INSERT CRC

T1/E1 SIGNALING

IFEC LOCK

OFEC LOCK

INTERLEAVER

RS UNCORR. WORD

EBNO

RX LEVEL

IBS BER

RX DVB FRM LOCK

LNB CURRENT

LNB VOLTAGE

COMMON (menu)

TERR FPGA CFG

CODEC FPGA CFG

CODEC DEV CFG

VOLTAGE (menu)

+1.5V RX SUPPLY

+1.5V TX SUPPLY

+3.3V SUPPLY

+5V SUPPLY

+12V SUPPLY

-12V SUPPLY

+20V SUPPLY

EXT CLOCK ACT

EXT REF ACT

EXT REF LOCK

CLEAR LATCHED ((ENTER)) Allows the user to reset the latched alarms by pressing <ENTER> on the keypad.

BACKWARD ALARMS Backward alarms are alarms that are fed back to or received from the other end of the satellite link. In IBS Mode (including Drop & Insert), Backward Alarm 1 is the only one used. It would be received if the distant end demod drops lock.

NOTE

For the following alarms: RCV = YES indicates a received backward alarm. FRC allows the user to force the alarm locally.

IDR BACKWARD 1	**{RCV = NO/YES, FRC = NO/YES}**
IDR BACKWARD 2	**{RCV = NO/YES, FRC = NO/YES}**
IDR BACKWARD 3	**{RCV = NO/YES, FRC = NO/YES}**
IDR BACKWARD 4	**{RCV = NO/YES, FRC = NO/YES}**
MAP SUMMARY	**{NONE, BK 1; BK 2; BK 1, 2; BK 3; BK 1, 3; BK 2, 3; BK 1, 2, 3; BK 4; BK 1,4; BK 2,4; BK 1, 2,4; BK 3,4; BK 1, 3,4; BK 2, 3,4; BK 1, 2, 3,4}** ***TBD***

NOTE

For the following alarms: XMIT = YES indicates that the modem is currently transmitting the corresponding backward alarm.

IDR BACKWARD 1	**{XMT = NO/YES}**
IDR BACKWARD 2	**{XMT = NO/YES}**
IDR BACKWARD 3	**{XMT = NO/YES}**
IDR BACKWARD 4	**{XMT = NO/YES}**
IBS PROMPT	**{Pass/Fail, FRC = No/Yes}** Indicates that a prompt maintenance alarm is generated. Only valid in IBS Framing.
IBS SERVICE	**{Pass/Fail, FRC = No/Yes}** Indicates that a service alarm is generated. Only valid in IBS Framing.

4.3.8 System Menu Options and Parameters

DATE (MM/DD/YY) Allows the user to enter the current date.

TIME {HH:MM:SS} Allows the user to enter the current time.

FRONT PANEL (menu)

BKLT LEVEL **{OFF, LOW, MED, HIGH}**
Allows the user to enter the backlight intensity level.

BKLT TIMEOUT **{00 - 99}**
Allows the user to enter the length of time (in seconds) of keyboard inactivity before the backlight shuts off. 00 = no timeout.

KEY CLICK **{ON, OFF}**
Allows the user to enable or disable the audible beep each time a key is pressed. Illegal entries will still cause a beep to be heard.

REMOTE CONTROL **{TERMINAL, COMPUTER}**
Allows the user to select between terminal RS-232 control and remote port M&C RS-232/-485 control.

TERMINAL (menu)

TYPE **{VT-100, WYSE50, VIEWPOINT}**
Allows the user to select the emulation type.

BAUD RATE **{150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600}**
Allows the user to enter the terminal baud rate.

REMOTE PORT (menu)

ADDRESS **{32 - 255}**
Allows the user to enter the Remote Port Multidrop Address.

BAUD RATE **{150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38,400}**
Allows the user to enter the Remote Port Baud Rate.

INTERFACE **{RS-232, RS-485}**
Allows the user to enter the Remote Port interface type.

TCP/IP (menu)

BOOT MODE	**{DEFAULT, NON-VOL, BOOTP}** **DEFAULT:** If no Ethernet Interface is to be used. No IP Address or mask changes will be allowed. **NON-VOL:** Stores and uses IP Mask and addresses as provided by the user. **BOOTP:** At boot time, use Bootp Protocol to get names, masks, and IP Addresses of the modem, router, and server.
BOOTp SERVER	**{128 – 257, default is 206}** Only used if Bootp is selected in Boot Mode. Should be consistent with the tag expected by the users Bootp Server.
MODEM HOST	The Host Modem for the network.
IP ADDR MASK	**{XXX.XXX.XXX.XXX}** The IP Address Mask of the local network. The mask is expressed in a hexadecimal format, and must be a valid TCP/IP Mask. This field should be set before changes are made to the Modem or Router Address.
MODEM IP ADDR	**{XXX.XXX.XXX.XXX}** The IP Address of the modem. This address should be consistent for the mask defined. This address is expressed in hexadecimal format. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.
SERVER IP ADDR	**{XXX.XXX.XXX.XXX}** The IP Address of the Boot Server and the address of the SNMP Trap Server when SNMP is active. If a server is used and there is no local router, this address must be consistent with the modem address. If a router has been specified, the address is presumed to be reachable via the router. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.
ROUTER IP ADDR	**{XXX.XXX.XXX.XXX}** The IP Address of the Local Network Router. If a router is present on the local network, this address must be consistent with the IP Mask and the subnet of the modem. If no router is present, then the address should be set to a foreign address. This address is expressed in hexadecimal format. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

MODEM EADDR

{001065010000}
Displays the Ethernet address of the device. Set at the factory and is a unique identifier for the Ethernet physical interface.

ETHER RATE

{10 MBPS/HD}
The data rate for the local Ethernet Interface.
10 Mbps/HD – for 10 Base-T in either half-duplex or full duplex.

SNMP (menu)

A description of OID organization is provided in the MIB portion of this manual (Appendix C).

SNMP VERSION

{V1 & V2, V3}
This selection controls the SNMP Version that will be used in messaging between the equipment and it's host.

When V1 & V2 is used, RD COMMUNITY and RDWR COMMUNITY are used to determine the authorization of an incoming message.

When V3 is used, three contexts are supported: ***public***, ***mib2***, and ***dev***. Context, Authentication and Privacy are a portion of each SNMPV3 message.

The ***public*** context will only allow the user to see the sysoid of the unit. This is the most restricted access possible and only allows the unit to be identified by a host SNMP Station.

The ***mib2*** context allows a user with appropriate authentication to access the mib2 OIDs and the SNMP OIDs. These are of interest primarily to network operators not controlling the satellite link.

The ***dev*** context allows a user with appropriate authentication to access the device control portion of the MIB. These OIDs are used to control the devices satellite link and operation.

TRAP VERSION

{V1, V2}
This controls the type of message format used when a message trap is generated by the equipment and bound for a SNMP Host. Messages will only be sent if the unit has been authorized to do so.

AUTHORIZATION

{TRAPS OFF, TRAPS ON}
This controls the type of message format used when a message trap is generated by the equipment and bound for a SNMP host. Messages will only be sent if the unit has been authorized to do so.

RD COMMUNITY **{16 characters of name}**
This menu is only displayed when SNMP VERSION is set to V1 & V2.

This is the community that a host must be acting within when an OID variable is requested by a V1/V2 SNMP message.

RDWR COMMUNITY **{16 characters of name}**
This menu is only displayed when SNMP VERSION is set to V1 & V2.

This is the community that a host must be acting within when an OID variable is being changed by a V1/V2 SNMP message.

FTP (menu)

USER ID Allows the user to enter the user identification for access to an FTP session.

PASSWORD Allows the user to enter the password for access to an FTP session.

HW/FW CONFIG (menu)

FIRMWARE REV Displays the installed firmware revision.

M&C REV Displays the installed Monitor and Control revision.

MAIN BOARD (menu)

NOTE

Only the appropriate of the VCO adjustment screens listed below will be displayed. These are protected fields, to prohibit accidental changes. To edit the field, the user must depress all four of the direction arrow keys simultaneously.

INT VCO ADJUST **{0% - 100**%}
Allows the user to adjust the internal frequency reference for calibration. **Only displayed of the system reference clock is INTERNAL.**

HI STAB VCO ADJUST **{0% - 100**%}
Allows the user to adjust the internal frequency reference for calibration. **Only displayed if the system reference clock source is HI STABILITY.**

LARGEST HB GAP Used for factory test only.

IF BOARD (menu) Indicates the Radyne ComStream part number for the IF Board Assembly.

AGC/CTRL/VALUE **{0% - 100**%}
Allows the user to adjust the internal frequency reference for calibration. **Only displayed if the system reference clock source is HI STABILITY.**

I OFFSET Used for factory test only.

Q OFFSET Used for factory test only.

IF RX LVL OFFSET Used for factory test only.

LB RX LVL OFFSET Used for factory test only.

POWER SOURCE Used for factory test only.

TERR INTFC BRD Indicates the Radyne ComStream part number for the Terrestrial Interface Assembly.

CODEC BOARD (menu) Indicates the Radyne ComStream part number for the Codec Board.

TPC FPGA IMAGE Used for factory test only.

TPC CODEC IMAGE Used for factory test only.

FEATURES (menu)

5012.2840.2417 **{____.____.____}**
Allows the user to install purchased feature upgrades (see Appendix A).
Whether or not the feature has been upgraded, or if the feature requires a hardware upgrade (contact the Radyne ComStream Customer Service Department).

UPGRADE LIST (menu) The following menu screens display the following:

511 KBPS, 1 MBPS, 5 MBPS, 10 MBPS, 20 MBPS (The highest option installed will hide the lower rates.)

RXIF

RXLBAND

TXIF

TXLBAND

ENH ASYNC

IDR

SEQ

RS

RS CUSTOM

IBS

D&I

AUPC

8PSK

16QAM

TURBO 5 MBPS, TURBO 20 MBPS
(The highest option installed will hide the lower rates.)

OM73 SCRAMBLING

DVB

EDMAC

4.3.9 Test Menu Options and Parameters

TX TEST PATTERN	**{NONE, 2047, 2^15-1, 2^23-1}** Allows the user to enable the tests listed above.
RX TEST PATTERN	**{NONE, 2047, 2^15-1, 2^23-1}** Allows the user to enable the tests listed above.
PATTERN SYNC	**{YES, NO}** Yes indicates that the RX Test Pattern is in sync.
TST PAT ERR CNT	**{NO SYNC, nnnn x 10^{n}}** Displays the number of errors detected by the test pattern checker.
TST PATT BER	**{NO SYNC, nnnn x 10^{-n}}** Displays the measured BER for the test pattern.
RESTART TST PAT ((ENTER))	Allows the user to restart the test by pressing <ENTER> on the keypad.

LOOPBACK

{IF, TERR TX/RX, BASEBAND TX/RX, NONE, TERR RX, BASEBAND RX, TERR TX, BASEBAND TX, IFEC TX}
Terrestrial Loopback is performed at the Terrestrial Interface

IF: IF loopback loops the IF output of the Modulator to the IF input of the Demodulator. If using 8PSK or 16QAM Modulation, the output power must be above -15 dB.

TERR TX/RX: Enables both. Baseband loopback is performed at interface between the Baseband Processor Card and the Modem Card. This ensures Framer/Deframer integrity.

BASEBAND TX/RX: Enables both Baseband Tx and Baseband Rx.

NONE**:** No loopback performed.

TERR RX: (Distant Loop) Sends received satellite data to the Modulator for transmission to the distant end.

BASEBAND RX: Sends Rx data from the Modem Card to the Tx data input to the Modem Card.

TERR TX: Sends Tx Terrestrial Data to Rx data out.

BASEBAND TX: Sends Tx data to the receive input to the BB Card.

CARRIER TYPE

{NORMAL, CW, DUAL, OFFSET, POS FIR, NEG FIR}
Allows the user to set the type of carrier.

NORMAL: Causes the Modulator to output normal modulation.

CW: Causes the Modulator to output a pure carrier.

DUAL: Causes a double sideband output.

OFFSET: Causes a single sideband output.

POS FIR: For manufacturer’s use only.

NEG FIR: For manufacturer’s use only.

4.4 DMD20 Strap Codes

The Strap Code is a quick set key that sets many of the modem parameters. For quick setup of the DMD20, Strap Codes are very helpful. When a Strap Code is entered, the modem is automatically configured for the code's corresponding data rate, overhead, code rate, framing, scrambler type and modulation. An example of how to set a strap code follows:

Example: At the Front Panel <Modulator> Menu, depress '↓', then move '→' to the 'Strap Code' Submenu and enter #16. The DMD20 will be automatically configured to the parameters shown below in the highlighted row 'Strap Code 16'.

Use the Strap Code Guide (Table 4-4) for available strap codes.

Table 4-4. DMD20 Strap Codes
Dis = Disable

Strap Code (Decimal)	Data Rate (Kbps)	Overhead	Code Rate	Type	Framing Type	Scrambler Type	Drop and Insert	Reed-Solomon	Modulation	Mode
1	64	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
2	128	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
3	256	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
5	384	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
6	512	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
9	768	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
4	1536	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
10	1920	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
8	2048	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
12	2048	1*	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
16	1544	96K	3/4	VIT	IDR	V.35 (IESS)	Dis	Dis	QPSK	IDR
32	2048	96K	3/4	VIT	IDR	V.35 (IESS)	Dis	Dis	QPSK	IDR
64	6312	96K	3/4	VIT	IDR	V.35 (IESS)	Dis	Dis	QPSK	IDR
128	8448	96K	3/4	VIT	IDR	V.35 (IESS)	Dis	Dis	QPSK	IDR
24	56	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
33	56	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
34	64	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
36	64	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
40	128	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
48	128	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
65	256	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
66	256	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT

68	320	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
72	320	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
80	384	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
96	384	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
129	512	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
130	512	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
132	768	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
136	768	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
144	896	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
44	896	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
7	1344	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
11	1344	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
13	1536	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
14	1536	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
19	1544	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
21	1544	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
22	1920	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
25	1920	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
26	2048	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
28	2048	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
37	2368	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
38	2368	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
41	48	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
160	1544	965/1024	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
52	1920	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
69	6312	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
70	8448	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
73	3152	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
74	3152	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
76	3264	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
81	3264	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
88	512	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
97	1024	1	1/2	VIT	CNT	V.35 (IESS)	Dis	Dis	QPSK	CNT
98	1024	1	3/4	VIT	CNT	V.35 (IESS)	Dis	Dis	QPSK	CNT
112	64	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
131	128	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
133	256	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS

134	192	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
137	192	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
138	320	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
140	320	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
145	384	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
100	448	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
146	448	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
104	576	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
148	576	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
152	640	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
161	640	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
162	704	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
164	704	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
168	768	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
193	832	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
194	832	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
196	896	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
208	896	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
224	960	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
15	960	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
23	1024	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
27	1024	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
29	1536	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
30	1088	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
39	1088	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
43	1152	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
46	1152	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
51	1216	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
53	1216	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
54	1280	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
57	1280	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
58	1344	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
67	1408	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
71	1408	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
75	1472	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
77	1472	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
78	1600	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS

83	1600	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
85	1664	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
86	1664	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
89	1728	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
90	1728	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
92	1792	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
99	1792	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
101	2048	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
102	1856	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
105	1856	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
106	2048	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
120	1544	965/1024	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
135	1984	16/15	1/2	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
139	1984	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
45	3088	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
141	3088	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
176	4000	1	1/2	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
116	4000	1	3/4	VIT	NONE	V.35 (IESS)	Dis	Dis	QPSK	CNT
60	1344	16/15	3/4	VIT	IBS	IBS	Dis	Dis	QPSK	IBS
200	128	NONE	1/2	VIT	NONE	V.35(IESS)	Dis	Dis	QPSK	CNT

4.5 Sample DMD20 Applications

The following section provides brief application notes for operating the DMD20 and explains by example how to configure the DMD20 for some of the most popular configurations.

The following information illustrates the allowable combinations for Mode and Data Rate for the DMD20.

Allowable Combinations: Mode/Rate/Framing.

IDR:

8.448 Mbps	3/4, 7/8 Rate FEC
6.312 Mbps	1/2, 3/4, 7/8 Rate FEC
2.048 Mbps	1/2, 3/4, 7/8 Rate FEC
1.544 Mbps or Below	1/2, 3/4, 7/8 Rate FEC

IBS:

2.048 Mbps or below	1/2, 3/4, 7/8 Rate

Closed Network:

8.448:	96 Kb Framing or No Framing, 3/4, 7/8 Rate FEC
6.312:	96 Kb Framing or No Framing, 1/2, 3/4, 7/8 Rate FEC
2.048:	96 Kb Framing or 1/15 Framing or No Framing, 1/2, 3/4, 7/8 Rate FEC
1.544:	96 Kb Framing or 1/15 Framing or No Framing, 1/2, 3/4, 7/8 Rate FEC
Any Rate 2.048 & lower:	1/15 Framing or No Framing, 1/2, 3/4, 7/8 Rate FEC

4.5.1 Operational Case Examples

NOTE

For best results always begin setup by setting the data rate to 512 Kbps. This data rate is applicable for all modes and as such provides a convenient launch point for setting up the modem. Any mode of operation can be entered from this starting point.

Case 1: IDR 8.448 Mbps, 3/4 Rate Viterbi

Starting with the Data Rate = 512 Kbps

Modulator:

Method 1 -

Set mode to IDR
Under Mod Data Menu:
- Set code rate to 3/4 VIT
- Set data rate for 8448000

Under Interface Menu:
- Set Interface type
- Set Tx clock selection

Under Mod IF Menu:
- Set desired Tx frequency and power level
- Turn IF ON

Method 2 -

Set Mod strap code to: 128
Under Interface Menu:
- Set Interface type
- Set Tx clock selection

Under Mod IF Menu:
- Set desired Tx frequency and power level
- Turn IF on

Demodulator:

Method 1 -

Set mode to IDR
Under Demod IF Menu: Set desired Rx frequency
Under Demod data Menu:
- Set code rate to 3/4 VIT
- Set data rate for 8448000

Under Interface Menu:
- Set Interface type
- Set Buff clock selection
- Set Buffer Size

Method 2 -

Set Demod strap code to 128
Under Demod IF Menu, set desired Rx frequency
Under Interface Menu:
- Set Interface type
- Set Buff clock selection
- Set Buffer Size

Case 2: IBS 1.544 Mbps, 3/4 Rate Viterbi

Starting with the Data Rate – 512 Kbps

Modulator:

Method 1 - Set Framing to 1/15
Set mode to IBS
Under Mod Data Menu:
- Set code rate to 3/4 VIT
- Set data rate for 1544000

Under Interface Menu:
- Set Interface type
- Set Tx clock selection

Under Mod IF Menu: Set desired Tx frequency and power level
Turn IF ON

Method 2 -

Set Mod strap code to: 120
Under Interface Menu:
- Set Interface type
- Set Tx clock selection

Under Mod IF Menu: Set desired Tx frequency and power level
Turn IF on

Demodulator:

Method 1 - Set Framing to 1/15:
Set mode to IBS:
Under Demod IF Menu: Set desired Rx frequency
Under Demod Data Menu:
Set code rate to 3/4 VIT
Set data rate for 1544000
Under Interface Menu:
Set Interface type
Set Buff clock selection
Set Buffer Size

Method 2 -
Set Demod strap code to: 120
Under Demod IF Menu: Set desired Rx frequency
Under Interface Menu:
Set Interface type
Set Buff clock selection
Set Buffer Size

Case 3: Closed Network, 3/4 Rate Viterbi, IBS Overhead

Starting with the Data Rate = 512 Kbps

Modulator:

Method 1 -
Set mode to IDR:
Under Mod Data Menu:
Set code rate to 3/4 VIT
Set Framing for 1/15
Under Interface Menu:
Set Interface type
Set Tx clock selection
Under Mod IF Menu: Set desired Tx frequency and power level
Turn IF ON

Method 2 -
Set Mod strap code to: 101
Under Interface Menu:
Set Interface type
Set Tx clock selection

Under Mod IF Menu: Set desired Tx frequency and power level
Turn IF on

Demodulator:

Method 1 -

Set mode to: Closed Net
Under Demod IF Menu: Set desired Rx frequency
Under Demod data Menu:
- Set code rate to 3/4 VIT
- Set Framing for 1/15

Under Interface Menu:
- Set Interface type
- Set Buff clock selection
- Set Buffer Size

Method 2 -

Set Demod strap code to: 101
Under Demod IF Menu: Set desired Rx frequency
Under Interface Menu:
- Set Interface type
- Set Buff clock selection
- Set Buffer Size

Case 4: Loop Timing Example

Method 1 -

Set mode to IBS
Under Interface Menu:
- Under Tx Setup Menu:
  - Set INTF to RS-422
  - Set SCT Source to SCR
  - Set Tx Clock to SCTE

Method 2 -

Set mode to Closed Net
Under Interface Menu:
- Under Tx Setup Menu:
  - Set INTF to RS-422
  - Set SCT Source to SCR
  - Set Tx Clock to SCTE

4.6 Configuring the DMD20 for Drop and Insert

Several dependencies exist when configuring the modem for Drop and Insert (D&I). The following paragraphs explain these dependencies and provide the user with the information required to ensure smooth transition into D&I and to minimize the potential impact of these dependencies.

4.6.1 Data Rate

Data Rate affects the Drop and Insert function in the following ways:

- It determines the number of Satellite Channels that will be displayed in the Edit Maps.
- It contributes to the Operational Mode selection process. Trying to change the Operational Mode to D&I when a data rate is not set to a valid D&I rate will result in the error message 'INVALID DATA RATE,' and the mode change will not be allowed.
- It contributes to the Terrestrial Framing Mode selection process. Trying to select a T1-type Drop Mode such as T1-ESF with the mod data rate set to 1920000 bps (a valid E1 D&I rate but not a valid T1 rate) will result in the error message 'INVALID DROP MODE' and the selection will not be allowed. Trying to select a T1 type Insert Mode such as T1-D4 with the demod data rate set to 1920000 bps will result in the error message INVALID INSERT MODE and the selection will not be allowed.
- Once D&I Mode has been selected, trying to change the data rate to something other than another valid D&I data rate will result in the error message 'RATE OUT OF BOUNDS' and the change will not be allowed.
- Once D&I Mode has been selected with a T1 Terrestrial Framing Mode, attempting to change the data rate to 1920000 will result in the error message 'RATE OUT OF BOUNDS' and the change will not be allowed.

Therefore, the data rate should be entered as the first step in configuring the modem for D&I. The Mod Data Rate should be set according to the number of timeslots to be dropped and the Demod Data Rate should be set according to the number of timeslots to be inserted. The following table gives the allowable D&I data rates based on the number of slots (n) to be dropped or inserted.

n = 1, data rate = 64000
n = 2, data rate = 128000
n = 3, data rate = 192000
n = 4, data rate = 256000
n = 5, data rate = 320000
n = 6, data rate = 384000
n = 8, data rate = 512000
n = 10, data rate = 640000
n = 12, data rate = 768000
n = 15, data rate = 960000
n = 16, data rate = 1024000
n = 20, data rate = 1280000
n = 24, data rate = 1536000
n = 30, data rate = 1920000 (valid with E1 Interface only)

4.6.2 Operational Network Specification

The Network Specification of the Modem often determines which additional menus and displays are available for use by the operator. The D&I Mode-specific menus will not be displayed unless the Network Spec. of the modem is set to D&I. Therefore, the second step in configuring the modem should be to set the Network Spec. to D&I. At this point, the D&I specific menus in the Interface section will become available and will remain available until the Network Spec. of the modem is changed to something other than D&I. When the Network Spec. is changed to something other than D&I, the D&I specific menus will automatically disappear.

4.6.3 Terrestrial Framing - Drop Mode/Insert Mode

The Drop Mode Selection and the Insert Mode Selection identify the Terrestrial Data-Framing Format. As previously mentioned, their selection is influenced by the Modulator and Demodulator Data Rates, and trying to select a T1 Type Framing Format with a data rate of 1920000 bps will result in an error message. In turn, the selection of the terrestrial framing formats influences the satellite channel to terrestrial timeslot mappings in the following manner:

> The selection of T1-D4, T1-ESF, or SLC-96 type terrestrial framing format limits the terrestrial timeslots to values from 1 - 24.
>
> The selection of PCM-30 or PCM-30C type terrestrial framing limits the terrestrial timeslots to values from 1 - 15, 17 - 31. In these modes, terrestrial timeslot 16 is reserved for ABCD signaling and may not be dropped or inserted.
>
> The selection of PCM-31 or PCM-31C type terrestrial framing limits the terrestrial timeslots to values from 1 - 31. Therefore, the terrestrial framing format should be identified via the Drop Mode and Insert Mode entries prior to editing the Drop or Insert satellite channel to terrestrial timeslot maps.

4.6.3.1 Insert Terrestrial Frame Source

The Insert Terrestrial Frame Source selection tells the Modem from where the Insert Terrestrial Frame is coming.

External: Indicates that the terrestrial frame is to be input via the Insert Data In Port.

Internal: Indicates that the modem needs to generate the terrestrial frame and that all non-inserted timeslots need to be filled with the appropriate idle code based upon the terrestrial framing (T1 or E1).

The selection of the Insert Terrestrial Frame Source also influences the Buffer Clock selection in the following manner:

When the Insert Terrestrial Frame Source selection is set to External, the received satellite data will be clocked out of the Doppler Buffer based upon the clock recovered from the insert data input. Therefore, the Buffer Clock selection will automatically be set to External and cannot be modified. Attempts to select a different buffer clock will result in the error message INVALID BUFFER CLOCK and the selection will not be allowed.

When the Insert Terrestrial Frame Source selection is set to Internal, the operator needs to specify how data should be clocked out of the Doppler Buffer. In this case, the operator will be able to select SCTE, SCT, RX SAT, or EXT EXC as the source for the Buffer Clock. Therefore, the Insert Terrestrial Frame Source selection should be made prior to attempting to change the Buffer Clock. In most instances, the Insert Terrestrial Frame Source selection will be set to External and the Buffer Clock will automatically be set to External.

4.6.4 D&I Sample Configurations and D&I Clock Setup Options

The following are several examples of how to configure the modem for D&I. Also, refer to Figures 3-14 through 3-17 for the D&I Clocking Setup Options Available.

Example 1: Drop 512 Kbps from a T1 trunk, 3/4 Rate Viterbi
Insert 512 Kbps into a T1 trunk, 3/4 Rate Viterbi
Drop 512 Kbps from a T1 trunk, 3/4 Rate Viterbi

Under Modulator:
- Under Mod Data:
  - Set Data Rate = 512000
  - Set Conv Enc = 3/4 Rate VIT

Under Modulator:
- Set Network Spec. = Drop & Insert

Under Interface:
- Under TX Setup:
  - Set Tx Type according to your hardware configuration (example: G703BT1B8ZS)
  - Set Tx Clock = SCTE
  - Under Tx D&I:
    - Set Drop Mode = T1-D4
    - Use SATCh TS edit capability to define desired mapping of Satellite Channels to drop Terrestrial Slots
    - Use Map Copy to copy Tx Edit to Tx Active

Under Modulator:
- Under Mod IF:
  - Set Frequency to desired value
  - Turn IF Output Power On

Under Demodulator:
- Under Demod Data:
  - Set Data Rate = 512000
  - Set Conv Enc = 3/4 Rate VIT

Under Demodulator:
- Set Network Spec. = Drop & Insert

Under Interface:
- Under RX Setup:
  - Set Rx Type according to your hardware configuration
  - Set Buff Size to desired depth
- Under Rx D&I:
  - Set Insert Mode = T1-D4
  - Set T1 E1 Frm Src = External
  - Use SATCh TS edit capability to define proper mapping of Satellite Channels to insert Terrestrial Slots
  - Use Map Copy to copy Rx Edit to Rx Active
- Under Demodulator:
  - Under Demod IF:
    - Set Frequency to desired value

Example 2: Multidestinational Remote Site Programming
Drop 512 Kbps from a T1 trunk, 3/4 Rate Viterbi.
Extract 512 Kbps from a 1536 Kbps carrier and insert into a T1 trunk, 3/4 Rate Viterbi.

Drop 512 Kbps from a T1 trunk, 3/4 Rate Viterbi
Configuration setup is exactly as previously shown in Example 1.

Extract 512 Kbps from a 1536 Kbps carrier and insert into a T1 trunk, 3/4 Rate Viterbi

Under Demodulator:
- Under Demod Data:
  - Set Data Rate = 1536000
  - Set Conv Enc = 3/4 Rate VIT

Under Demodulator:
- Set Network Spec. = Drop & Insert

Under Interface:
- Under RX Setup:
  - Set Rx Type according to your hardware configuration
  - Set Buff Size to desired depth
- Under Rx D&I:
  - Set Insert Mode = T1-D4
  - Set T1 E1 Frm Src = External
    - Use SATCh TS edit capability to define proper mapping of Satellite Channels to insert Terrestrial Slots
    - For Satellite Channels that are not to be inserted, enter “NI” (No Insert) for the Terrestrial Slot
    - Use Map Copy to copy Rx Edit to Rx Active

Under Demodulator:
- Under Demod IF:
  - Set Frequency to desired value.

Figures 4-3 through 4-6 illustrate D&I Clock Setup Options

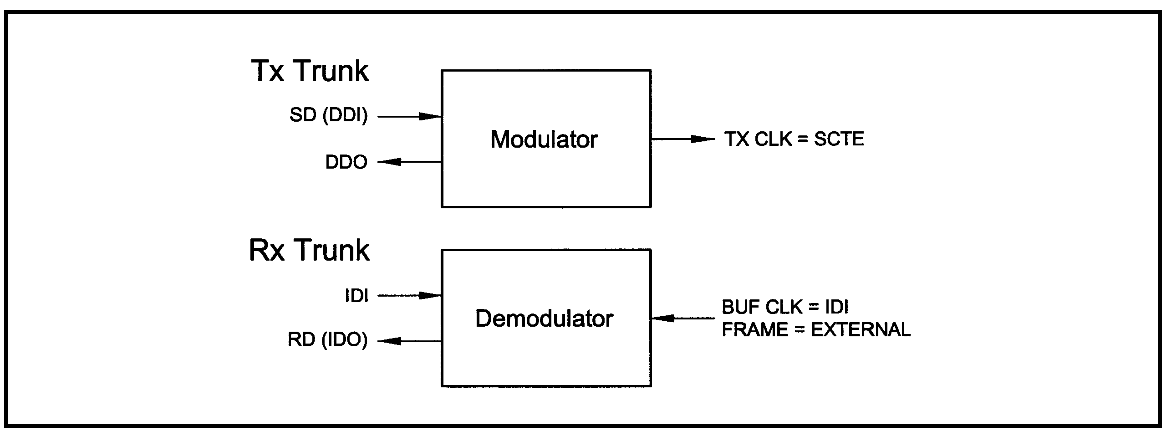


Figure 4-3. Transmit Trunk and Receive Trunk

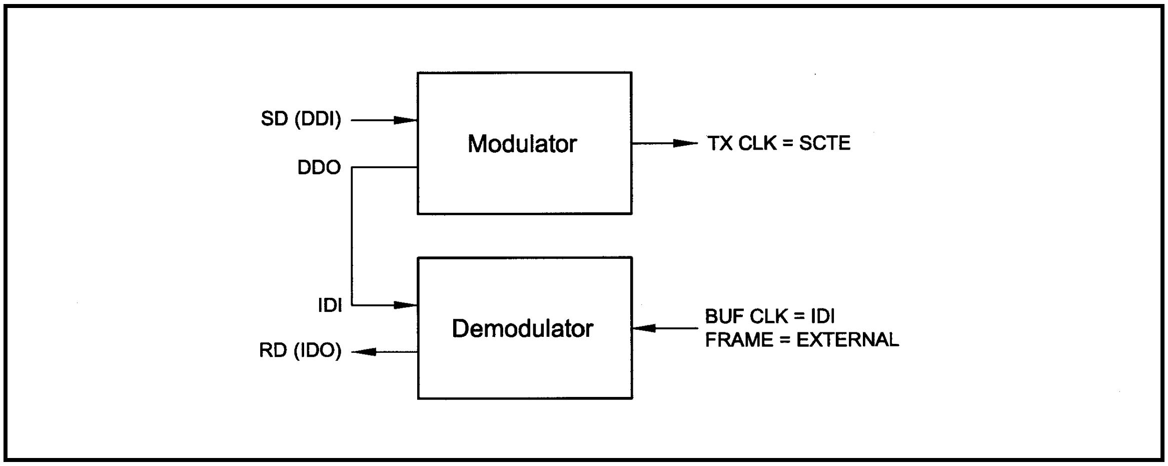


Figure 4-4. Single Trunk

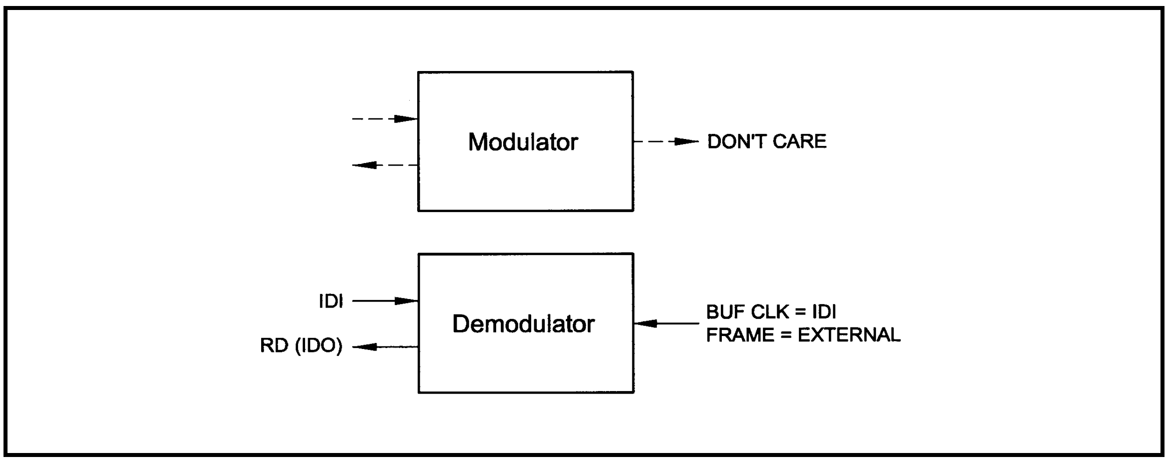


Figure 4-5. Rx Only With Trunk

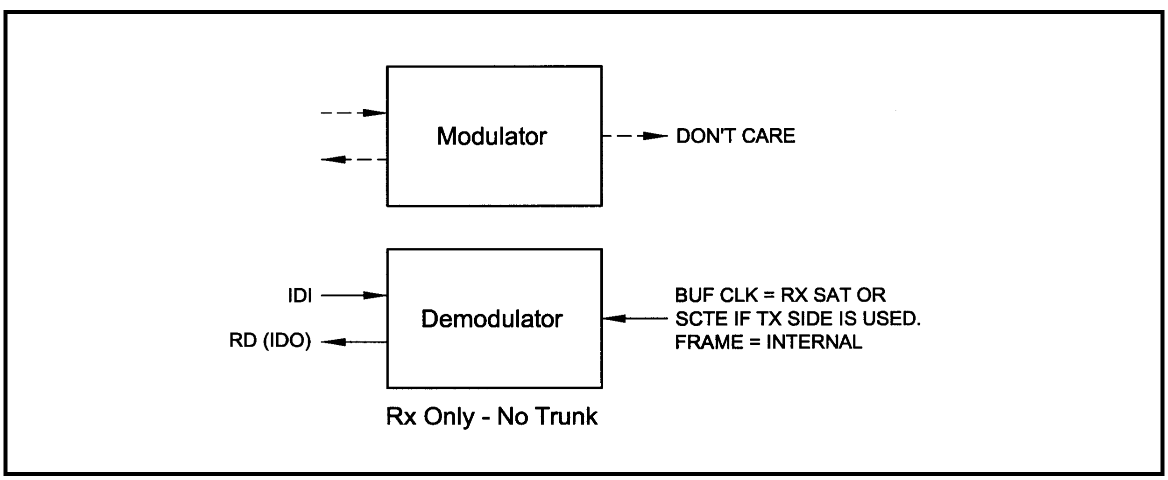


Figure 4-6. Rx Only No Trunk

4.7 D&I Maps and Map Editing

The Drop and Insert multiplexer is programmed by loading it with a transmit and receive map. Maps always contain 30 entries, although, only the first “n” entries are relevant (see Table 4-5).

The DMD20 includes provisions to copy, change, and store the D&I transmit and receive maps directly from the Front Panel or via the remote M&C link. These maps are tables that are used to define and configure the D&I functions. Each map contains up to 30 entries, which are enough to define the channel assignments for a T1 (24 channel) or E1 (30 channel) frame structure. Maps that are created are stored in non-volatile battery backed-up memory within the modem and remain unchanged after a power-down.

Table 4-5. D&I Multiplexer Map Locations Used

Data Rate (Kbps)	Map Locations Used (n = 1, 2,4,8,16,24,30)
64	1
128	1-2
256	1-4
384	1-6
512	1-8
768	1-12
1024	1-16
1536	1-24
1920	1-30

It is important to understand that each map contains up to 30 usable entries. In many cases a smaller number of entries will be relevant, except when the data rate is 1920 Kbps, in which case 30 entries will used by the multiplexer. To determine the number of relevant entries, divide the data rate by 64 Kbps.

For example:

At 384 Kbps, 384/64 = 6 entries.

Therefore, in this case only the first six entries of the map would be relevant.

The Modem is equipped with eight permanently stored default maps, which are designated ROM 1 through ROM 8. The user may also define, modify, and save an additional eight maps which are designated USER 1 through USER 8.

NOTE

ROM maps are read-only and may not be modified (refer to Table 4-6).

Table 4-6. D&I ROM Maps

ROM Map	T1/E1 Time Slot																													
#	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
3	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
4	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
5	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6
6	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Since the D&I Functions are separate and distinct, two separate maps must be configured at the start of the D&I Multiplexer Operation. These are the Tx (transmit) Active Map for Drop Mapping and the Rx (receive) Active Map for Insert Mapping. The number of entries in each map is determined by the data rates selected. Each map entry consists of an IBS Time Slot assignment and the Terrestrial (T1 or E1) Channel Number to which it is assigned. Drop Mapping and Insert Mapping are completely separate and independent.

The map that is actually used for the Drop Function is the Tx Active Map; the map that is actually used for the Insert function is the Rx Active Map. Two additional maps exist: the Tx Edit Map and the Rx Edit Map. The Edit Maps are the buffer areas that are used when creating or modifying a map through the modem's LCD; when editing is complete, the appropriate map should be copied to the Active Map.

Any map may be copied to any other map with the exception of the ROM maps. These maps may only be the source of the data used to create a User, Edit, or Active Map.

Maps can be created in the map editor and stored as "User Maps". New "Active Maps" can be downloaded during Modem Operation but this will result in a temporary disruption of service on the terrestrial line or the Satellite transmission.

The following paragraphs give examples of typical configurations that could use the ROM Maps as templates. The ROM Map used would have to be first copied to the appropriate Active Transmit (Drop) and/or Active Receive (Insert) Map(s) before it could be used. To use a modification of a ROM Map, the ROM Map must first be copied to the appropriate Edit Map, then modified, and then copied to the appropriate Active Map.

NOTE

The mapping of channels to time slots is arbitrary; it is not necessary to map CH1 to TS1, CH2 to TS2, etc. The channel to the time slot mapping may be in any order within the constraints of the number of available channels.

For example, ROM Map 1 could be used as the template for as Active Transmit (Drop) Map for a modulator configured for 64 Kbps operation. Only the first time slot of the T1 or E1 frame would be dropped into the modulator transmit path. The Drop Multiplexer would know to look only at the first entry in the Active Transmit table and would ignore the other 29 entries. If the map contained an “8” in its first entry, the eighth channel of the T1/E1 frame would be sent to the modulator.

ROM Map 2 could be used as the template for an Active Receive (Insert) Map for a demodulator configured for 128 Kbps operation. The demodulated data in the receive path would be inserted into the first two time slots of the T1 or E1 frame. The Insert Multiplexer would know to look only at the first two entries in the Active Receive table and would ignore the other 28 entries. If the first two entries were modified to contain a 27 and 28, the data would be inserted into the 27th and 28th time slots of the E1 frame.

ROM Map 3 could be used as the template for an Active Transmit (Drop) Map with a modulator and/or demodulator configured for 256 Kbps operation. The T1 or E1 Data in the transmit path or the demodulated data in the receive path would be dropped from and/or inserted into the first four time slots of the T1 or E1 frame. The Multiplexer would know to look only at the first four entries in the Active map(s) and would ignore the other 26 entries.

ROM Map 4 could be used as the template for an Active Transmit (Drop) or Active Receive (Insert) Map with a modulator and/or demodulator configured for 384 Kbps operation. The T1 or E1 Data in the transmit path or the demodulated data in the receive path would be dropped from and/or inserted into the first six time slots of the T1 or E1 frame. The Insert Multiplexer would know to look only at the first six entries in the Active map(s) and would ignore the other 24 entries. To Drop the last six channels of a T1 frame into a modulator transmit path, the first six entries of the Active Transmit map should contain 19, 20, 21, 22, 23, and 24.

ROM Map 5 could be used as the template for an Active Transmit (Drop) and/or Active Receive (Insert) Map with a modulator and/or demodulator configured for 512 Kbps operation. The T1 or E1 Data in the transmit path or the demodulated data in the receive path would be dropped from and or inserted into the first eight time slots of the T1 or E1 frame. The Multiplexer would know to look only at the first eight entries in the Active map(s) and would ignore the other 22 entries. To insert data received from a demodulator into channels 17 through 24 of an E1 frame, the first eight entries of the Active Receive map should contain 17, 18, 19, 20, 21, 22, 23, and 24.

ROM Map 6 could be used as the template for an Active Transmit (Drop) and/or Active Receive (Insert) Map with a modulator and/or demodulator configured for 768 Kbps operation. The T1 or E1 Data in the transmit path or the demodulated data in the receive path would be dropped from and or inserted into the first 12 time slots of the T1 or E1 frame. The Multiplexer would know to look only at the first 12 entries in the Active map(s) and would ignore the other 18 entries. To insert data received from a demodulator into channels 3 through 14 of an E1 frame, the first 12 entries of the Active Receive map should contain 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14.

ROM Map 7 could be used as the template for an Active Transmit (Drop) and/or Active Receive (Insert) Map with a modulator and/or demodulator configured for 1920 Kbps operation. This would be used with E1 frames where time slot 16 is not used for the multiframe alignment signal and therefore channels 1 through 30 are mapped directly with time slots 1 through 30.

ROM Map 7 could also be used as the template for an Active Transmit (Drop) and/or Active Receive (Insert) Map with a modulator and/or demodulator configured for 1024 Kbps operation. This would be used with T1 or E1 frames where channels 1 through 16 are mapped into time slots 1 through 16 (in any order). Map slots 17 through 30 would be ignored.

ROM Map 7 could also be used as the template for an Active Transmit (Drop) and/or Active Receive (Insert) Map with a modulator and/or demodulator configured for 1536 Kbps operation. This would be used with T1 frames where channels 1 through 24 are mapped into time slots 1 through 24 (in any order). Map slots 25 through 30 would be ignored.

ROM Map 8 could also be used as the template for an Active Transmit (Drop) and/or Active Receive (Insert) Map with a modulator and/or demodulator configured for 1920 Kbps operation. However, this mapping would be relevant with E1 frames where time slot 16 is used for the multiframe alignment signal and therefore channels 1 through 30 are mapped to time slots 1 through 16 and 17 through 31.

4.8 Configuring the DMD20 to use the Ethernet Data Interface (Optional)

When the optional Ethernet Data Interface Card is installed in the DMD20, all of the Ethernet related menus become available and can be used to control the interface as follows:

Under the Interface Menu:
- Under the Tx Setup Menu:
  - Set the Terrestrial Interface to Ethernet.
  - Set the Ethernet Flow Control as desired (refer to Section 4.8.1 for details).
  - Set the Ethernet Daisy Chain as desired (refer to Section 4.8.2 for details).
  - Set the Tx Clock to SCTE.
  - Set the Tx Clock Polarity to Normal.
  - Under Drop & Insert:
    - Set the Drop Mode to None.

Under the Interface Menu:
- Under the Rx Setup Menu:
  - Set the Terrestrial Interface to Ethernet.
  - Set the Buffer Size to Zero.
  - Set the Buffer Clock to Rx Sat.
  - Set the Buffer Clock Polarity to Normal.
  - Under Drop & Insert:
    - Set the Insert Mode to None.

4.8.1 Ethernet Flow Control

When disabled, if a packet is received for transmission and no packet buffer space is available, the incoming packet is discarded.

When enabled, flow control is used to throttle the transmission station in order to avoid overrunning the transmit buffers, which would in turn cause packets to be dropped. The throttling mechanism used depends upon the interface and whether it is half-duplex or full duplex and is described in the following sub-paragraphs:

4.8.1.1 Half-Duplex Flow Control

In half-duplex mode, the DMD20 uses industry standard backpressure to support flow control as follows:

When available buffer space is almost gone, the DMD20 will force a collision on the input port when it senses an incoming packet. This collision will cause the transmitting station to back off and retry the transmission.

The DMD20 will stop forcing collisions as soon as free buffer space becomes available.

4.8.1.2 Full-Duplex Flow Control

In full-duplex mode, the DMD20 implements IEEE 8802.3x flow control as follows:

When available buffer space is almost gone, the DMD20 sends out a pause frame with the maximum pause time to stop the remote nodes from transmitting.

The DMD20 sends out another pause frame with the pause time set to zero as soon as free buffer space becomes available.

4.8.2 Ethernet Daisy Chain

When disabled, Port 4 (JS4) on the DMD20 Ethernet Data Interface operates normally. Data received on Port 4 that is not addressed to other equipment on the LAN side, is transmitted over the satellite.

When Port 4 is selected for Daisy Chain, any data received on Port 4 (JS4) is forwarded to of the other LAN side ports (Ports 1 - 3) and is not transmitted over the satellite. This is extremely useful in a point-to -multipoint configuration as illustrated in Figure 4-7.

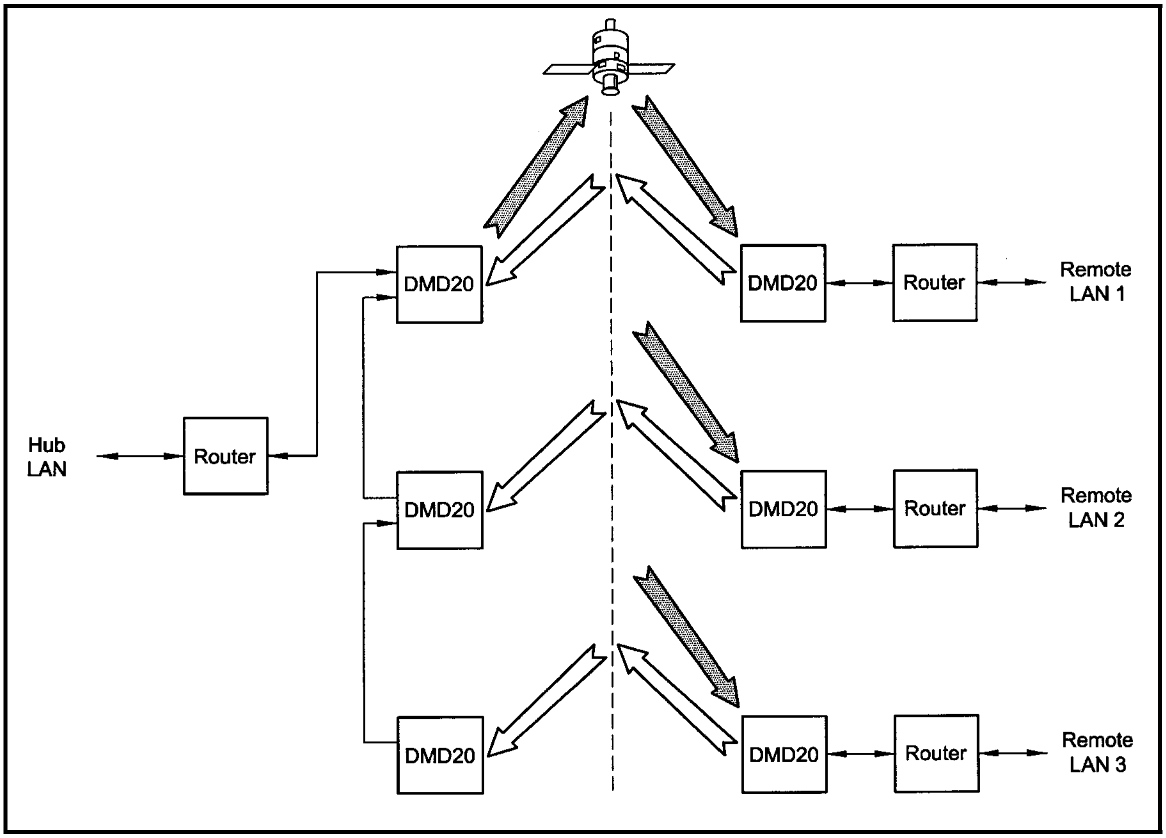


Figure 4-7. Point-to-Multipoint with Daisy Chaining

4.8.3 Packet Statistics

The following statistics are available under the Monitor Menu when the Ethernet Data Interface is selected:

Total Packets: This Counter displays the total number of Ethernet packets received from the satellite.

Error Packets: This counter displays the total number of Ethernet packets received from the satellite that had errors.

Packet Error Rate: This displays the Ethernet Packet Error Rate (PER) from the satellite.

Packet Statistics Reset: Allows the user to reset the Ethernet Total Packets and Ethernet Error Count by pressing <Enter>.

Link Status: The following status is available under the Monitor Menu/Link Status Sub-Menu when the Ethernet Data Interface is selected:

Port 1 Status: Displays the current status of LAN Port 1.

Port 2 Status: Displays the current status of LAN Port 2.

Port 3 Status: Displays the current status of LAN Port 3.

WAN Status: Displays the current status of the WAN Port.

For each of the above-listed ports, the status may take on one of the following values/meanings.

Down: The link is down.
Unresolved: Unable to agree on connection speed.
10 Mbps Half: Connected at 10 Base-T Half Duplex.
10 Mbps Full: Connected at 10 Base-T Full Duplex.
100 Mbps Half: Connected at 100 Base-T Half Duplex.
100 Mbps Full: Connected at 100 Base-T Full Duplex.

If all four LAN Ports are down, a Tx Data Activity Minor Alarm will be generated.

If the WAN Port is down, a Tx and Rx Ethernet WAN Major Alarm will be generated.

4.9 Terminal Mode Control

The DMD20 Terminal Mode Control allows the use of an external terminal or computer to monitor and control the modem from a full screen interactive presentation operated by the modem itself. No external software is required other than VT-100 Terminal Emulation Software (e.g. “Procomm” for a computer when used as a terminal. The Control Port is normally used as an RS–232 Connection to the terminal device. The RS-232 operating parameters can be set using the modem Front Panel and stored in EEPROM for future use (refer to Section 4.11 for setup and terminal screens).

4.9.1 Modem Terminal Mode Control

The modem can be interactively monitored and controlled in the Terminal Mode, with a full screen presentation of current settings and status. Programming is accomplished by selecting the item to be modified and pressing the terminal key of the option number. For example, to change the transmit data rate, enter ‘33’ at the terminal. The modem will respond by presenting the options available and requesting input. Two types of input may be requested. If the input is multiple choice, the desired choice is selected by pressing the ‘Space’ key. When the desired option is displayed, press the ‘Enter’ key to select that option. The other possible input type requires a numerical input (such as entering a frequency or data rate. This type of input is followed by pressing the ‘Enter’ or carriage return key. 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.

The Terminal Control Mode supports serial baud rates of 150, 300, 1200, 2400, 4800, 9600, 19200, and 38400. The connection must be set for 8 data bits, 1 stop bit and no parity (8,N,1). Three terminal emulations are supported: VT-100, WYSE 50, and ADDS-VP.

“$” is used for setting the screen when the terminal is used for the first time the non-volatile memory is reset.

4.9.2 Modem Setup for Terminal Mode

Terminal Mode Communications and Protocol is set from the Front Panel Control by setting the “Control Mode” Parameter to “Terminal”, and then setting the “Modem Port”, “Term Baud” and “Emulation” Parameters as desired. Then a terminal is connected to Connector J5 on the Back Panel. All operating software for the Terminal Mode is contained within the DMD20 Modem Internal Control Software.

A “break” signal on the communications line, pressing “ESC” on the terminal or Power On of the modem will initiate full screen terminal mode printing and redraw the full screen. The Terminal Mode displays the present status of all user parameters controlled and read by the processor, and offers a menu allowing change to any controlled parameter.

The Terminal Mode uses eight “Screens,” each of which have the basic contents of the three modem monitor and control areas as set in the Front Panel matrix columns. This screen is used for setting the parameters of the Modulator, Demodulator, Event, Alarm, Latched Alarm, Drop Controls, Insert Controls, and Interface Areas.

4.10 Modem Remote Communications

4.10.1 Host Computer Remote Communications

NOTE

This specification is applicable to the DMD20, DMD15, DMD15L, DMD10 and DMD10L Modems. Any reference to the DMD20 in this document can be applicable to any one of these three modems.

Control and status messages are conveyed between the DMD20 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 ComStream Link Level Protocol (RLLP), which serves as a protocol ‘wrapper’ for the RM&C data. Complete information on monitor and control software is contained in the following sections.

4.10.1.1 Protocol Structure

WARNING!!

When new features are added to Radyne ComStream, Inc. 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, Inc. 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, Inc. Customer Service Department at (602) 437-9620 to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control Software used in satellite earth station equipment such as modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex 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.

4.10.1.2 Protocol Wrapper

The Radyne ComStream COMMSPEC is byte-oriented, with the Least Significant Bit (LSB) issued first. Each data byte is conveyed as mark/space information with two marks comprising the stop data. When the last byte of data is transmitted, a hold comprises one steady mark (the last stop bit). To begin or resume data transfer, a space (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 ComStream Link Level Protocol (RLLP) organizes the actual monitor and control data within a shell, or ‘protocol wrapper’, that surrounds the data. The format and structure of the COMMSPEC message exchanges are described herein. Decimal numbers have no suffix; hexadecimal numbers end with a lower case ‘h’ suffix and binary values have a lower case ‘b’ suffix. Thus, 22 = 16h = 000010110b. The principal elements of a data frame, in order of occurrence, are summarized as follows:

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

<BYTE COUNT>: The Byte Count is the number of bytes in the <DATA> field (2 Bytes).

<SOURCE ID>: The Source Identifier defines the multi-drop address origin.

NOTE

All nodes on a given control bus have a 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 Frame Sequence Number (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 (2 Bytes).

<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 in Table 4-7.

Table 4-7. Checksum Calculation Example

BYTE FIELD	DATA CONTENT	RUNNING CHECKSUM
<BYTE COUNT>	02h = 00000010b	00000010b
<SOURCEID>	F0h = 11110000b	11110010b
<DESTINATION ID>	2Ah = 00101010b	00011100b
<FSN>	09h = 00001001b	00100101b
<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:

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

Since the only concern is the modulo 256 (modulo 1 00h) 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:

2 + 240 + 42 + 9 + 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>

4.10.1.3 Frame Description and Bus Handshaking

In a Monitor and Control environment, every message frame on a control bus port executes as a packet in a loop beginning with a wait-for-SYN-character mode. The remaining message format header information is then loaded, either by the M&C computer or by a subordinate piece of equipment (such as the DMD20) 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 the transmit power level of a DMD20 modulator), 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 ComStream, Inc. 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.

4.10.1.4 Global Response Operational Codes

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

Table 4-8. Response OPCODES

Response OPCODE Description	OPCODE
Good Message	000d = 0000h
Bad Parameter	255d = 00FFh
Bad Opcode	254d = 00FEh
Command Not Allowed in LOCAL Mode	252d = 00FCh
Incomplete Parameter	247d = 00F7h

The following response error codes are specific to the DMD20:

DMD20 Response Error Code Descriptions	OPCODE
MPARM_MODEMNUMBER_ERROR	0x0400
MPARM_FREQUENCY_ERROR	0x0401
MPARM_STRAP_ERROR	0x0402
MPARM_FILTERMASK_ERROR	0x0403
MPARM_DATARATE_ERROR	0x0404
MPARM_EXTEXCCLOCK_ERROR	0x0405
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_TERRLOOPBACK_ERROR	0x0415
MPARM_BASELOOPBACK_ERROR	0x0416
MPARM_CLOCKCONTROL_ERROR	0x0417
MPARM_CLOCKPOLARITY_ERROR	0x0418
MPARM_FRAMING_ERROR	0x0419
MPARM_DROPMODE_ERROR	0x041A
MPARM_SCTSOURCE_ERROR	0x041B
MPARM_DROPT1SIGNALING_ERROR	0x041C
MPARM_DROPMAP_ERROR	0x041D
MPARM_T1D4YELLOW_ERROR	0x041E
MPARM_FORCEDALARMS_ERROR	0x041F
MPARM_ALARMMASKENABLE_ERROR	0x0420
MPARM_ALARMMASK_ERROR	0x0421
MPARM_MODE_ERROR	0x0422
MPARM_CIRCUITID_ERROR	0x0423
MPARM_ESCCHANNEL1VOLUME_ERROR	0x0424
MPARM_ESCCHANNEL2VOLUME_ERROR	0x0425
MPARM_TERRESTRIAL_LOOPBACK_ERROR	0x0426
MPARM_INTERFACE_LOOPBACK_ERROR	0x0427
MPARM_IF_LOOPBACK_ERROR	0x0428
MPARM_INTERFACETYPE_ERROR	0x0429
MPARM_INTERFACENOTPRESENT_ERROR	0x042A
MPARM_INTERFACECOMMUNICATION_ERROR	0x042B
MPARM_SYMBOLRATE_ERROR	0x042C
MPARM_NOTIMPLEMENTED_ERROR	0x042D
MPARM_SUMMARYFAULT_ERROR	0x0430
MPARM_DATAINVERT_ERROR	0x0431
MPARM_ESCSOURCE_ERROR	0x0432
MPARM_AUPCLOCALENABLE_ERROR	0x0435
MPARM_AUPCREMOTEENABL_ERROR	0x0436

MPARM_AUPCLOCALCLACTION_ERROR	0x0437
MPARM_AUPCREMOTECLACTION_ERROR	0x0438
MPARM_AUPCTRACKINGRATE_ERROR	0x0439
MPARM_AUPCREMOTEBBLOOPACK_ERROR	0x043A
MPARM_AUPCREMOTE2047_ERROR	0x043B
MPARM_AUPCEBNO_ERROR	0x043C
MPARM_AUPCMINPOWER_ERROR	0x043D
MPARM_AUPCMAXPOWER_ERROR	0x043E
MPARM_AUPCNOMINAPOWER_ERROR	0x043F
MPARM_TIME_MARK_ERROR	0x0444
DPARM_MODE_ERROR	0x0600
DPARM_FREQUENCY_ERROR	0x0601
DPARM_SWEEPDELAY_ERROR	0x0602
DPARM_DATARATE_ERROR	0x0603
DPARM_SWEEPBOUNDARY_ERROR	0x0604
DPARM_LEVELLIMIT_ERROR	0x0605
DPARM_STRAP_ERROR	0x0606
DPARM_FILTERMASK_ERROR	0x0607
DPARM_DEMODULATIONTYPE_ERROR	0x0608
DPARM_CONVDECODER_ERROR	0x0609
DPARM_REEDSOLOMON_ERROR	0x060A
DPARM_DIFFERENTIALDECODER_ERROR	0x060B
DPARM_DESCRAMBLERCONTROL_ERROR	0x060C
DPARM_DESCRAMBLERTYPE_ERROR	0x060D
DPARM_SPECTRUM_ERROR	0x060E
DPARM_BUFFERSIZE_ERROR	0x060F
DPARM_BUFFERCLOCK_ERROR	0x0610
DPARM_BUFFERCLOCKPOL_ERROR	0x0611
DPARM_INSERTMODE_ERROR	0x0612
DPARM_T1SIGNALING_ERROR	0x0613
DPARM_T1E1FRAMESOURCE_ERROR	0x0614
DPARM_FRAMING_ERROR	0x0615
DPARM_OPERATINGMODE_ERROR	0x0616

DPARM_MAPSUMMARY_ERROR	0x0617
DPARM_AUTOALARM_ERROR	0x0618
DPARM_BEREXPONENT_ERROR	0x0619
DPARM_CIRCUITID_ERROR	0x061A
DPARM_TERRLOOPBACK_ERROR	0x061B
DPARM_BASELOOPBACK_ERROR	0x061C
DPARM_IFLOOPBACK_ERROR	0x061D
DPARM_INTERFACETYPE_ERROR	0x061E
DPARM_INTERFACENOTPRESENT_ERROR	0x061F
DPARM_INTERFACECOMMUNICATION_ERROR	0x0620
DPARM_SYMBOLRATE_ERROR	0x0621
DPARM_NOTIMPLEMENTED_ERROR	0x0622
DPARM_DATAINVERT_ERROR	0x0623
DPARM_SUMMARYFAULT_ERROR	0x0624
DPARM_EXTERNALEXCSOURCE_ERROR	0x0625
DPARM_CLEARLATCHEDALARM1_ERROR	0x0626
DPARM_CLEARLATCHEDALARM2_ERROR	0x0627
DPARM_CLEARLATCHEDALARM3_ERROR	0x0628
DPARM_ASYNCMODE_ERROR	0x062C
DPARM_ASYNCBAUDRATE_ERROR	0x062D
DPARM_ASYNCTYPE_ERROR	0x062E
DPARM_ASYNCDATABITS_ERROR	0x062F
DPARM_TIME_MARK_ERROR	0x0630
MDPARM_MAPNUMBER_ERROR	0x0A00
MDPARM_TIME_ERROR	0x0A01
MDPARM_DATE_ERROR	0x0A02

4.10.1.5 Collision Avoidance

When properly implemented, the physical and logical devices and ID addressing scheme of the COMMSPEC normally precludes message packet contention on the control bus. The importance of designating unique IDs for each device during station configuration cannot be overemphasized. One pitfall, which is often overlooked, concerns multi-drop override IDs. All too often, multiple devices of the same type are assigned in a direct-linked ("single-thread") configuration accessible to the M&C computer directly.

For example, if two DMD20 Modems 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 22. 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 then 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:

Directly-Addressed Equipment	Multi-Drop Override ID
Broadcast (all directly-linked devices)	00
DMD-3000/4000, 4500 or 5000 Mod Section, DMD20	01
DMD-3000/4000, 4500 or 5000 Demod Section, DMD20	02
RCU-340 1:1 Switch	03
RCS-780 1:N Switch	04
RMUX-340 Cross-Connect Multiplexer	05
CDS-780 Clock Distribution System	06
SOM-340 Second Order Multiplexer	07
DMD-4500/5000 Modulator Section	08
DMD-4500/5000 Demodulator Section	09
RCU-5000 M:N Switch	10
DMD20 Modulator	20
DMD20 Demodulator	21
DMD20 Modem	22
DVB3030 Video Modulator, DM240	23
RCS20 M:N Switch	24
RCS10 M:N Switch	25
RCS11 1:1 Switch	26
Reserved for future equipment types	27-31

NOTE

Multi-drop override IDs 01 or 02 can be used interchangeably to broadcast a message to a DMD-3000/4000 Modem, DMD-4500/5000, or a DMD20 Modem. Radyne ComStream, Inc. 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 DMD20 Modulator is queried for its equipment type identifier, it will return a "20" and DMD20 Demodulator will return a "21". A DMD20 Modem will also return a "22".

4.10.1.6 Software Compatibility

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

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

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

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

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

If packets are handled in this fashion, there will also be backward-compatibility between Radyne ComStream, Inc. 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.

4.10.1.8 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 an acknowledgment either 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 Link Level Protocol Message Block is shown below.

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

4.10.2 Remote Port Packet Structure:

The Modem protocol is an enhancement on the DMD20 protocol. It also uses a packet structure format. The structure is as follows:

<SYNC>: Message format header character that defines the beginning of a message. The <SYNC> character value is always 0x16 (1 byte).

<BYTE COUNT>: The number of bytes in the <DATA> field (2 bytes).

<SOURCE ID>: Identifies the address of the equipment from where the message originated (1 byte).

<DEST. ID>: Identifies the address of the equipment where the message is to be sent (1 byte).

<FSN>: Frame sequence number ensures correct packet acknowledgment and data transfers (1 byte).

<OPCODE>: This byte identifies the message type associated with the information data. The equipment processes the data according to the value in this field. Return error codes and acknowledgment are also included in this field (2 bytes).

<...DATA...>: Information data. The number of data bytes in this field is indicated by the <BYTE COUNT> value.

<CHECKSUM>: The modulo 256 sum of all preceding message bytes excluding the <SYNC> character (1 byte).

CAUTION!!

The Modem RLLP is not software-compatible with the following previous Radyne ComStream, Inc. products: RCU5000 and DMD4500. These products may not occupy the same bus while using this protocol as equipment malfunction and loss of data may occur.

NOTE

When transmitting a packet at 9600 baud, the Remote M&C should ensure that the timeout value between characters does not exceed the time it takes to transmit 200 characters(≈ 200 msec). If this timeout value is exceeded, the equipment will timeout.

4.10.3 DMD20 Opcode Command Set

Refer to Appendix B for Modem Remote Communications.

4.11 Terminal Port User Interface

The Terminal Port of the DMD20 allows for complete control and monitoring of all DMD20 parameters and functions via an RS-232 Serial Interface. ‘Terminal Mode’ can be entered from the front panel by selecting ‘System’ and then ‘Control Mode’ followed by ‘Terminal.’ The default settings for the terminal are as follows:

VT-100, 19,200 Baud; 8 Data bits; 1 stop bit; 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.

The Terminal Control Mode is menu-driven and the allowable values for each item number will be shown. To change an item, type in its number followed by <ENTER>. If the parameter to be changed requires a numeric value, enter the number followed by <ENTER> If the parameter is non-numeric, press <SPACE> to cycle through the list of available entries.

NOTE

Items that do not have ID numbers are Status only and cannot be changed.

4.12 Connecting the Terminal

1. Connect the computer to the DMD20 Remote Connector (J20) on the rear of the unit using the RS-232 Cable.

2. Enable the terminal by selecting Terminal Mode from the front panel.

3. Verify that your emulation software is set to the following:

   VT-100
   19200 baud
   8 data bits
   no parity
   1 stop bit

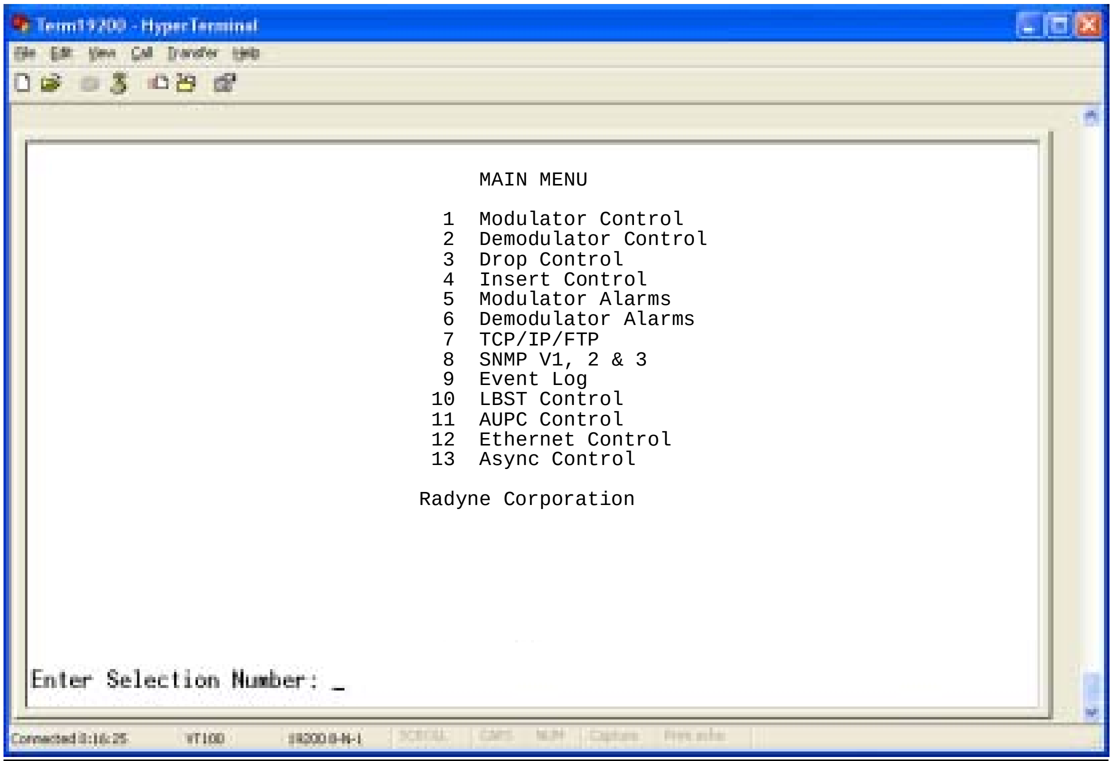
   Modify the DMD20 selection, if necessary, to match the settings (the Front Panel ‘SYSTEM’ Sub-Menu contains all the Terminal Emulation Controls).

4.13 Terminal Screens

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

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

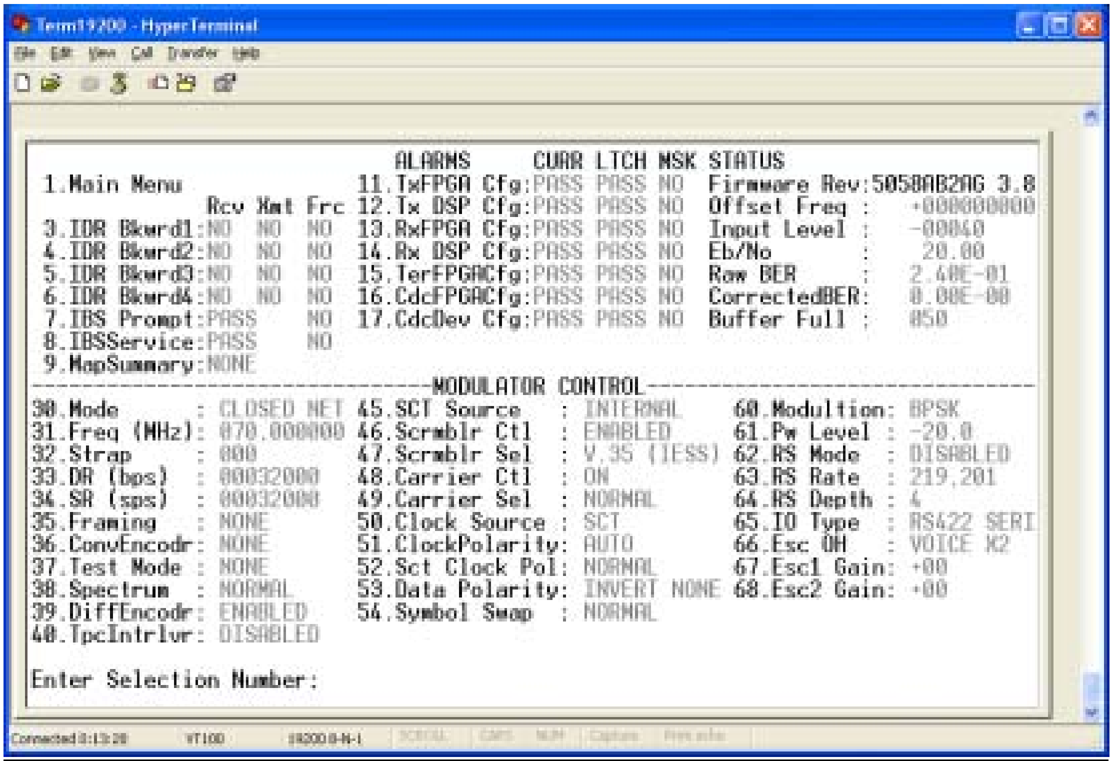
Main Menu Screen:



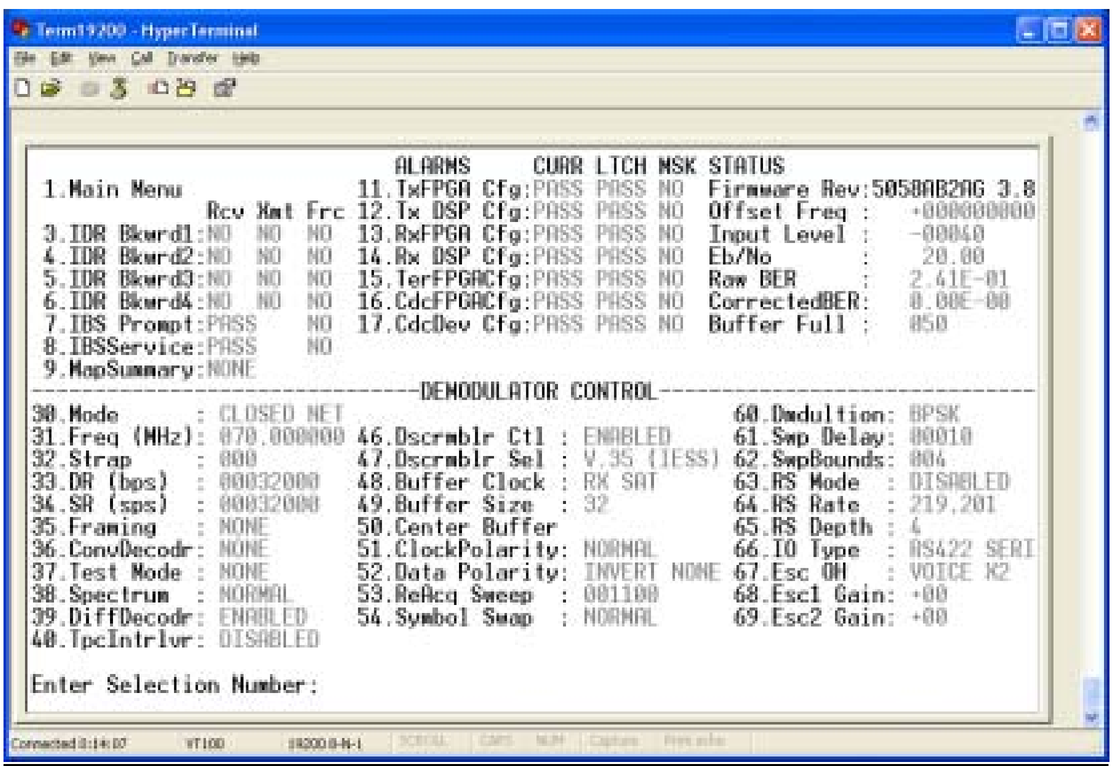
NOTE

Selection "12 Ethernet Control" only displays when Ethernet is selected as the interface type.

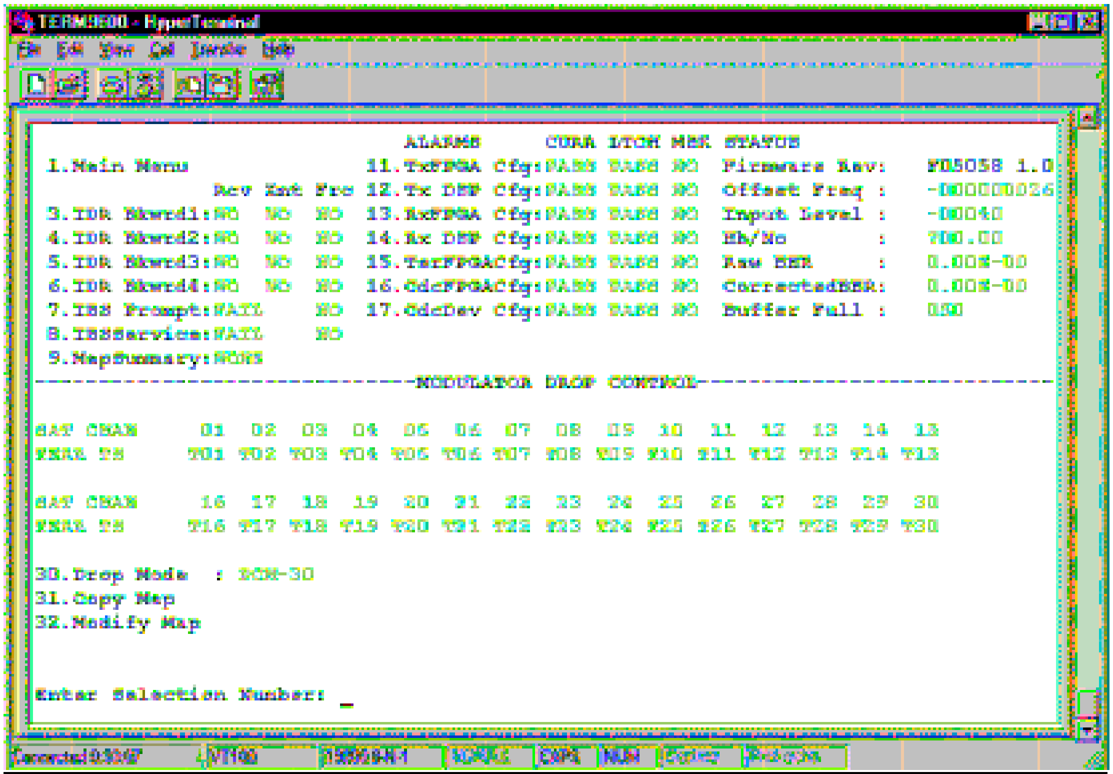
Modulator Control Screen:



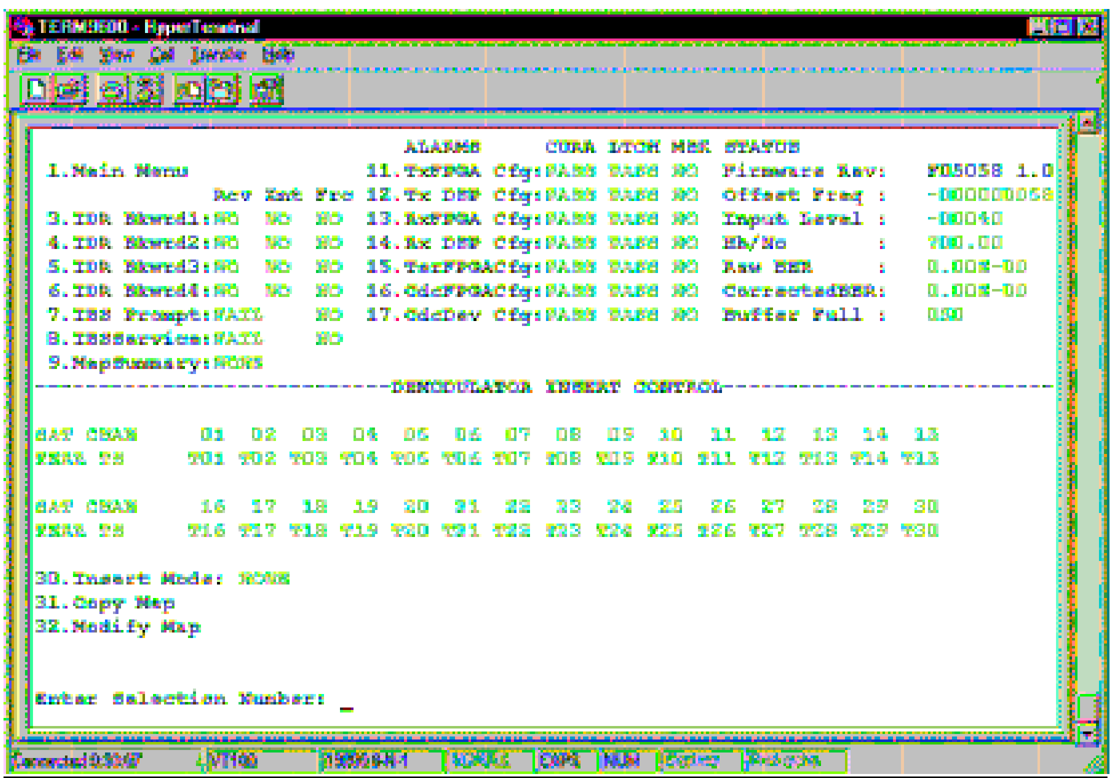
Demodulator Control Screen:



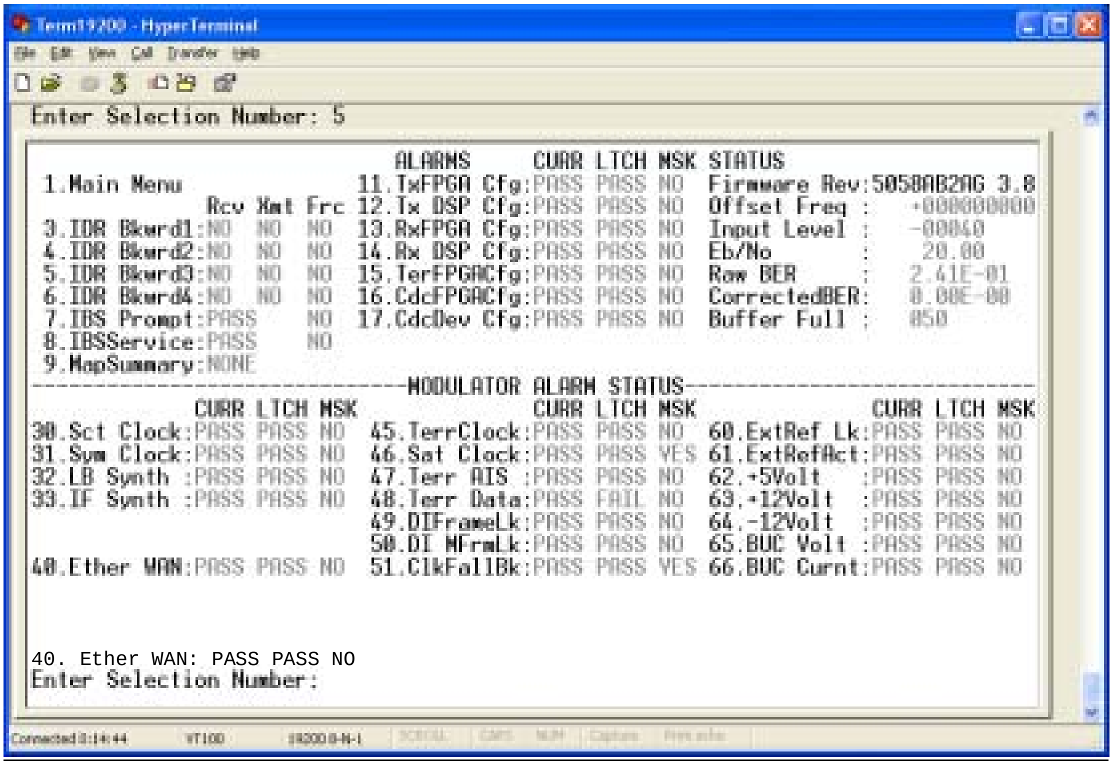
Modulator Drop Control Screen:



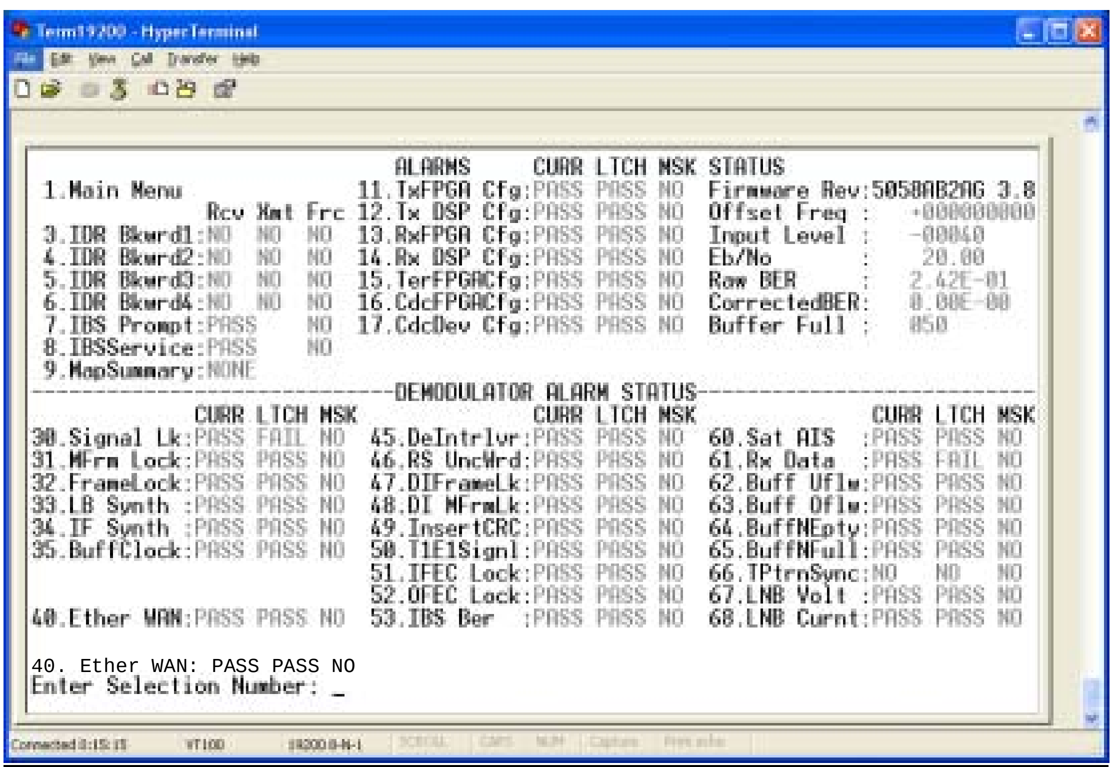
Demodulator Insert Control Screen:



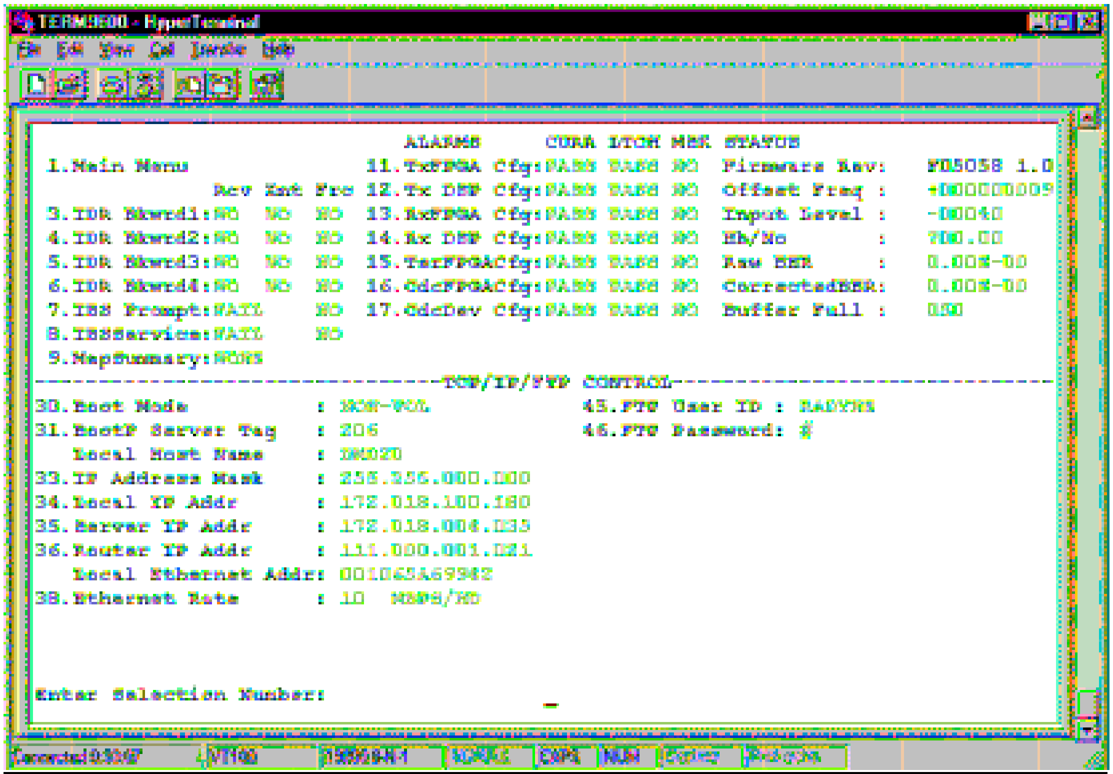
Modulator Alarm Status Screen:



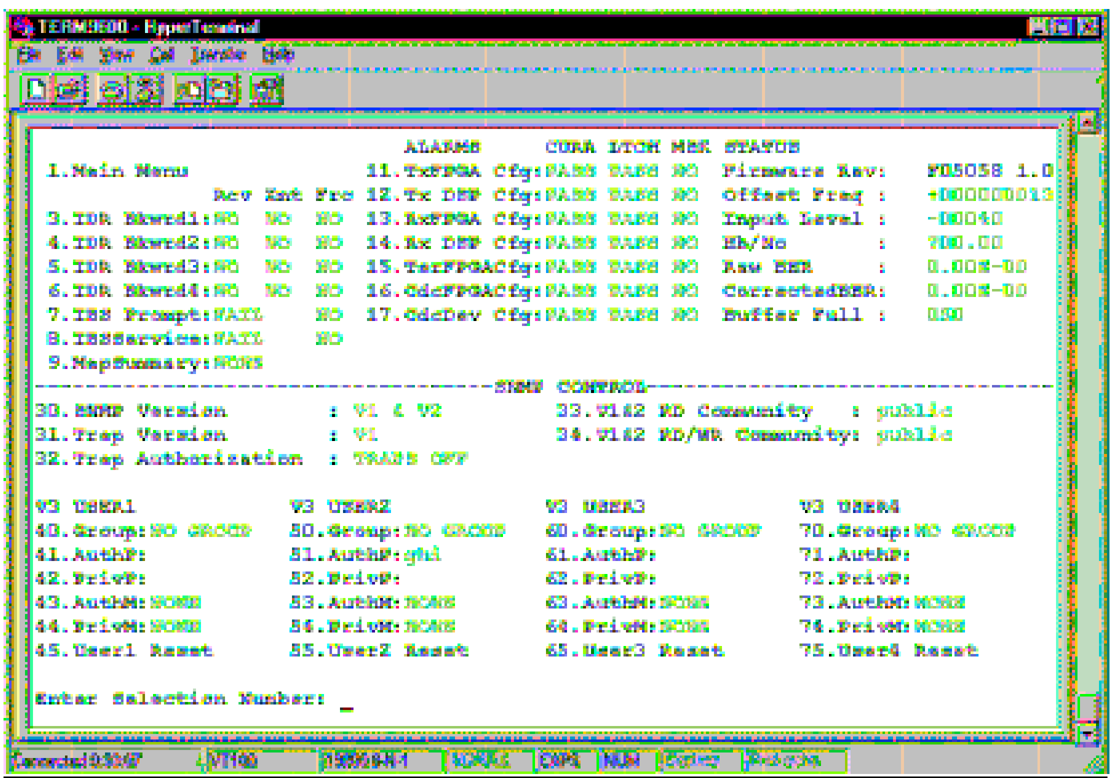
Demodulator Alarm Status Screen:



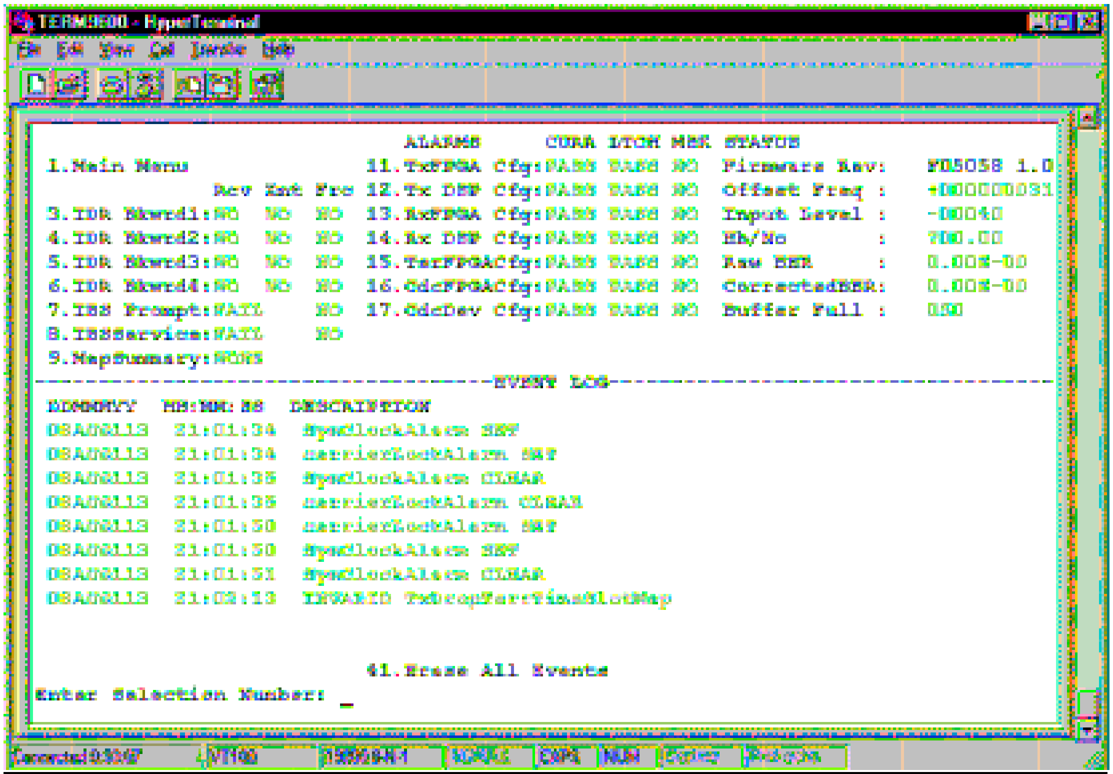
TC/IP/FTP Control Screen:



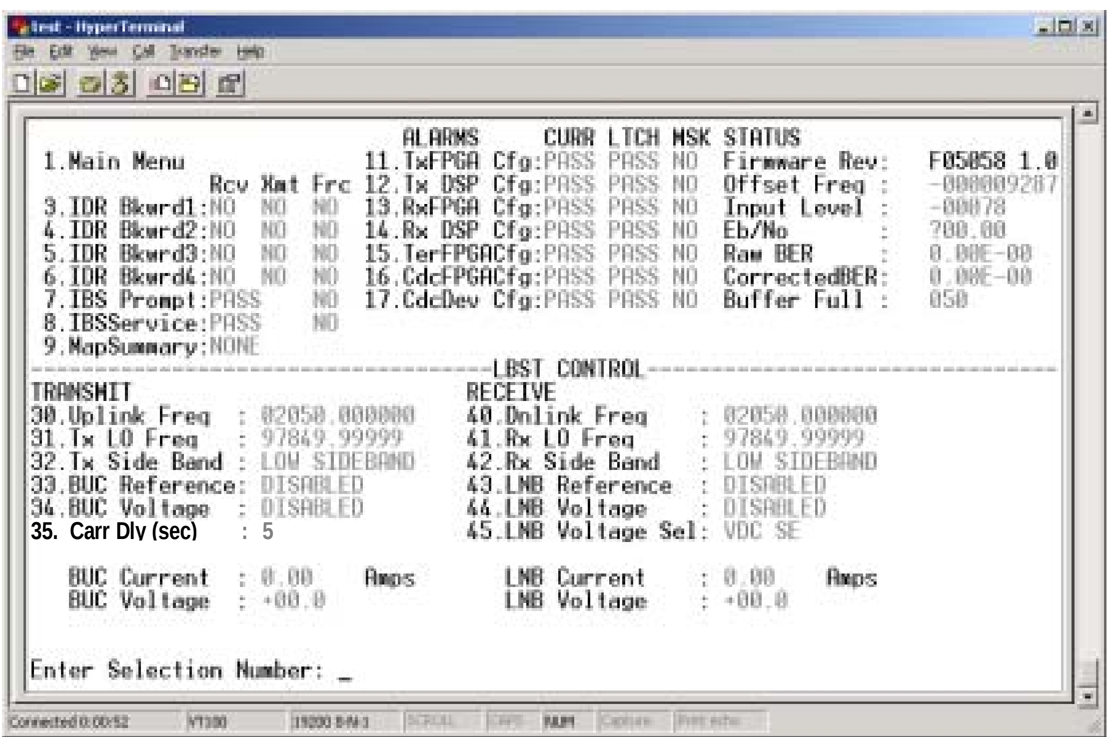
SNMP Control Screen:



Event Log Screen:

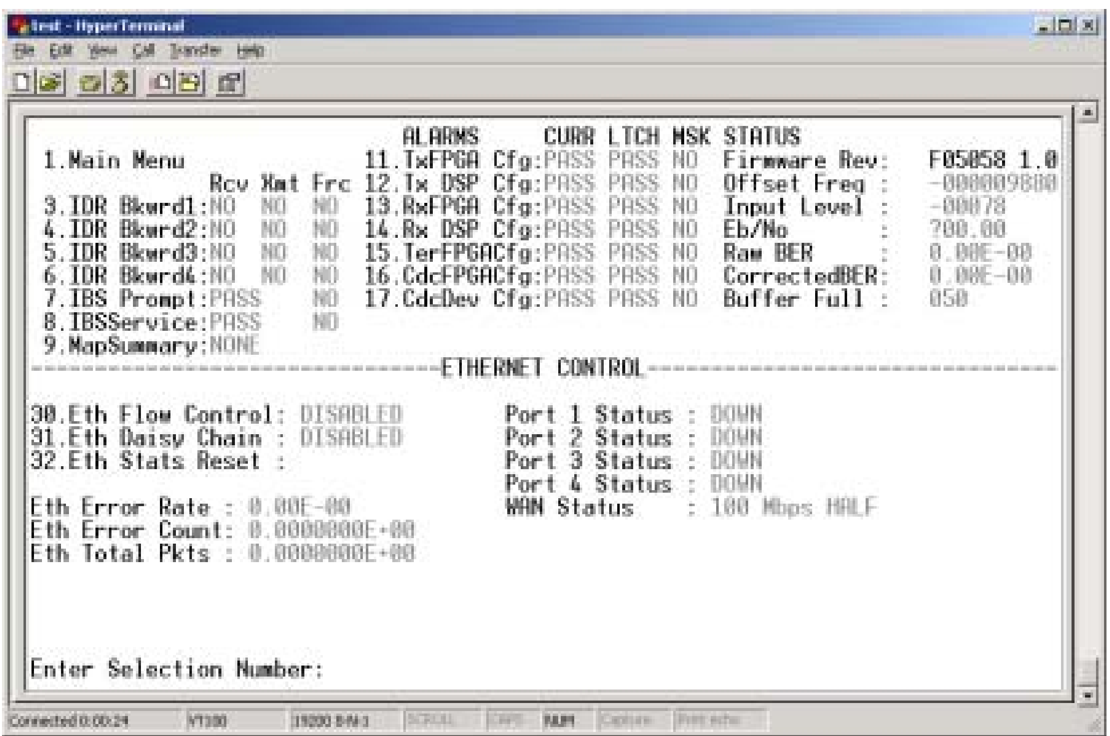


LBST Control Screen:



AUPC Control Screen:

Ethernet Control Screen:



Rear Panel Interfaces

5

This section discusses the electrical interfaces available from the rear panel. All locations are as viewed from the rear of the unit unless otherwise specified.

5.0 DMD20 Connections

All DMD20 connections are made to labeled connectors located on the rear of the unit (refer to Figure 5-1 for the standard unit and Figure 5-2 for the DMD20 LBST). The connector definitions below are those on the DMD20 unit. Any connection interfacing to the DMD20 must be the appropriate mating connector.

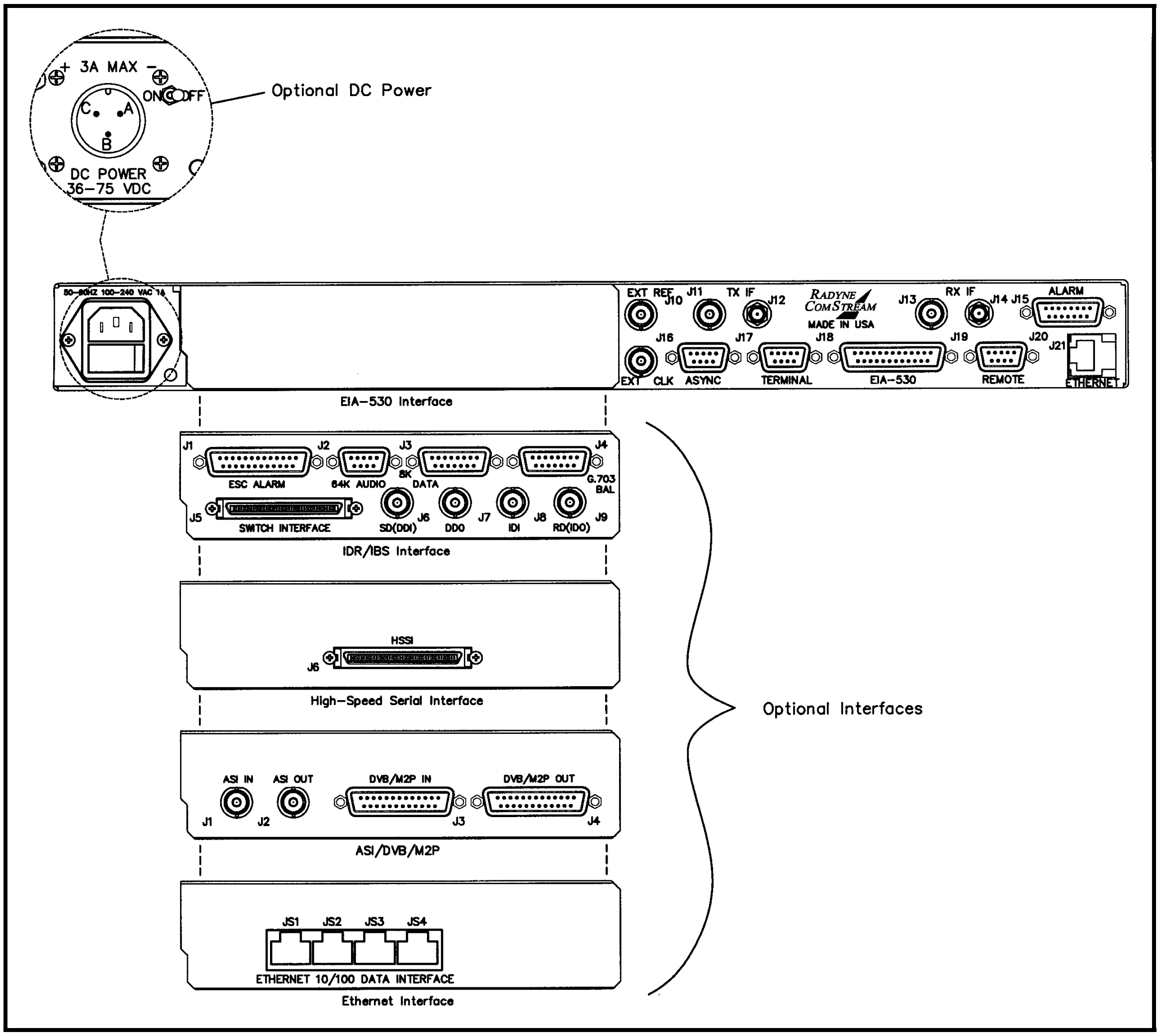


Figure 5-1. DMD20 Universal Satellite Modem Rear Panel Configurations

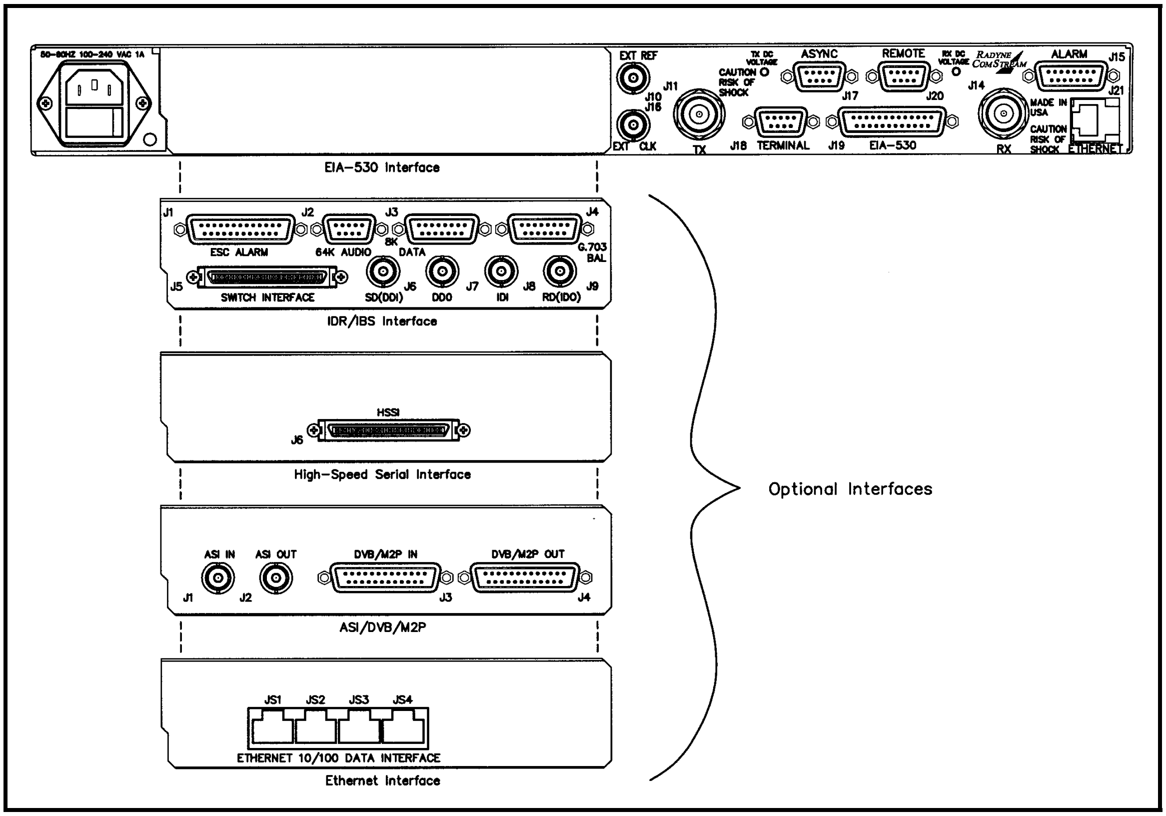


Figure 5-2. DMD20 LBST Universal Satellite Modem Rear Panel Configurations

5.1 Compact Flash

The compact flash slot is located on the right side as viewed from the rear of the unit. It is for Radyne ComStream, Inc. use.

5.2 Power Input Modules

5.2.1 AC Power Input Module

AC Input Module (Figure 5-1) is located on the left side of the unit. Power applied to the port with the supplied power cable is 100 – 240 VAC, 50 – 60 Hz. Integrated into the Power Input Module is the Power On/Off Rocker Switch. Power consumption for the unit is 1A. A chassis ground connection (#10-32 threaded stud), is located to the lower right of the module.

5.2.2 DC Power Input/Switch

The Optional DC Power Input and Switch (Figure 5-1) is available for all DMD2401 products. The unit may be powered from a 36 – 75 VDC source with a maximum unit power consumption of 3 A. Refer to Table 5-1 for pinouts.

Table 5-1. DC Power

A	–
B	+
C	Ground

5.3 Chassis Connections (Standard)

5.3.1 EXT REF (J10)

The External Reference Port is a 75-Ohm Female BNC Connector and will accept the following frequencies: 1.0, 1.544, 2.0, 2.048, 5.0, and 10.0 MHz).

5.3.2 TX IF (J11)

The Transmit IF Output Port is a 75-Ohm Female BNC Connector that is used for 70/140 MHz IF. The power level is programmable from 0 to -25 dBm in 0.1 dBm steps. The IF Frequency can be programmed to 50 – 90 MHz or 100 – 180 MHz, in 1 Hz Steps.

5.3.3 TX L-Band IF (J12)

The Transmit IF Output Port is a 50-Ohm SMA Female Connector that can be used for L-Band IF. The power level is programmable from 0 to -25 dBm, in 0.1 dBm steps. The IF Frequency can be programmed to 950 – 2050 MHz, in 1 Hz Steps.

5.3.4 RX IF (J13)

The Receive IF Input Port is a 75-Ohm Female BNC Connector that is used for 70/140 MHz IF. If the customer orders the 70/140 MHz IF, the Transmit IF Output Port is a 75-Ohm Female BNC Connector.

5.3.5 RX L-Band IF (J14)

The Receive IF Input Port is a 50-Ohm SMA Female Connector that can be used for L-Band IF. The IF Frequency can be programmed from 950 to 1750 MHz in 1 Hz Steps.

5.3.6 ALARM (J15)

The Alarm Port is a 15-Pin Female “D” Connector. Refer to Table 5-2 for pinouts.

Table 5-2. ALARM Port 15-Pin Female “D” Connector (J15)

Pin No.	Signal Name	Signal	Direction
1	Mod Fault - C	MF-C	No Direction
2	Mod Fault – NC	MF-NC	No Direction
3	Mod Fault – NO	MF-NO	No Direction
4	Demod Fault - C	DF-C	No Direction
5	Demod Fault – NC	DF-NC	No Direction
6	Demod Fault – NO	DF-NO	No Direction
7	Prompt - C	CEF-C	No Direction
8	Prompt – NC	CEF-NC	No Direction
9	Prompt – NO	CEF-NO	No Direction
10	Service – C	SP1-NO	No Direction
11	Service – NC	SP1-NC	No Direction
12	Service – NO	SP2-NO	No Direction
13	No Connect	SP2-NC	No Direction
14	AGC Out	AGC	No Direction
15	Ground	GND	---

5.3.7 EXT CLK (J16)

The External Clock Port is a 75-Ohm Female BNC Connector. It allows interfacing to an external clock source.

5.3.8 TERMINAL (J17)

Used for factory testing only.

5.3.9 ASYNC (J18)

The Asynchronous Data Interface Port is a 9-Pin Female "D" Connector. Refer to Table 5-3 for pinouts.

Table 5-3. ASYNC Port 9-Pin Female "D" Connector (J17)

Pin No.	Signal Name	Signal	Direction
1	Receive Data B	RXD_B	Output
2	Receive Data A	RXD_A	Output
3	Transmit Data A	TXD_A	Input
4	Transmit Data B	TXD_B	Input
5	Ground	GND	---
6	No Connect	DSR	---
7	No Connect	RTS	---
8	No Connect	CTS	---
9	No Connect	NC	---

5.3.10 EIA-530 (J19)

The EIA-530 Port is an RS-422/V.35/RS-232 Connection. It is a 25-Pin Female "D" Connector. Refer to Table 5-4 for pinouts.

Table 5-4. EIA-530 Port (RS-422/V.35/RS-232) 25-Pin Female "D" Connector (J19)

Pin No.	Signal Name	Signal	Direction
1	Shield	---	---
2	Send Data A (-)	SD-A	Input
3	Receive Data A (-)	RD-A	Output
4	Request To Send A (-)	RS-A	Input
5	Clear To Send A (-)	CS-A	Output
6	Data Mode A (-)	DM-A	Output
7	Signal Ground	SGND	---
8	Receiver Ready A (-)	RR-A	Output
9	Receive Timing B (+)	RT-B	Output
10	Receiver Ready B (+)	RR-B	Output
11	Terminal Timing B (+)	TT-B	Input
12	Send Timing B (+)	ST-B	Output
13	Clear T Send B (+)	CS-B	Output
14	Send Data B (+)	SD-B	Input

15	Send Timing A (-)	ST-A	Output
16	Receive Data B (+)	RD-B	Output
17	Receive Timing A (-)	RT-A	Output
18	Modulator Fault - Open Collector	MF	Output
19	Request To Send B (+)	RS-B	Input
20	Data Terminal Ready A (-)	TR-A	Input
21	Demodulator Fault	DF	Output
22	Data Mode B (+)	DM-B	Output
23	Data Terminal Ready B (+)	TR-B	Input
24	Terminal Timing A (-)	TT-A	Input
25	No Connect	---	---

5.3.11 REMOTE (J20)

The Remote Port is a RS-485 or RS-232 Connection for remote monitor and control of the modem. It is a 9-Pin Female “D” Connector. Refer to Table 5-5 for pinouts.

Table 5-5. Remote Port (RS-485 or RS-232) 9-Pin Female “D” Connector (J20)

Pin No.	Signal Name	Signal	Direction
1	Transmit Data RS-485 (+)	TX-485-B	Output
2	Transmit Data RS-232	TXD-232	Output
3	Receive Data RS-232	RXD-232	Input
4	NC	NC	---
5	Ground	GND	---
6	Transmit Data RS-485 (–)	TX-485-A	Output
7	NC	No Connect	---
8	Receive Data RS-485 (+)	RX-485-B/CTS	Input
9	Receive Data RS-485 (–)	RX-485-A	Input

5.3.12 ETHERNET (J21)

The ETHERNET Port (J21) can be used for the Monitor & Control (M&C) Functions of the unit. The physical interface is a standard female RJ-45 Connector.

5.4 IDR/IBS Interface (Optional)

5.4.1 ESC ALARM (J1)

The ESC (Engineering Service Circuits) Alarms Port is a 25-Pin Female “D” Connector. Refer to Table 5-6 for pinouts.

Table 5-6. ESC ALARM Port 25-Pin Female “D” Connector (J1)

Pin No.	Signal Name	Signal	Direction
1	Ground	GND	---
2	Backward Alarm Out - 1NO	ESCBWO 1NO	N/A
3	No Connection	NC	---
4	Backward Alarm Out - 2 NO	ESCBWO 2NO	N/A
5	No Connection	NC	---
6	Backward Alarm Out - 3 NO	ESCBWO 3NO	N/A
7	Ground	GND	---
8	Backward Alarm Out - 4 NO	ESCBWO 4NO	N/A
9	No Connection	NC	---
10	Backward Alarm In - 2	ESCBWI 2	Input
11	Backward Alarm In - 4	ESCBWI 4	Input
12	No Connection	NC	---
13	No Connection	NC	---
14	Backward Alarm Out - 1 C	ESCBWO 1C	N/A
15	Backward Alarm Out - 1 NC	ESCBWO 1NC	N/A
16	Backward Alarm Out - 2 C	ESCBWO 2C	N/A
17	Backward Alarm Out - 2 NC	ESCBWO 2NC	N/A
18	Backward Alarm Out - 3 C	ESCBWO 3C	N/A
19	Backward Alarm Out - 3 NC	ESCBWO 3NC	N/A
20	Backward Alarm Out - 4 C	ESCBWO 4C	N/A
21	Backward Alarm Out - 4 NC	ESCBWO 4NC	N/A
22	Backward Alarm In – 1	ESCBWI 1	Input
23	Backward Alarm In – 3	ESCBWI 3	Input
24	No Connection	NC	---
25	No Connection	NC	---

5.4.2 64K AUDIO (J2)

The 64K AUDIO Port allows for communications between Earth Stations. It is a 9-Pin Female "D" Connector that complies to IESS 308. Refer to Table 5-7 for pinouts.

Table 5-7. 64K AUDIO Port 9-Pin Female "D" Connector (J2)

Pin No.	Signal Name	Signal	Direction
1	Transmit Audio 1A	ESCAUDTX 1A	Input
2	Receive Audio 1A	ESCAUDRX 1A	Output
3	Ground	GND	---
4	Transmit Audio 2B	ESCAUDTX 2B	Input
5	Receive Audio 2B	ESCAUDRX 2B	Output
6	Transmit Audio 1B	ESCAUDTX 1B	Input
7	Receive Audio 1B	ESCAUDRX 1B	Output
8	Transmit Audio 2A	ESCAUDTX 2A	Input
9	Receive Audio 2A	ESCAUDRX 2A	Output

5.4.3 8K DATA (J3)

The 8K Data Port allows for communications between Earth Stations. It is a 15-Pin Female "D" Connector that complies to IESS 308. Refer to Table 5-8 for pinouts.

Table 5-8. 8K DATA Port 15-Pin Female "D" Connector (J3)

Pin No.	Signal Name	Signal	Direction
1	Receive Octet-B	ESCRXO-B	Output
2	Receive Clock-B	ESCRXC-B	Output
3	Receive Data-B	ESCRXD-B	Output
4	No Connection	NC	---
5	No Connection	NC	---
6	Transmit Data-A	ESCTXD-A	Input
7	Transmit Clock-A	ESCTXC-A	Output
8	Transmit Octet-A	ESCTXO-A	Output
9	Receive Octet-A	ESCRXO-A	Output
10	Receive Clock-A	ESCRXC-A	Output
11	Receive Data-A	ESCRXD-A	Output
12	Ground	GND	---
13	Transmit Data-B	ESCTXD-B	Input
14	Transmit Clock-B	ESCTXC-B	Output

15	Transmit Octet-B	ESCTXO-B	Output

5.4.4 G.703 BAL (J4)

The G.703 Interface Port (Balanced) is a 15-Pin Female "D" Connector. Refer to Table 5-9 for pinouts.

Table 5-9. G.703 BAL Port 15-Pin Female "D" Connector (J4)

Pin No.	Signal Name	Signal	Direction
1	Send Data (-)	SD-A	Input
2	Ground	GND	---
3	Receive Data A (-)	RD-A	Output
4	Ground	GND	---
5	Drop Data Out (+)	DDO-B	Output
6	Insert Data In (+) EXC (+)	IDI-B	Input
7	External Clock A (-)	BAL EXC-A	Input
8	External Clock B (+)	BAL EXC-B	Input
9	Send Data (+)	SD-B	Input
10	No Connect	---	---
11	Receive Data B (+)	RD-B	Output
12	Drop Data Out (-)	DDO-A	Output
13	Insert Data In (-) EXC (-)	IDI-A	Input
14	MOD-FLT	---	---
15	DMD-FLT	---	---

5.4.5 SWITCH INTERFACE (J5)

The Switch Interface Port is a 68-Pin High-Density Female Connector. Refer to Table 5-10 for pinouts.

Table 5-10. SWITCH INTERFACE Port 68-Pin High-Density Female Connector (J5)

Pin No.	Signal Name	Signal	Direction
1	G.703 Send Data Input A	G.703B SD-A	Input
2	Synchronous Data Send Data Input - A	SYNC SD-A	Input
3	IDR ESC Backward Alarm Out - 1 Common	ESCBWO 1C	---
4	G.703 Insert Data Input – A	G.703B IDI-A	Input

5	Synchronous Data Send Timing Output – A	SYNC ST-A	Output
6	IDR ESC Backward Alarm Out - 1 Normally Open	ESCBWO 1NO	Input
7	Synchronous Data Terminal Timing Input – A	SYNC TT-A	Input
8	IDR ESC Backward Alarm Out - 2 Normally Closed	ESCBWO 2NC	---
9	G.703 Drop Data Out A - Synchronous Data Receive Timing Output - A	DDO-A RT-A	Output
10	IDR ESC Backward Alarm Output - 3 Common	ESCBWO 3C	---
11	G.703 Insert Data Out A - Synchronous Data Receive Data A	IDO-A RD-A	Output
12	IDR ESC Backward Alarm Output - 3 Normally Open	ESCBWO 3NO	---
13	External Clock Input - A	BAL EXC-A	No Connect
14	Ground	GND	---
15	IDR ESC Audio Input Channel 1A	ESCAUDTX 1A	Input
16	IDR ESC Audio Input Channel 2A	ESCAUDTX 2A	Input
17	IDR ESC Audio Output Channel 1A	ESCAUD RX 1A	Output
18	IDR ESC Audio Output Channel 2A	ESCAUD RX 2A	Output
19	IDR ESC Backward Alarm Input - 3	ESCBWI 3	Input
20	IBS ES Transmit Data A IDR ESC Backward Alarm Input 1	TXD-A BWI 1	Input
21	Mod Fault Open Collector Output	MOD FLT	Output Open Collector
22	IBS ES Receive Data Output - A	ES RXD-A	Output
23	IBS ES Data Set Ready (RS-232 Only)	ES DSR	No Connect
24	IDR ESC Transmit 8 Kbps Output Clock	ESCTXC-A	Output
25	IDR ESC Transmit 8 Kbps Output Data	ESCTXD-A	Input
26	IDR ESC Receive 8 Kbps Output Clock	ESCRXC-A	Output
27	IDR ESC Receive 8 Kbps Output Data	ESCRXD-A	Output
28	IDR ESC Backward Alarm Output - 4 Normally Closed	ESCBWO 4NC	---

29	IBS Transmit Octet Input - A	TXO-A	Input
30	Synchronous Data Mode A	SYNC DM-A	Output
31	Synchronous Data Clear to Send - A	SYNC CS-A	Output
32	IBS Receive Octet Output - A	RXO-A	Output
33	Synchronous Data Request to Send - A	SYNC RS-A	Input
34	Synchronous Data Receiver Ready - A	SYNC RR-A	Output
35	G.703 Send Data Input - B	G703B SD-B	Input
36	Synchronous Data Send Data Input - B	SYNC SD-B	Input
37	IDR ESC Backward Alarm Out - 1 Normally Closed	ESCBWO 1 NC	---
38	G.703 Insert Data Input - B	G703B IDI-B	---
39	Synchronous Data Send Timing Output - B	SYNC ST-B	---
40	IDR ESC Backward Alarm Out - 2 Common	ESCBWO 2C	---
41	Synchronous Data Terminal Timing – B	SYNC TT-B	---
42	IDR ESC Backward Alarm Output - 2 Normally Open	ESCBWO 2NO	---
43	G.703 Drop Data Out - B Synchronous Data Receive Timing – B	DDO-B RT-B	Output
44	IDR ESC Backward Alarm Out - 3 Normally Closed	ESCBWO 3NC	---
45	G.703 Insert Data Out Synchronous Data	IDO-B RD-B	Output
46	IDR ESC Backward Alarm Out - 4 Common	ESCBWO 4C	---
47	External Clock Input - B	BAL EXC-B	---
48	Ground	GND	---
49	IDR ESC Audio Input Channel - 1B	ESCAUDTX 1B	Input
50	IDR ESC Audio Input Channel - 2B	ESCAUDTX 2B	Input
51	IDR ESC Audio Output Channel - 1B	ESCAUDRX 1B	Output

52	IDR ESC Audio Output Channel - 2B	ESCAUDRX 2B	Output
53	IDR ESC Backward Alarm Input - 4	ESCBWI 4	Input
54	IBS ES Transmit Data – B IDR ESC Backward Alarm Input - 2	TX-B BWI 2	Input
55	Demod Fault Open Collector Output	DMD FLT	Output Open Collector
56	IBS ES Receive Data Input - B	ES RXD-B	Output
57	Ground	GND	---
58	IDR ESC Transmit 8 Kbps Output Clock - B	ESCTXC-B	Output
59	IDR ESC Transmit 8 Kbps Output Data - B	ESCTXD-B	Input
60	IDR ESC Receive 8 Kbps Clock Output - B	ESCRXC-B	Output
61	IDR ESC Receive 8 Kbps Data Output - B	ESCRXD-B	Output
62	IDR ESC Backward Alarm Out - 4 Normally Open	ESCBWO 4NO	---
63	IBS Transmit Octet Input - B	TXO-B	Input
64	Synchronous Data – Data Mode Out - B	SYNC DM-B	Output
65	Synchronous Data - Clear to Send - B	SYNC CS-B	Input
66	IBS Receive Octet Output - B	RXO-B	Output
67	Synchronous Data Request to Send – B	SYNC RS-B	Input
68	Synchronous Data Receiver Ready - B	SYNC RR-B	Output

5.4.6 SD (DDI) (J6)

The Send Data (Drop Data In) Port (Unbalanced) is a 75-Ohm Female BNC Connector.

5.4.7 DDO (J7)

The Drop Data Out Port (Unbalanced) is a 75-Ohm Female BNC Connector.

5.4.8 IDI (J8)

The Insert Data In Port (Unbalanced) is a 75-Ohm Female BNC Connector.

5.4.9 SD (IDO) (J9)

The Send Data (Insert Data Out) Port (Unbalanced) is a 75-Ohm Female BNC Connector.

5.5 Ethernet Data Interface (Optional)

The optional DMD20 Ethernet Data Interface provides four RJ-45, Auto-Crossover and Auto-Sensing, 10/100 Ethernet Data Ports. JS1 through JS4 may be referred to Port 1 through Port 4 respectively.

5.6 High-Speed Serial Interface (HSSI) (Optional)

5.6.1 HSSI (J6)

The HSSI (High-Speed Serial Interface) (J6) 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 5-11.

Table 5-11. 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
5	30	LC	Loopback Circuit C	Output
6	31	ST	Send Timing (SCT)	Output
7	32	SG	Signal Ground	---
8	33	TA	DTE Available	Input
9	34	TT	Terminal Timing (SCTE)	Input
10	35	LA	Loopback Circuit A	Input
11	36	SD	Send Data	Input
12	37	LB	Loopback Circuit B	Input
13	38	SG	Signal Ground	---
14 - 18	39 – 43	5 Ancillary to DCE	Reserved	Input
19	44	SG	Signal Ground	---
20 - 23	45 - 48	4 Ancillary from DCE	Reserved	Output
24	49	TM	Test Mode	Output
25	N/A	MOD_FLT	Alarm	Output
50	N/A	DMD_FLT	Alarm	Output

5.7 ASI/DVB/M2P Interface (Optional)

5.7.1 ASI IN (J1)

The ASI IN Port (J1) is supported on the BNC Connector. The interface complies with DVB ASI Electrical Specifications.

5.7.2 ASI OUT (J2)

The ASI OUT Port (J2) is supported on the BNC Connector. The interface complies with DVB ASI Electrical Specifications.

5.7.3 DVB/M2P IN (J3)

DVB or M2P IN Port (J3) is supported on the DB-25 female connector. It complies with RS-422 Electrical Specifications. Refer to Table 5-12a for DVB and 5-12 b for M2P pinouts for this connector.

Table 5-12a. J3 – DVB In - 25-Pin Female

Pin Number	Signal Name	Direction
1	CLK+	Input
14	CLK-	Input
2	SYSTEM GND	Input
15	SYSTEM GND	Input
3	D7+	Input
16	D7-	Input
4	D6+	Input
17	D6-	Input
5	D5+	Input
18	D5-	Input
6	D4+	Input
19	D4-	Input
7	D3+	Input
20	D3-	Input
8	D2+	Input
21	D2-	Input
9	D1+	Input
22	D1-	Input
10	D0+	Input
23	D0-	Input
11	DVALID+	Input

24	DVALID-	Input
12	PSYNC+	Input
25	PSYNC-	Input
13	Cable Shield	---

Table 5-12b. J3 – M2P In - 25-Pin Female		
Pin Number	**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	Cable Shield	---

5.7.4 DVB/M2P OUT (J4)

The DVB or M2P OUT Port (J4) is also supported on the DB-25 Female Connector. It complies with RS-422 Electrical Specifications. Refer to Table 5-13a for DVB and 5-13 b for M2P pinouts for this connector.

Table 5-13a. J3 - DVB Out – 25-Pin Female 'D' Sub Connector

Pin Number	Signal Name	Direction
1	CLK+	Output
14	CLK-	Output
2	SYSTEM GND	Output
15	SYSTEM GND	Output
3	D7+	Output
16	D7-	Output
4	D6+	Output
17	D6-	Output
5	D5+	Output
18	D5-	Output
6	D4+	Output
19	D4-	Output
7	D3+	Output
20	D3-	Output
8	D2+	Output
21	D2-	Output
9	D1+	Output
22	D1-	Output
10	D0+	Output
23	D0-	Output
11	DVALID+	Output
24	DVALID-	Output
12	PSYNC+	Output
25	PSYNC-	Output
13	Cable Shield	---

Table 5-13b. J3 - M2P Out – 25-Pin Female 'D' Sub Connector		
Pin Number	**Signal Name**	**Direction**
1	NC	Output
14	NC	Output
2	CLK+	Output
15	CLK-	Output
3	SYNC+	Output
16	SYNC-	Output
4	VALID+	Output
17	VALID-	Output
5	D0+	Output
18	D0-	Output
6	D1+	Output
19	D1-	Output
7	D2+	Output
20	D2-	Output
8	D3+	Output
21	D3-	Output
9	D4+	Output
22	D4-	Output
10	D5+	Output
23	D5-	Output
11	D6+	Output
24	D6-	Output
12	D7+	Output
25	D7-	Output
13	Cable Shield	---

Maintenance and Troubleshooting

6

This section discusses unit maintenance and troubleshooting for the DMD20 Universal Satellite Modem.

> **CAUTION!!**
>
> ***The DMD20 contains a Lithium Battery. DANGER OF EXPLOSION exists if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local and national regulations.***

6.0 Periodic Maintenance

There is no external fuse on the DMD20. The fuse is located on the power supply assembly inside the case, and replacement is not intended in the field.

6.0.1 Clock Adjustment

The DMD20 allows for internal VCO speed adjustment from the front panel. Clock adjustment should be performed only when an internal clock source has insufficient accuracy for the custom modem application.

6.1 Troubleshooting

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 DMD20. If this does not cure the problem, wiring or power should be suspect.

The following is a brief list of possible problems that could be caused by failures of the modem or by improper setup and configuration for the type of service. The list is arranged by possible symptoms exhibited by the modem.

Symptom	Possible Cause
The Modem will not acquire the incoming carrier:	There is an improper receive input to modem.
	The Receive Carrier Level is too low.
	The Receive Carrier Frequency is outside of the acquisition range.
	The Transmit Carrier is incompatible.
	Modem is in Test Mode.
The Async Port is not configured correctly.	The switches may not be set in the correct positions.

6.1.1 Alarm Faults

6.1.1.1 Major Tx Alarms

Alarm	Possible Cause
FPGA CFG	Indicates a transmit FPGA hardware failure.
DSP CFG	Indicates a transmit FPGA failure.
SCT Clock PLL	Indicates that the Tx SCT Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.
SYM Clock PLL	Indicates that the Tx Symbol Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a problem with the incoming clock to the modem (SCTE).
LB Synth PLL	Indicates that the Tx L-Band Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.
IF Synth PLL	Indicates that the Tx IF Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.
Ethernet WAN	Indicates that the WAN Port is down.

6.1.1.2 Major Rx Alarms

Alarm	Possible Cause
FPGA CFG	Indicates a receive FPGA hardware failure.
DSP CFG	Indicates a receive DSP failure.
SIGNAL LOCK	Indicates that the demod is unable to lock to a signal.
FRAME LOCK	Indicates that the Framing Unit is unable to find the expected framing pattern.
MULTIFRAME LOCK	Indicates that the Framing Unit is unable to find the expected framing pattern.
LB SYNTH PLL	Indicates that the Rx L-Band Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.
IF SYNTH PLL	Indicates that the Rx IF Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.
Ethernet WAN	Indicates that the WAN Port is down.

6.1.1.3 Minor Tx Alarms

Alarm	Possible Cause
TERR CLK ACT	Indicates no Terrestrial Clock activity.
TERR DATA ACT	Indicates no Tx Data activity.
TX TERR AIS	Indicates that AIS has been detected in the Tx Data Stream.
DnI FRAME LOCK	When running Drop Mode, indicates that the framing unit is unable to find the exported terrestrial framing pattern.
DnI M-FRAME LOCK	When running Drop Mode, indicates that the framing unit is unable to find the exported terrestrial framing pattern.
TX DVB FRAME LOCK	Indicates that the Tx Input Data Stream Framing does not match the user selected Tx Terr Framing. Incorrect Tx Terr Framing selected. Incorrectly framed Tx Input Data Stream.
BUC CURRENT	Indicates that current is either below or above the threshold limits of the LNB, as specified by the modem. Only active when voltage is enabled.
BUC VOLTAGE	Indicates that the voltage is not functioning correctly when voltage is enabled.

6.1.1.4 Minor Rx Alarms

Alarm	Possible Cause
BUFF UNDERFLOW	Indicates that a Doppler Buffer underflow has occurred.
BUFF NEAR EMPTY	Indicates that the Doppler Buffer is about to underflow.
BUFF NEAR FULL	Indicates that the Doppler Buffer is about to overflow.
BUFF OVERFLOW	Indicates that a Doppler Buffer overflow has occurred.
RX DATA ACTIVITY	Indicates that there is no Rx Data activity. For the Ethernet Interface, indicates that no Ethernet port is active (no cable is plugged in).
SAT AIS	Indicates that AIS has been detected in the receive satellite data stream.
DnI FRAME LOCK	Indicates if drop/insert data is frame locked.
DnI M-FRAME LOCK	Indicates if drop/insert data has multiframe lock.
INSERT CRC	Indicates if the Circular Redundancy Check is passing in PCM-30C and PCM-31C Modes.
T1/E1 SIGNALING	Indicates that the T1/E1 Signal is not locked.
IFEC LOCK	Indicates that the Inner Codec is not locked.
OFEC LOCK	Indicates that the Reed-Solomon Decoder is not locked.
INTERLEAVER	Indicates that the Reed Solomon Interleaver is not synchronized.
EBNO (dB)	Indicates that the Eb/No is outside of limits.
IBS BER	Indicates that there are more than one in 1000 bits in error in IBS mode.
RX DVB FRAME LOCK	Indicates that the Rx Satellite Data Stream Framing is not DVB.
LNB CURRENT	Indicates that current is either below or above the threshold limits of the BUC, as specified by the modem. Only active when voltage is enabled.
LNB VOLTAGE	Indicates that voltage is not functioning correctly when voltage is enabled.

6.1.1.5 Drop and Insert Alarms

Alarm	Possible Cause
Multiframe Lock	The insert framer is not in sync.
CRC Lock	An Insert CRC Fault occurred. Valid in T1-ESF, PCM-30, or PCM-30C Modes.
T1 Signaling	An Insert T1 Yellow Fault occurred. Valid in T1-ESF, T1D4, or SCL-96 Modes.
E1 FAS (E1 Frame Acquisition Sync)	An E1 FAS Fault occurred. Valid in PCM-30, or PCM-30C, PCM-31, or PCM-31C Modes.
E1 MFAS (E1 Multi-Frame Acquisition Sync)	An E1 MFAS Fault occurred. Valid in PCM-30, or PCM-30C, PCM-31, or PCM-31C Modes.

6.1.1.6 Common Major Alarms

Alarm	Possible Cause
TERR FPGA CFG	Indicates an Interface Card FPGA configuration failure probably caused by a missing, or wrong file.
CODEC FPGA CFG	Indicates Turbo Codec Card FPGA configuration failure probably caused by a missing, or wrong file.
+1.5V RX SUPPLY	Displays the measured voltage of the 1.5 Volt Rx power bus located inside the modem.
+1.5V TX SUPPLY	Displays the measured voltage of the 1.5 Volt Tx power bus located inside the modem.
+3.3V SUPPLY	Displays the measured voltage of the +3.3 Volt power bus located inside the modem.
+5V SUPPLY	Displays the measured voltage of the +5 Volt power bus located inside the modem.
+12V SUPPLY	Displays the measured voltage of the +12 Volt power bus located inside the modem.
+20V SUPPLY	Displays the measured voltage of the +20 Volt power bus located inside the modem.
EXT CLOCK ACT	Indicates that the External Clock is not active.
EXT REF ACT	Indicates no activity on the External Reference.
EXT REF LOCK	Indicates that the External Reference PLL is not locked.

6.1.2 Alarm Masks

The DMD20 performs a high degree of self-monitoring and fault isolation. The alarms for these faults are separated into the following three categories:

Active Alarms
Common Equipment Alarms
Backward Alarms

A feature exists that allows the user to 'Mask' out certain alarms as explained below. Alarms that are recorded in the event buffer are the same as the alarm buffer.

! CAUTION!!

Masking alarms may cause undesirable modem performance.

When an alarm is masked, the Front Panel LEDs and the Fault Relays do not get asserted, but the Alarm will still be displayed. This feature is very helpful during debugging or to lock out a failure of which the user is already aware.

6.1.2.1 Active Alarms

6.1.2.1.1 Major Alarms

Major Alarms indicate a modem hardware failure. Major Alarms may flash briefly during modem configuration changes and during power-up but should not stay illuminated. Alarms are grouped into Transmit and Receive Alarms - Transmit and Receive are completely independent.

6.1.2.1.2 Minor Alarms

Minor Alarms indicate that a problem may persist outside the modem such as loss of Terrestrial Clock, loss of terrestrial data activity, or a detected transmit or receive AIS condition.
Alarms are grouped into Transmit and Receive Alarms - Transmit and Receive are completely independent.

6.1.2.1.3 Common Equipment Faults

Common equipment faults indicate hardware or configuration problems in the modem that effect both transmit and receive operation. Most common faults indicate a hardware failure within the modem, such as a bad power supply. Common faults for the External Reference and External Clock indicate a bad modem configuration, not a hardware failure.

6.1.2.2 Latched Alarms

Latched Alarms are used to catch intermittent failures. If a fault occurs, the fault indication will be latched even if the alarm goes away. After the modem is configured and running, it is recommended that the Latched Alarms be cleared as a final step.

6.1.2.3 Backward Alarms

Backward Alarms are alarms that are fed back to or received from the other end of the satellite link. In IBS Mode (including Drop & Insert), Backward Alarm 1 is the only one used. It would be received if the distant end demod drops lock.

6.2 IBS Fault Conditions and Actions

Figure 6-10 and Table 6-4 illustrate the IBS Fault Conditions and Actions to be taken at the Earth Station, at the Terrestrial Data Stream, and the Satellite. These faults include those detected on the Terrestrial link and those detected from the satellite.

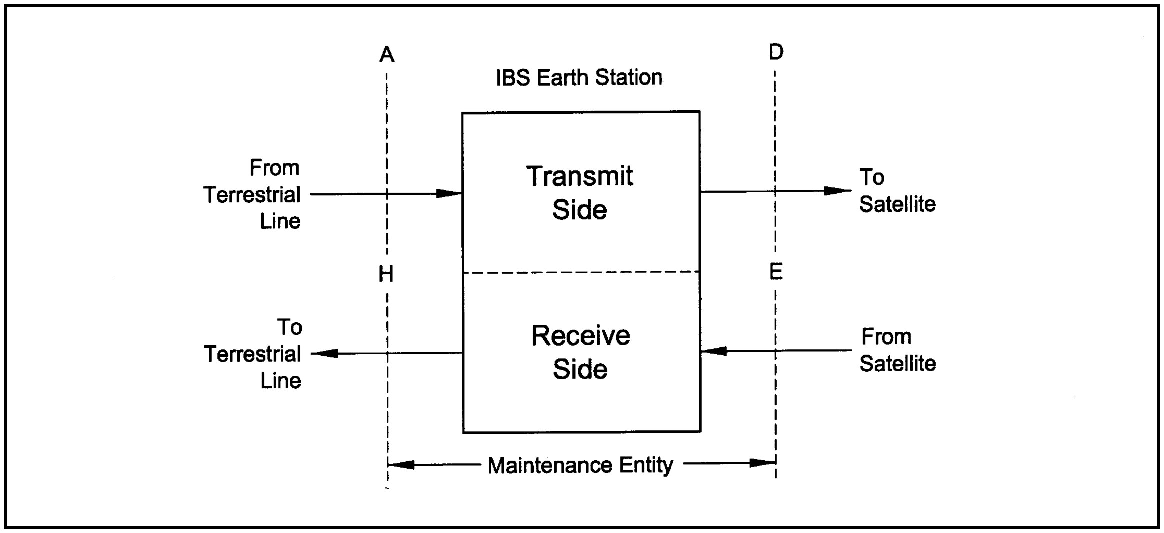


Figure 6-10. IBS Alarm Concept

Table 6-4. IBS Fault Conditions and Actions (includes Drop and Insert)			
Fault Detected on Terrestrial Link (Across Interface A)	**Action In Earth Station**	**Action to Terrestrial (Across Interface H)**	**Action to Satellite (Across Interface D)**
FA1 - Loss of Terrestrial Input	AS1, 2 - IBS Prompt, Service Alarm	AH2 - '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD1 - AIS in Relevant TSs
FA2 - Loss of Terrestrial Signaling	AS1 - - IBS Prompt Alarm	AH2 - '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD3 - '1111' in RelevantTS16's
FA3 - Loss of Terrestrial Frame	AS1 - - IBS Prompt Alarm	AH2 - '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD1 - AIS in Relevant TSs
FA4 - Loss of Terrestrial Multiframe	AS1 - IBS Prompt Alarm	AH2 - '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD3 - '1111' in Relevant TS16's
FA5 - BER of $1x\ 10^{-3}$ or Greater on Terrestrial Input	AS1 - IBS Prompt Alarm	AH2 - '1' in Bit 3 of NFAS TSO, Yellow Alarm	AD1 - AIS in Relevant TSs
FA6 - Alarm Indication Received on Terrestrial Input	---	---	AD2 - '1' in Bit 3 of Byte 32
Fault Detected From Satellite (Across Interface E)			
FA1 - Loss of Satellite Signal Input	AS1, 2 - IBS Prompt, Service Alarm	AH1, 3 - AIS in TSs, '1111' in TS16	AD2 - '1' in Bit 3 of Byte 32
FA2 - Loss of Satellite Frame	AS1, 2 - IBS Prompt, Service Alarm	AH1, 3 - AIS in TSs, '1111' in TS16	AD2 - '1' in Bit 3 of Byte 32
FA3 - Loss of Satellite Multiframe	AS1, 2 - IBS Prompt, Service Alarm	AH1, 3 - AIS in TSs, '1111' in TS16	AD2 - '1' in Bit 3 of Byte 32
FA4 - BER of 1E-3 or Greater From Satellite Input	AS1, 2 - IBS Prompt, Service Alarm	AH1, 3 - AIS in TSs, '1111' in TS16	AD2 - '1' in Bit 3 of Byte 32
FA5 - Alarm Indication Received From Satellite Input	AS2 - IBS Service Alarm	AH2 - '1' in Bit 3 of NFAS TS0, Yellow Alarm	---

Technical Specifications

7

7.0 Data Rates

BPSK Uncoded	4.8 Kbps to 10.0 Mbps
1/2 Rate BPSK	2.4 Kbps to 5.0 Mbps
3/4 Rate BPSK	3.6 Kbps to 7.5 Mbps
7/8 Rate BPSK	4.2 Kbps to 8.75 Mbps
QPSK Uncoded	9.6 Kbps to 20.0 Mbps
1/2 Rate QPSK	4.8 Kbps to 10.0 Mbps
3/4 Rate QPSK	7.2 Kbps to 15.0 Mbps
7/8 Rate QPSK	8.4 Kbps to 17.5 Mbps
Rate 2/3 8PSK	9.6 Mbps to 20.0 Mbps
3/4 Rate 16QAM	14.4 Mbps to 20.0 Mbps
7/8 Rate 16QAM	16.84 Mbps to 20.0 Mbps

7.1 Modulator

Modulation	BPSK, QPSK, and OQPSK (8PSK, 16QAM Optional)
IF Tuning Range	50 to 90, 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range	950 to 2050 MHz in 1 Hz Steps
Impedance	IF, 75-Ohm (50-Ohm Optional) L-Band, 50-Ohm
Connector	BNC, 75-Ohm SMA, 50-Ohm, L-Band
Return Loss	IF, 20 dB Minimum L-Band, 14 dB Minimum
Output Power	0 to -25 dB
Output Stability	±0.5 dB Over Time and Temperature
Output Spectrum	Meets IESS 308/309/310 Power Spectral Mask
Spurious	-60 dBc In-Band (50 to 90 MHz, 100 to 180 MHz, 950 to 2050 MHz) -45 dBc Out-of-Band
On/Off Power Ratio	>60 dB
Scrambler	CCITT V.35 or IBS (Others Optional)
FEC	Viterbi, K = 7 at 1/2, 3/4 and 7/8 2/3 Rate Trellis Turbo Product Code (Optional) 0.495 - (32,26) x (32,26) x (4,3) 0.793 - (64,57) x (64,57) (Turbo Supported at all Modulation Types)
Outer Encoder Options	Reed-Solomon INTELSAT (DVB Optional)
Data Clock Source	Internal, External, Rx Recovered
Internal Stability	1×10^{-6} Typical (Optional to 5×10^{-8})

7.2 Demodulator

Demodulation	BPSK, QPSK, and OQPSK (8PSK, 16QAM Optional)
IF Tuning Range	50 to 90, 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range	950 to 2050 MHz in 1 Hz Steps
Impedance	IF, 75-Ohm (50-Ohm optional) L-Band, 50-Ohm
Connector	BNC, 75-Ohm SMA, 50-Ohm, L-Band
Return Loss	IF, 20 dB Minimum L-Band, 14 dB Minimum
Spectrum	INTELSAT IESS 308/309/310 Compliant
Input Level	10 x log (Symbol Rate) - 100, ±12 dB
Adjacent Channel Rejection Ratio	>+10 dBc
Total Input Power	-10 dBm or +40 dBc (the Lesser) @ 256 Kbps
FEC	Viterbi, K = 7 at 1/2, 3/4 and 7/8 Rate, Rate Sequential 1/2, 3/4, 7/8 (Optional) Trellis 2/3 Turbo Product Code (Optional) 0.495 - (32,26) x (32,26) x (4,3) 0.793 - (64,57) x (64,57) (Turbo Supported at all Modulation Types)
Decoder Options	Reed-Solomon INTELSAT (DVB Optional)
Descrambler	CCITT V.35 or IBS (Others Optional)
Acquisition Range	Programmable ±1 kHz to ± 255 kHz
Sweep Delay Value	100 msec to 6000 sec. in 100 msec Steps

7.3 Plesiochronous Buffer

Size	0 msec to 64 msec
Centering	Automatic on Underflow/Overflow
Centering Modes	IBS: Integral Number of Frames IDR: Integral Number of Multi Frames
Clock	Transmit, External, Rx Recovered or SCT (Internal)

7.4 Monitor and Control

Remote RS-485/Terminal RS-232/Ethernet 10 Base-T
DMD15 Protocol Compatible

7.5 DMD20 Drop and Insert (Optional)

Terrestrial Data	1.544 Mbps or 2.048 Mbps, G.732/733
Line Coding	AMI or B8ZS for T1 and HDB3 for E1
Framing	D4, ESF and PCM-30 (PCM-30C) or PCM-31 (PCM- 31C) for E1
Time Slot Selection	n x 64 Contiguous or Arbitrary Blocks for Drop or Insert.
Time Slots	TS1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 30, 31
Data Rates	64, 128, 192, 256, 320, 384, 512, 640, 768, 960, 1024, 1280, 1536, 1920 Kbps

7.6 Terrestrial Interfaces

A variety of standard interfaces are available for the DMD20 modem in stand-alone applications.

7.7 IDR/ESC Interface (Optional)

G.703 T1 (DSX1)	1.544 Mbps, 100-Ohm Balanced, AMI and B8ZS
G.703 E1	2.048 Mbps, 75-Ohm Unbalanced and 120-Ohm Balanced, HDB3
G.703 T2 (DSX2)	6.312 Mbps, 75-Ohm Unbalanced and 110-Ohm Balanced, B8ZS and B6ZS
G.703 E2	8.448 Mbps, 75-Ohm BNC, Unbalanced, HDB3

7.8 IBS/Synchronous Interface (Standard)

RS-422/-449	All Rates, Differential, Clock/Data, DCE
ITU V.35	All Rates, Differential, Clock/Data, DCE
RS-232	(DCE up to 200 Kbps)

7.9 High-Speed Serial Interface (HSSI)

HSSI:	HSSI, Serial, 50-Pin SCSI-2 Type Connector (Female)

7.10 ASI

ASI/RS-422 Parallel:	ASI, Serial, 75-Ohm BNC (Female) DVB/M2P, Parallel, RS-422, DB-25 (Female)
ASI/LVDS Parallel:	ASI, Serial, 75-Ohm BNC (Female) DVB/M2P, Parallel, LVDS, DB-25 (Female)

7.11 DVB/M2P

DVB/M2P:	DB-25 Female Connector. It complies with RS-422 Electrical Specifications.

7.12 Ethernet Data Interface (Optional)

Ethernet Data Interface	Four RJ-45, Auto-Crossover, Auto-Sensing, 10/100 Ethernet Data Ports. Complies with IEEE 802.3 and IEEE 802.3u.

7.13 Environmental

Prime Power	100 to 240 VAC, 50 to 60 Hz, 40 Watts Maximum 48 VDC (Optional)
Operating Temperature	0 to 50°C, 95% Humidity, Non-Condensing
Storage Temperature	-20 to 70°C, 99% humidity, Non-Condensing

7.14 Physical

Size	19” W x 16” D x 1.75” H (48.26 x 40.64 x 4.45 cm)
Weight	6.5 Pounds (3.0 Kg)

7.15 DMD20 Data Rate Limits

7.15.1 Non-DVB

Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	NONE	4800	10000000
BPSK	VIT 1/2	2400	5000000
BPSK	VIT 3/4	3600	7500000
BPSK	VIT 7/8	4200	8750000
BPSK	SEQ 1/2	2400	2048000
BPSK	SEQ 3/4	3600	2048000
BPSK	SEQ 7/8	4200	2048000
BPSK	TPC 21/44	2400	4772727
BPSK	TPC .495	2376	4950000
BPSK	TPC .793	3806	7930000
QPSK	NONE	9600	20000000
QPSK	VIT 1/2	4800	10000000
QPSK	VIT 3/4	7200	15000000
QPSK	VIT 7/8	8400	17500000
QPSK	SEQ 1/2	4800	2048000
QPSK	SEQ 3/4	7200	2048000
QPSK	SEQ 7/8	8400	2048000
QPSK	TPC 1/2	4582	9545454
QPSK	TPC 3/4	7200	15000000
QPSK	TPC 7/8	8400	17500000
QPSK	TPC .495	4752	6312000
QPSK	TPC .793	7612	6312000
OQPSK	NONE	9600	20000000
OQPSK	VIT 1/2	4800	10000000
OQPSK	VIT 3/4	7200	15000000
OQPSK	VIT 7/8	8400	17500000
OQPSK	SEQ 1/2	4800	2048000
OQPSK	SEQ 3/4	7200	2048000
OQPSK	SEQ 7/8	8400	2048000
OQPSK	TPC 1/2	4582	9545454
OQPSK	TPC 3/4	7200	15000000
OQPSK	TPC 7/8	8400	17500000

OQPSK	TPC .495	4752	6312000
OQPSK	TPC .793	7612	6312000
8PSK	TRE 2/3	9600	20000000
8PSK	TPC 3/4	10800	20000000
8PSK	TPC 7/8	12600	20000000
8PSK	TPC .495	9504	6312000
8PSK	TPC .793	15225	6312000
16QAM	VIT 3/4	14400	20000000
16QAM	VIT 7/8	16840	20000000
16QAM	TPC 3/4	1440	20000000
16QAM	TPC 7/8	16800	20000000
16QAM	TPC .495	9504	6312000
16QAM	TPC .793	15225	6312000

7.15.2 DVB

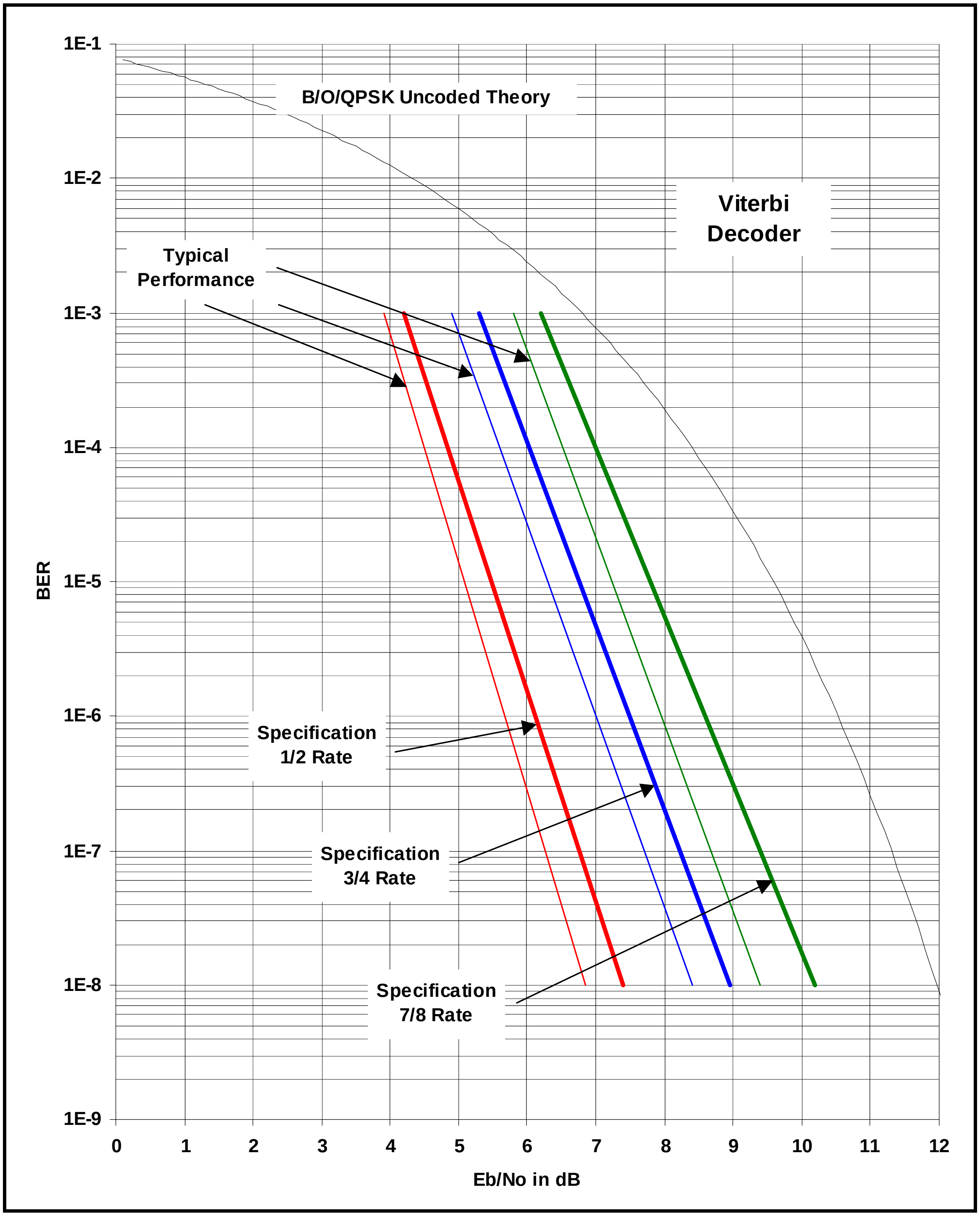
187 Mode			
Modulation	**Code Rate**	**Min Data Rate**	**Max Data Rate**
BPSK	VIT 1/2	2400	4583333
BPSK	VIT 2/3	2934	6111111
BPSK	VIT 3/4	3300	6875000
BPSK	VIT 5/6	3667	7638888
BPSK	VIT 7/8	3850	8020833
QPSK	VIT 1/2	4400	9166666
QPSK	VIT 2/3	5867	12222222
QPSK	VIT 3/4	6600	13750000
QPSK	VIT 5/6	7334	15277777
QPSK	VIT 7/8	7700	16041666
8PSK	TRE 2/3	8800	18333333
8PSK	TRE 5/6	11000	20000000
8PSK	TRE 8/9	11550	20000000
16QAM	VIT 3/4	13200	20000000
16QAM	VIT 7/8	15400	20000000

188 Mode			
Modulation	**Code Rate**	**Min Data Rate**	**Max Data Rate**
BPSK	VIT 1/2	2400	4607843
BPSK	VIT 2/3	2950	6143790
BPSK	VIT 3/4	3318	6911764
BPSK	VIT 5/6	3687	7679738
BPSK	VIT 7/8	3871	8063725
QPSK	VIT 1/2	4424	9215686
QPSK	VIT 2/3	5899	12287581
QPSK	VIT 3/4	6636	13823529
QPSK	VIT 5/6	7373	15359476
QPSK	VIT 7/8	7742	16127450
8PSK	TRE 2/3	8848	18431372
8PSK	TRE 5/6	11059	20000000
8PSK	TRE 8/9	11797	20000000
16QAM	VIT 3/4	13271	20000000
16QAM	VIT 7/8	15483	20000000

204 Mode			
Modulation	**Code Rate**	**Min Data Rate**	**Max Data Rate**
BPSK	VIT 1/2	2400	5000000
BPSK	VIT 2/3	3200	6666666
BPSK	VIT 3/4	3600	7500000
BPSK	VIT 5/6	4000	8333333
BPSK	VIT 7/8	4200	8750000
QPSK	VIT 1/2	4800	10000000
QPSK	VIT 2/3	6400	13333333
QPSK	VIT 3/4	7200	15000000
QPSK	VIT 5/6	8000	16666666
QPSK	VIT 7/8	8400	17500000
8PSK	TRE 2/3	9600	20000000
8PSK	TRE 5/6	12000	20000000
8PSK	TRE 8/9	12800	20000000
16QAM	VIT 3/4	14400	20000000
16QAM	VIT 7/8	16800	20000000

7.16 DMD20/DMD20 LBST BER Specifications

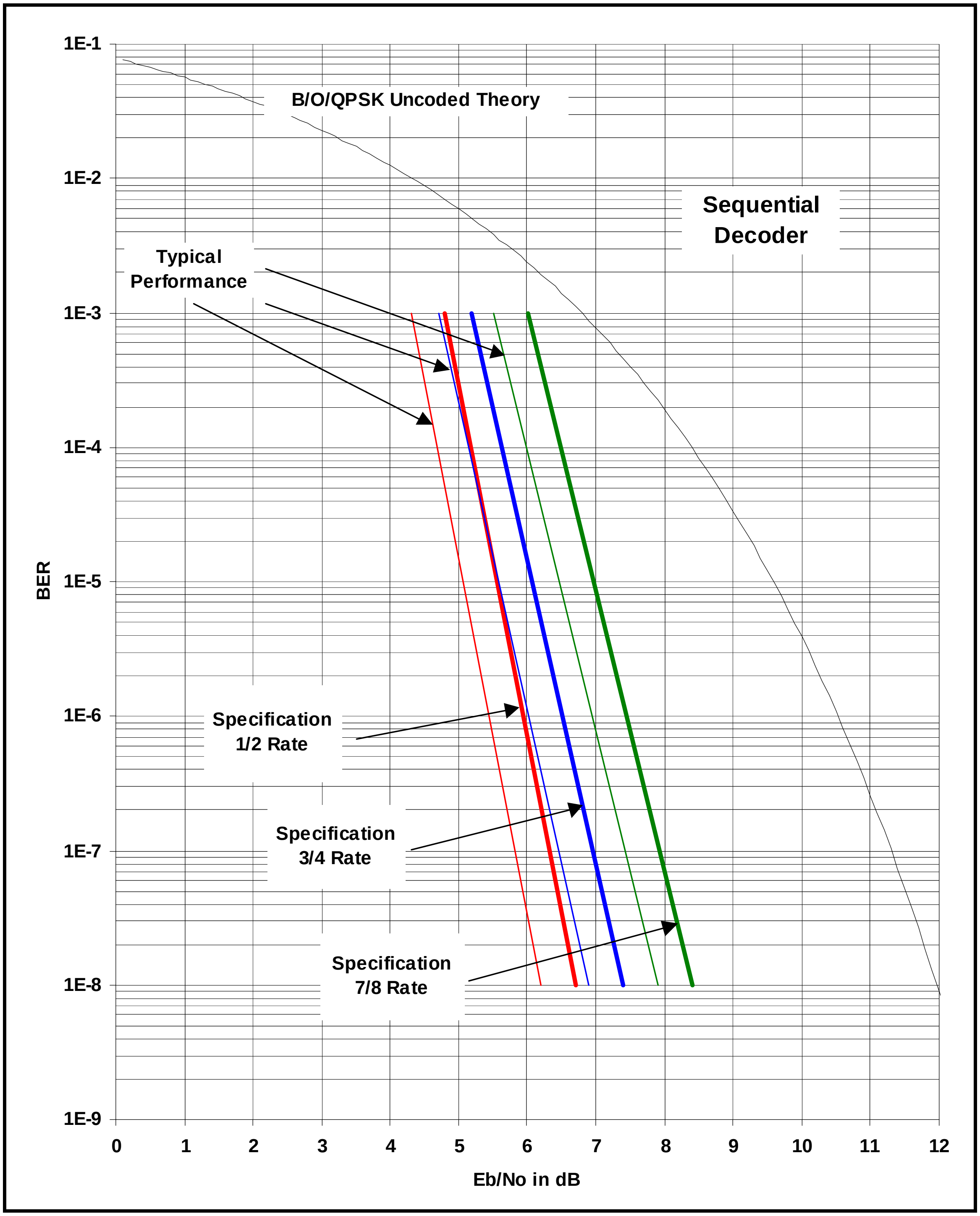
7.16.1 BER Performance (Viterbi)



Note: Eb/No values include the effect of using Differential Decoding and V.35 descrambling.

Figure 7-1. DMD20/DMD20 LBST B/O/QPSK BER Performance (Viterbi)

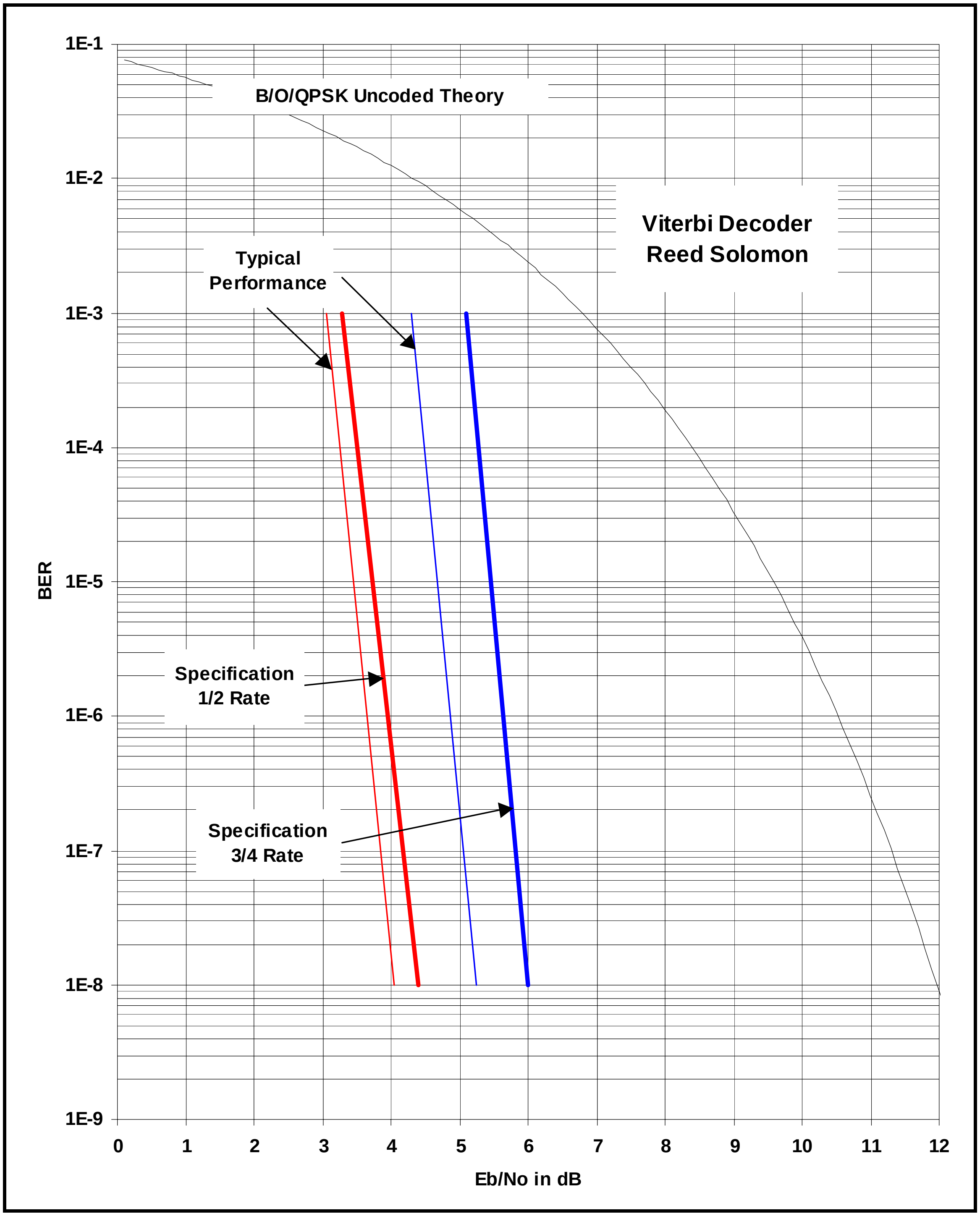
7.16.2 BER Performance (Sequential)



Note: Eb/No values include the effect of using Differential Decoding and v.35 descrambling.

Figure 7-2. DMD20/DMD20 LBST B/O/QPSK BER Performance (Sequential)

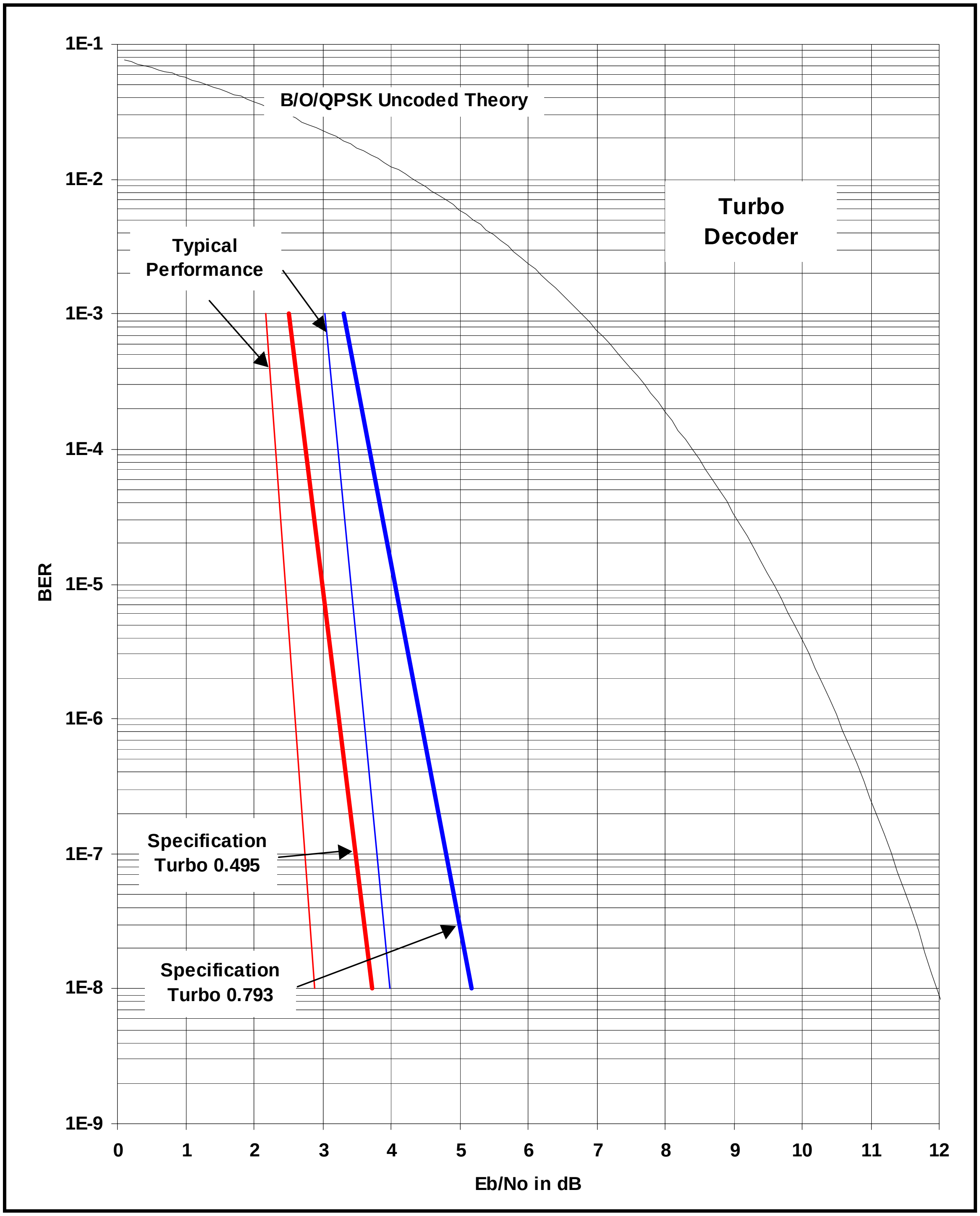
7.16.3 BER Performance (Viterbi with Reed-Solomon)



Note: Eb/No values include the effect of using Differential Decoding.

Figure 7-3. DMD20/DMD20 LBST B/O/QPSK BER Performance (Viterbi w/R-S)

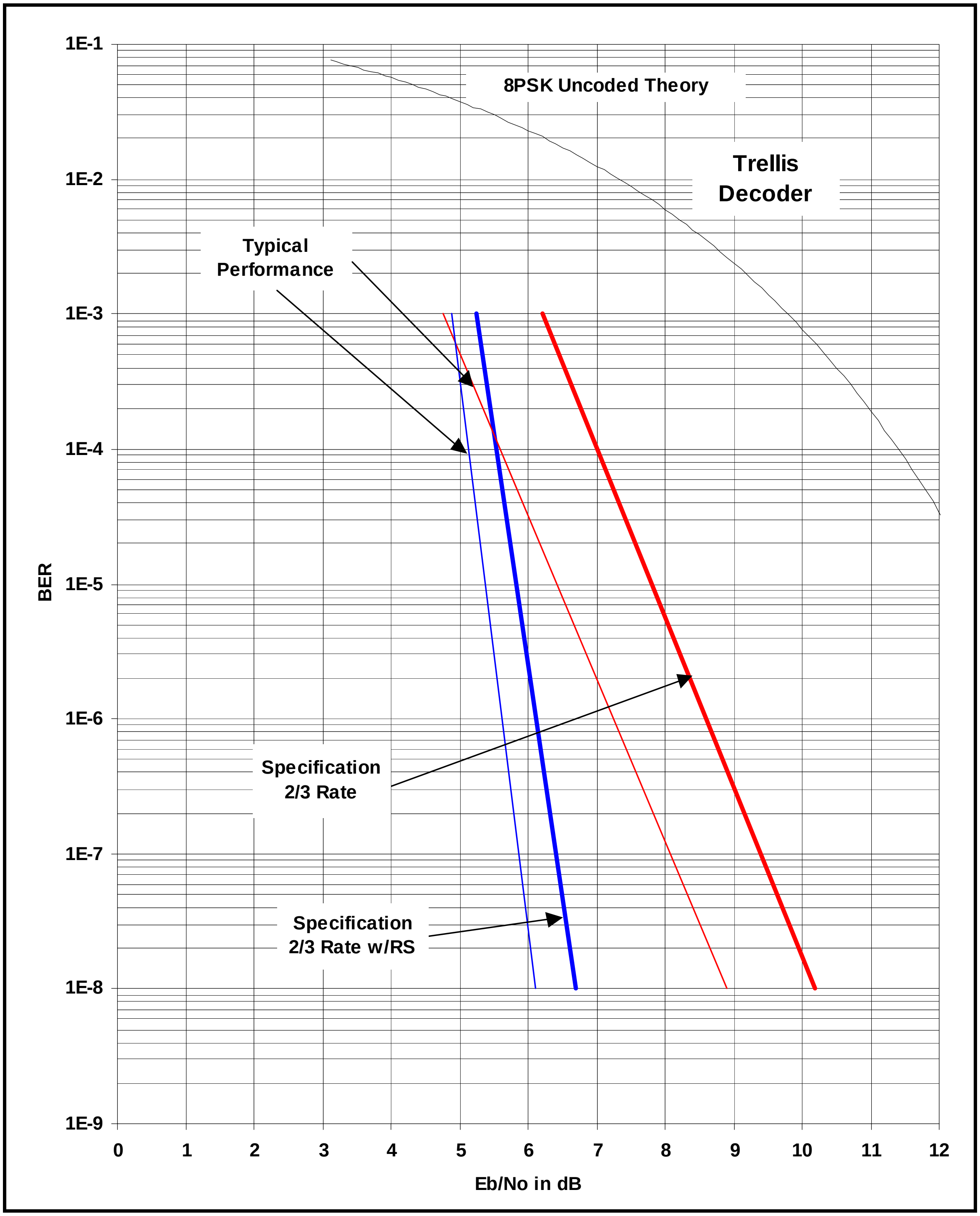
7.16.4 BER Performance (Turbo)



Note: Eb/No values include the effect of using interleaving and maximum iterations.

Figure 7-4. DMD20/DMD20 LBST B/O/QPSK BER Performance (Turbo)

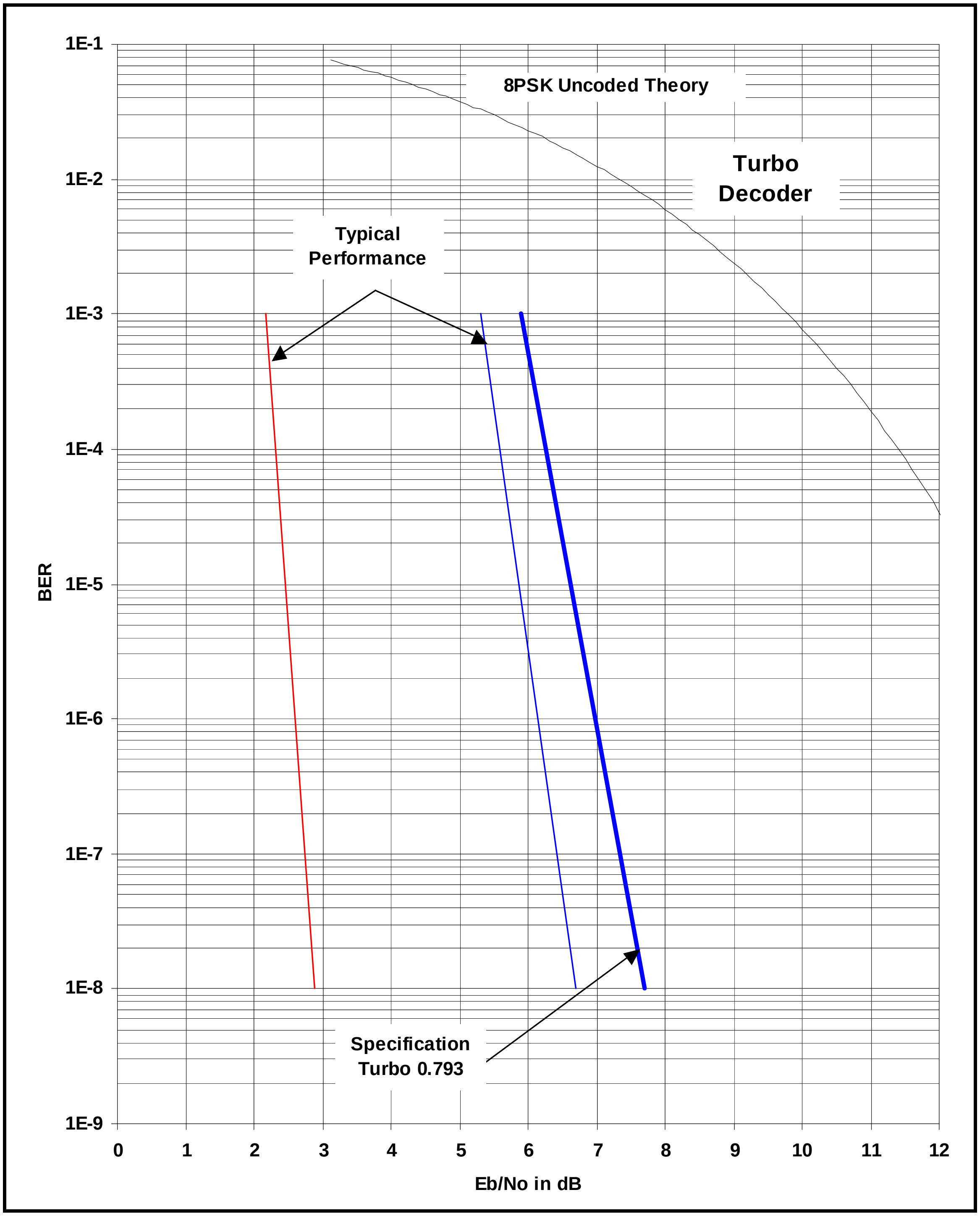
7.16.5 BER Performance (8PSK Trellis)



Note: Eb/No values include the effect of using Differential Decoding and V.35 Descrambling.

Figure 7-5. DMD20/DMD20 LBST 8PSK BER Performance (Trellis)

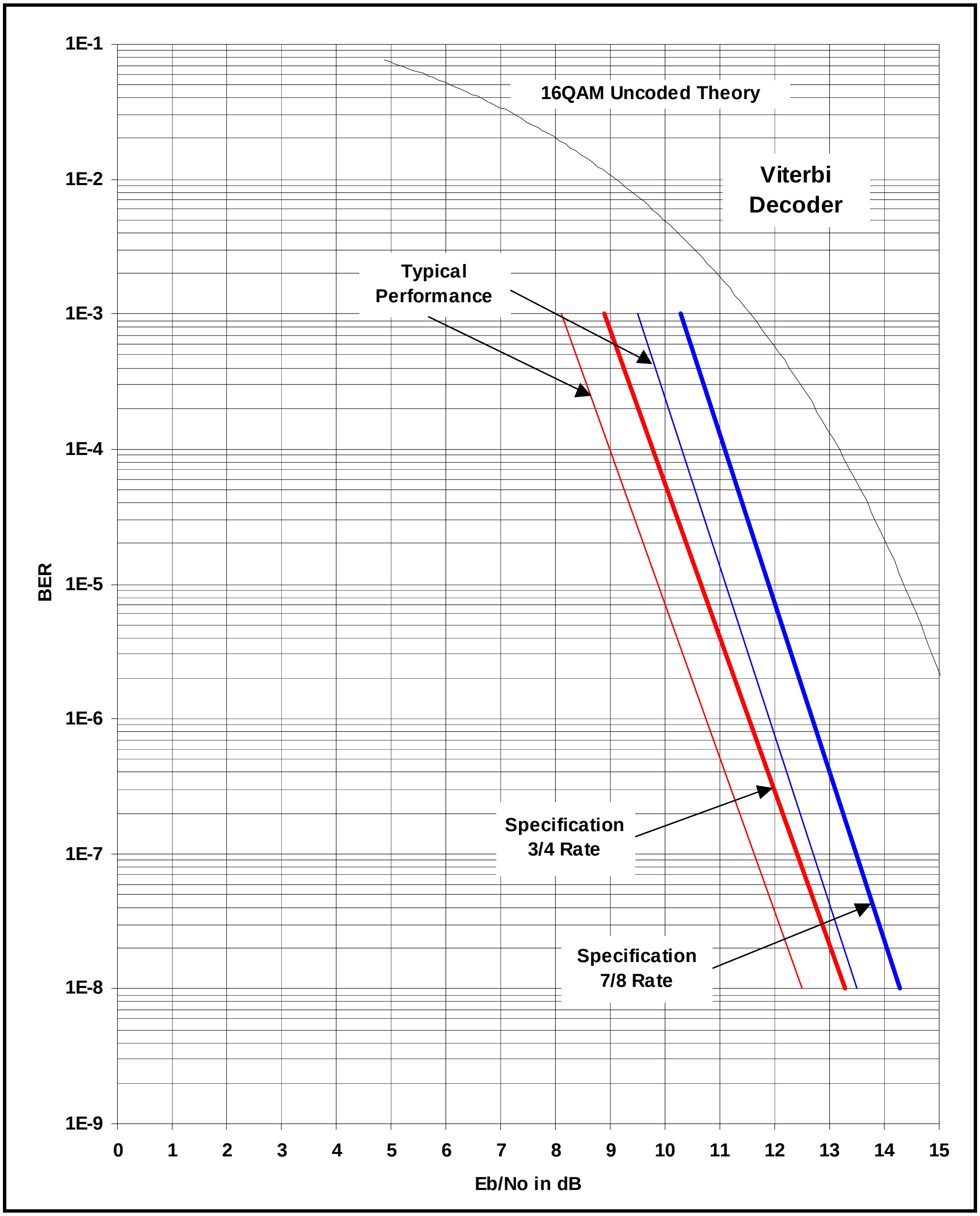
7.16.6 BER Performance (8PSK Turbo)



Note: Eb/No values include the effect of using interleaving and maximum iterations.

Figure 7-6. DMD20/DMD20 LBST 8PSK BER Performance (Turbo)

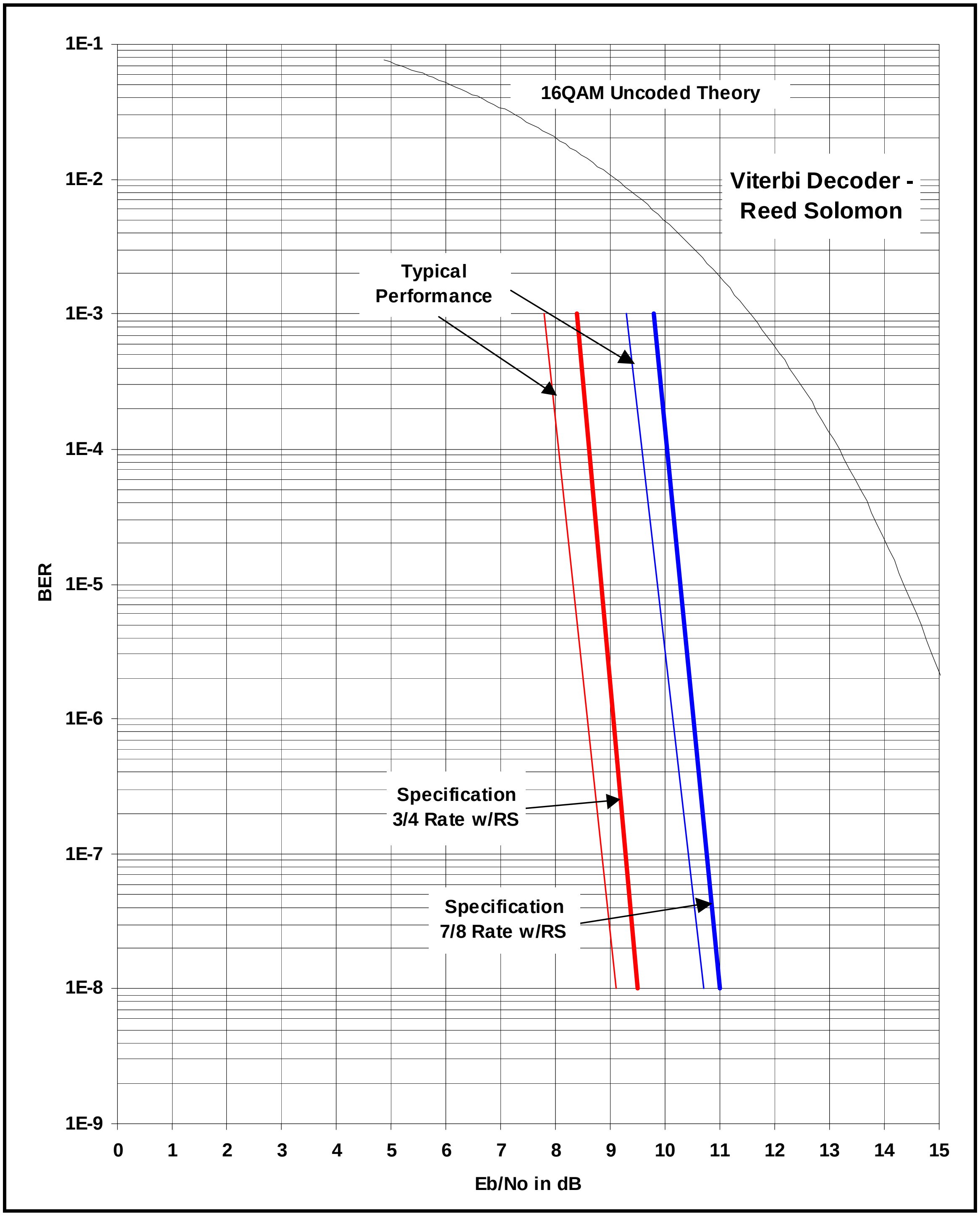
7.16.7 BER Performance (16QAM Viterbi)



Note: Eb/No values include the effect of using Differential Decoding and V.35 Descrambling.

Figure 7-7. DMD20/DMD20 LBST 16QAM BER Performance (Viterbi)

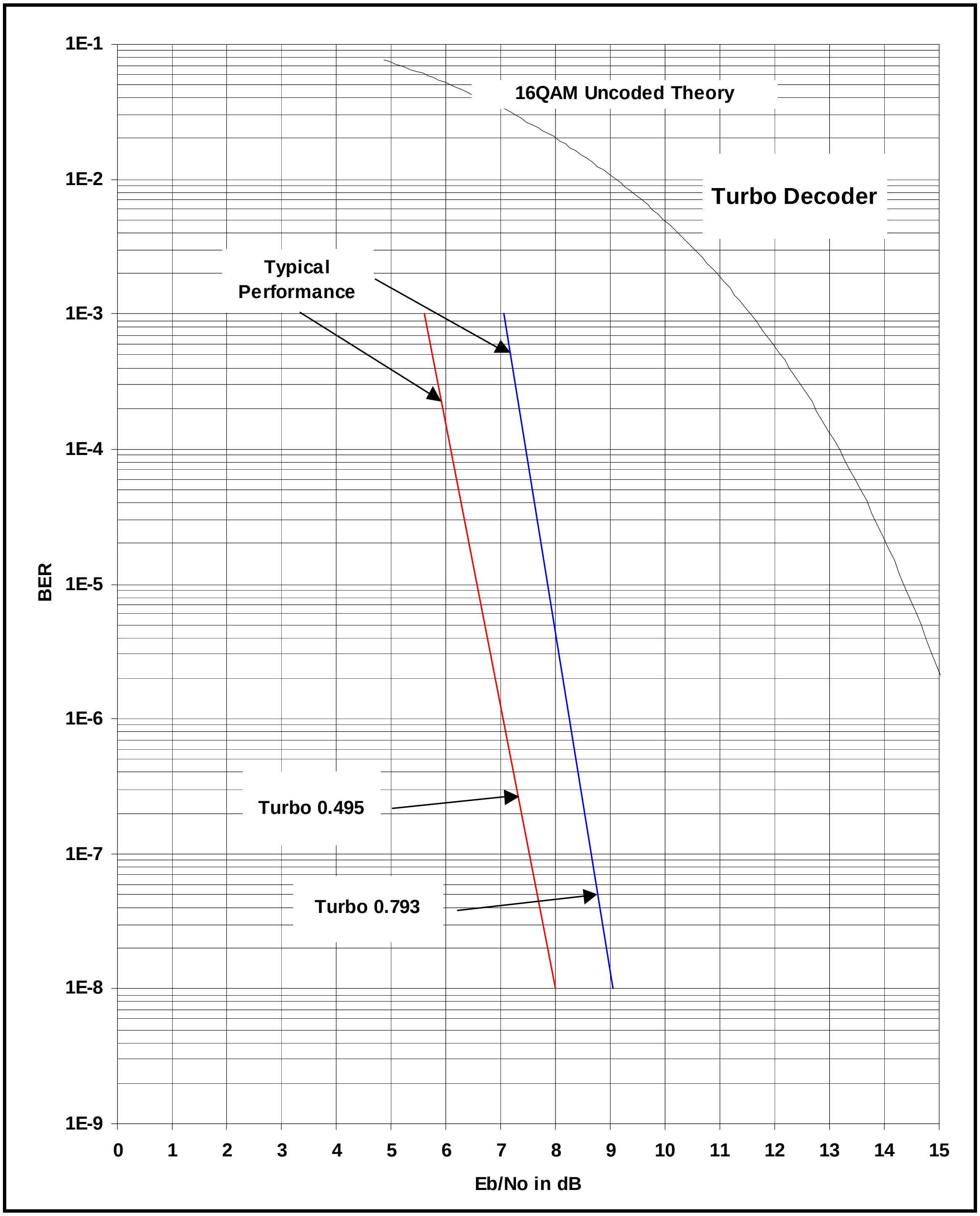
7.16.8 BER Performance (16QAM Viterbi with Reed-Solomon)



Note: Eb/No values include the effect of using Differential Decoding.

Figure 7-8. DMD20/DMD20 LBST 16QAM BER Performance (Viterbi w/R-S)

7.16.9 BER Performance (16QAM Turbo)



Note: Eb/No values include the effect of using interleaving and maximum iterations.

Figure 7-9. DMD20/DMD20 LBST 16QAM BER Performance (Turbo)

7.16.10 BER Performance ((O)QPSK Turbo)

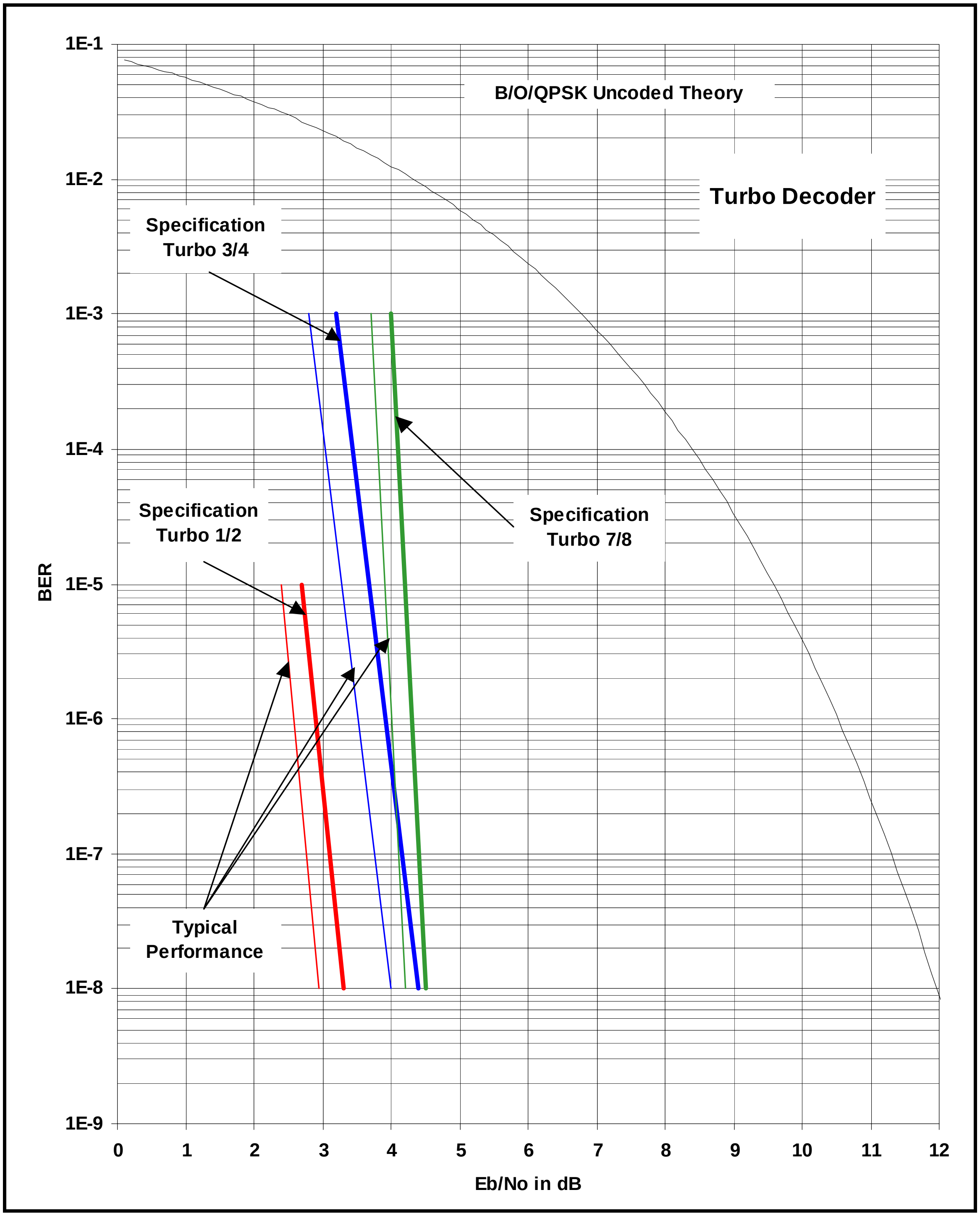


Figure 7-10. DMD20/DMD20 LBST (O)QPSK BER Performance (Turbo)

7.16.11 BER Performance (8PSK Turbo)

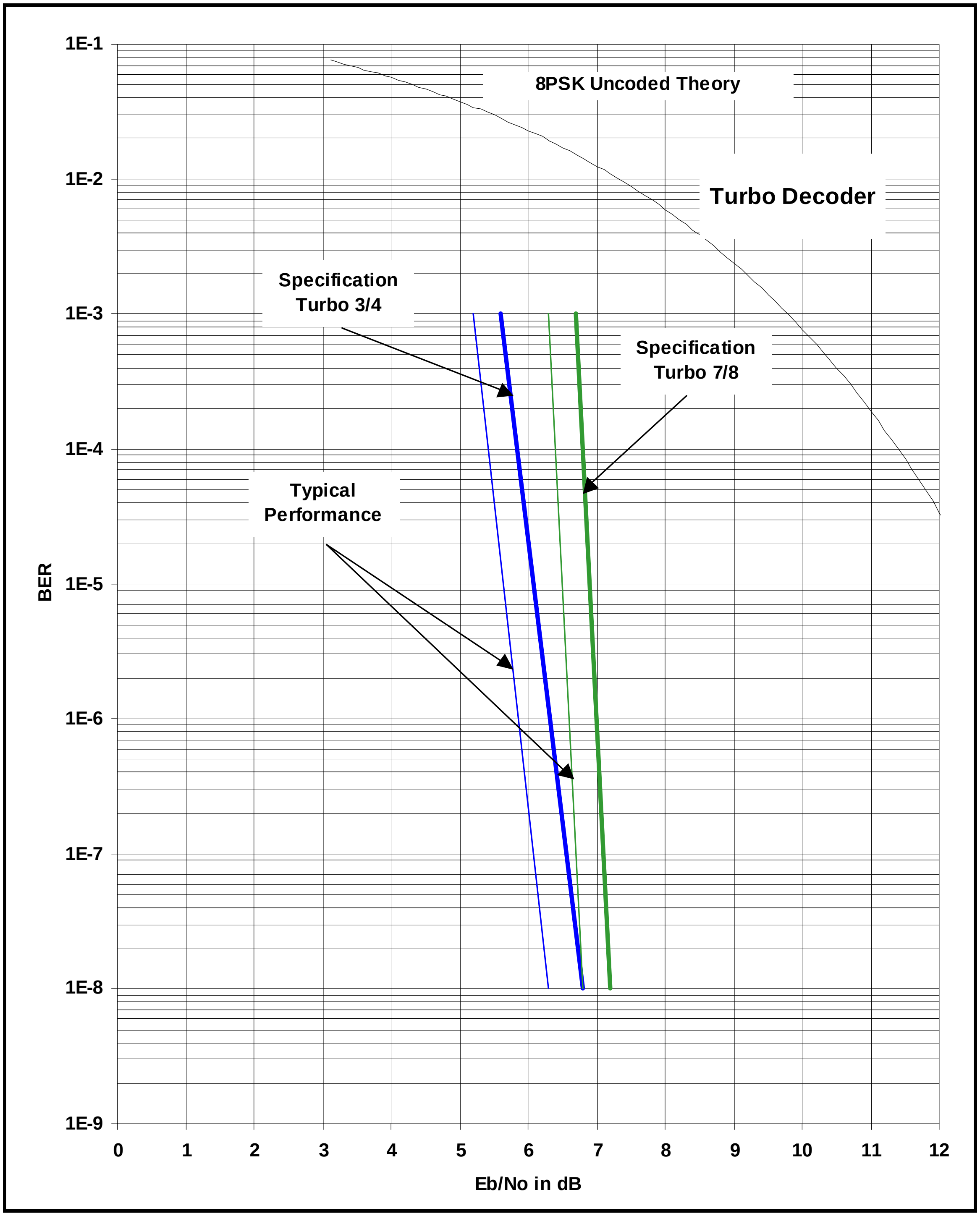


Figure 7-11. DMD20/DMD20 LBST 8PSK BER Performance (Turbo)

7.16.12 BER Performance (16QAM Turbo)

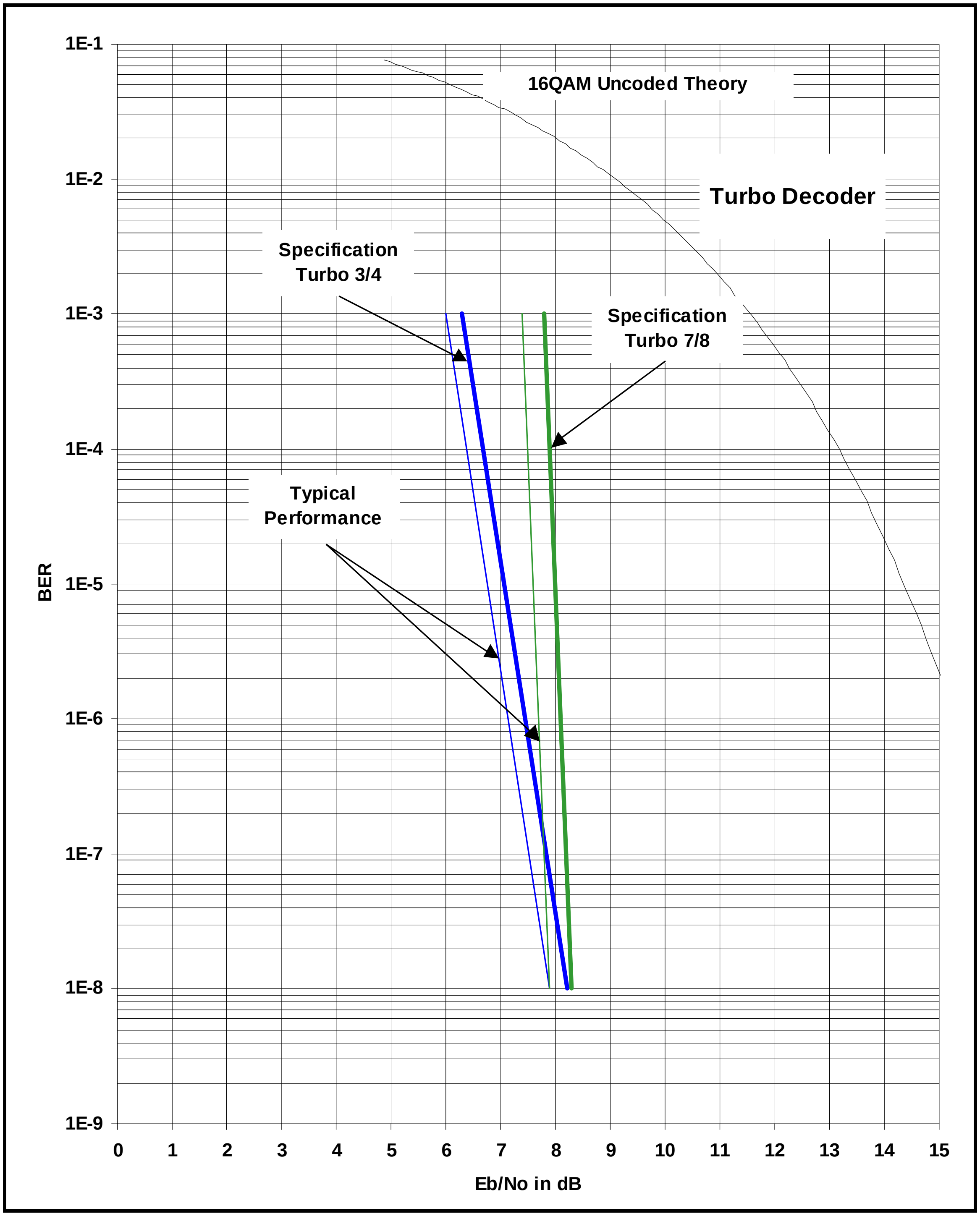


Figure 7-12. DMD20/DMD20 LBST 16QAM BER Performance (Turbo)

Table 7-1 - B/O/QPSK BER Performance (Viterbi)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	4.2 dB	5.3 dB	6.2 dB	3.9 dB	4.9 dB	5.8 dB
1E-4	4.8 dB	6.1 dB	7.1 dB	4.5 dB	5.6 dB	6.5 dB
1E-5	5.5 dB	6.8 dB	7.9 dB	5.1 dB	6.3 dB	7.2 dB
1E-6	6.1 dB	7.6 dB	8.6 dB	5.7 dB	7 dB	8.6 dB
1E-7	6.7 dB	8.3 dB	9.3 dB	6.2 dB	7.7 dB	9.4 dB
1E-8	7.4 dB	8.9 dB	10.2 dB	6.8 dB	8.4 dB	10.2 dB
1E-9	8.2 dB	9.7 dB	11 dB	7.4 dB	9.1 dB	10 dB
1E-10	9 dB	10.3 dB	11.7 dB	8.1 dB	9.8 dB	10.5 dB

Table 7-2 - B/O/QPSK BER Performance (Sequential)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	4.8 dB	5.2 dB	6 dB	4.3 dB	4.7 dB	5.5 dB
1E-4	5.2 dB	5.7 dB	6.4 dB	4.7 dB	5.2 dB	5.9 dB
1E-5	5.6 dB	6.1 dB	6.9 dB	5.1 dB	5.6 dB	6.4 dB
1E-6	5.9 dB	6.5 dB	7.4 dB	5.4 dB	6.1 dB	6.9 dB
1E-7	6.3 dB	7 dB	7.9 dB	5.8 dB	6.5 dB	7.4 dB
1E-8	6.7 dB	7.4 dB	8.4 dB	6.2 dB	6.9 dB	7.9 dB
1E-9	7.1 dB	7.8 dB	8.9 dB	6.6 dB	7.4 dB	8.4 dB
1E-10	7.4 dB	8.3 dB	9.4 dB	6.9 dB	7.8 dB	8.9 dB

Table 7-3 - B/O/QPSK BER Performance (Viterbi - w/RS)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	3.3 dB	5.1 dB	TBD	3 dB	4.3 dB	TBD
1E-4	3.5 dB	5.3 dB	TBD	3.2 dB	4.5 dB	TBD
1E-5	3.8 dB	5.4 dB	TBD	3.4 dB	4.7 dB	TBD
1E-6	4.1 dB	5.6 dB	TBD	3.6 dB	4.9 dB	TBD
1E-7	4.2 dB	5.8 dB	TBD	3.8 dB	5.1 dB	TBD
1E-8	4.4 dB	6 dB	TBD	4 dB	5.3 dB	TBD
1E-9	4.7 dB	6.1 dB	TBD	4.2 dB	5.4 dB	TBD
1E-10	5 dB	6.3 dB	TBD	4.4 dB	5.6 dB	TBD

Table 7-4 - B/O/QPSK BER Performance (Turbo)				
BER	Specification		Typical	
	Turbo 0.495	Turbo 0.793	Turbo 0.495	Turbo 0.793
1E-3	2.5 dB	3.3 dB	2.2 dB	3 dB
1E-4	2.7 dB	3.7 dB	2.3 dB	3.2 dB
1E-5	3 dB	4.1 dB	2.5 dB	3.4 dB
1E-6	3.2 dB	4.4 dB	2.6 dB	3.6 dB
1E-7	3.5 dB	4.8 dB	2.7 dB	3.8 dB
1E-8	3.7 dB	5.2 dB	2.9 dB	4 dB
1E-9	4 dB	5.6 dB	3 dB	4.2 dB
1E-10	4.2 dB	5.9 dB	3.2 dB	4.4 dB

Table 7-5 - 8PSK BER Performance (Trellis)				
BER	Specification		Typical	
	2/3 Rate	2/3 Rate w/RS	2/3 Rate	2/3 Rate w/RS
1E-3	6.2 dB	5.2 dB	4.8 dB	4.9 dB
1E-4	7 dB	5.5 dB	5.6 dB	5.1 dB
1E-5	7.8 dB	5.8 dB	6.4 dB	5.4 dB
1E-6	8.7 dB	6.2 dB	7.2 dB	5.6 dB
1E-7	9.5 dB	6.5 dB	8.1 dB	5.8 dB
1E-8	10.2 dB	6.7 dB	8.9 dB	6.1 dB
1E-9	11.1 dB	6.9 dB	9.7 dB	6.3 dB
1E-10	11.9 dB	7.3 dB	10.5 dB	6.6 dB

Table 7-6 - 8PSK BER Performance (Turbo)				
BER	Specification		Typical	
	Turbo 0.495	Turbo 0.793	Turbo 0.495	Turbo 0.793
1E-3	TBD	5.9 dB	2.2 dB	5.3 dB
1E-4	TBD	6.3 dB	2.3 dB	5.6 dB
1E-5	TBD	6.6 dB	2.5 dB	5.8 dB
1E-6	TBD	6.9 dB	2.6 dB	6.1 dB
1E-7	TBD	7.3 dB	2.7 dB	6.4 dB
1E-8	TBD	7.7 dB	2.9 dB	6.7 dB
1E-9	TBD	8 dB	3 dB	6.9 dB
1E-10	TBD	8.4 dB	3.2 dB	7.1 dB

Table 7-7 - 16QAM BER Performance (Viterbi)				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	8.9 dB	10.3 dB	8.1 dB	9.5 dB
1E-4	9.8 dB	11.1 dB	9 dB	10.3 dB
1E-5	10.7 dB	11.9 dB	9.9 dB	11.1 dB
1E-6	11.5 dB	12.7 dB	10.7 dB	11.9 dB
1E-7	12.4 dB	13.5 dB	11.6 dB	12.7 dB
1E-8	13.3 dB	14.3 dB	12.5 dB	13.5 dB
1E-9	14.2 dB	15.1 dB	13.4 dB	14.3 dB
1E-10	15 dB	15.9 dB	14.2 dB	15.1 dB

Table 7-8 - 16QAM BER Performance (Viterbi				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	8.4 dB	9.8 dB	7.8 dB	9.3 dB
1E-4	8.6 dB	8.1 dB	8.1 dB	9.6 dB
1E-5	8.9 dB	8.3 dB	8.3 dB	9.9 dB
1E-6	9.1 dB	8.6 dB	8.6 dB	10.2 dB
1E-7	9.3 dB	8.8 dB	8.8 dB	10.4 dB
1E-8	9.5 dB	9.1 dB	9.1 dB	10.7 dB
1E-9	9.8 dB	9.3 dB	9.3 dB	11 dB
1E-10	10 dB	9.6 dB	9.6 dB	11.3 dB

Table 7-9 - 16QAM BER Performance (Turbo)				
BER	Specification		Typical	
	Turbo 0.495	Turbo 0.793	Turbo 0.495	Turbo 0.793
1E-3	TBD	TBD	5.6 dB	7 dB
1E-4	TBD	TBD	6.1 dB	7.4 dB
1E-5	TBD	TBD	6.6 dB	7.8 dB
1E-6	TBD	TBD	7 dB	8.2 dB
1E-7	TBD	TBD	7.5 dB	8.6 dB
1E-8	TBD	TBD	8 dB	9 dB
1E-9	TBD	TBD	8.5 dB	9.4 dB
1E-10	TBD	TBD	9 dB	9.9 dB

Table 7-10 - (O)QPSK BER Performance (Turbo)						
BER	Specification			Typical		
	Turbo 1/2	Turbo 3/4	Turbo 7/8	Turbo 1/2	Turbo 3/4	Turbo 7/8
1E-3	TBD	3.2 dB	4 dB	TBD	2.8 dB	3.7 dB
1E-4	TBD	3.4 dB	4.1 dB	TBD	3 dB	3.8 dB
1E-5	2.7 dB	3.6 dB	4.2 dB	2.4 dB	3.2 dB	3.9 dB
1E-6	2.9 dB	3.8 dB	4.3 dB	2.6 dB	3.4 dB	4 dB
1E-7	3.1 dB	4.1 dB	4.4 dB	2.8 dB	3.7 dB	4.1 dB
1E-8	3.3 dB	4.4 dB	4.5 dB	3 dB	4 dB	4.2 dB

Table 7-11 - 8PSK BER Performance (Turbo)				
BER	Specification		Typical	
	Turbo 3/4	Turbo 7/8	Turbo 3/4	Turbo 7/8
1E-3	5.6 dB	6.7 dB	5.2 dB	6.3 dB
1E-4	5.8 dB	6.8 dB	5.4 dB	6.4 dB
1E-5	6 dB	6.9 dB	5.6 dB	6.5 dB
1E-6	6.2 dB	7 dB	5.8 dB	6.6 dB
1E-7	6.4 dB	7.1 dB	6 dB	6.7 dB
1E-8	6.8 dB	7.2 dB	6.3 dB	6.8 dB

Table 7-12 - 16QAM BER Performance (Turbo)				
BER	Specification		Typical	
	Turbo 3/4	Turbo 7/8	Turbo 3/4	Turbo 7/8
1E-3	6.3 dB	7.8 dB	6 dB	7.4 dB
1E-4	6.7 dB	7.9 dB	6.4 dB	7.5 dB
1E-5	7 dB	8 dB	6.7 dB	7.6 dB
1E-6	7.4 dB	8.1 dB	7.1 dB	7.7 dB
1E-7	7.8 dB	8.2 dB	7.5 dB	7.8 dB
1E-8	8.2 dB	8.3 dB	7.9 dB	7.9 dB

Table 7-13. Open Network Performance							
BER	Specification			Typical			
	IBS	IDR	IDR	IBS	IBS	IDR	IDR
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	3/4 Rate	7/8 Rate
1E-3	4.1 dB	5.2 dB	6.2 dB	3.25 dB	4.2 dB	4.35 dB	5.8 dB
1E-4	4.6 dB	6.0 dB	7.1 dB	3.8 dB	4.9 dB	5.25 dB	6.5 dB
1E-4	5.3 dB	6.7 dB	7.9 dB	4.6 dB	5.6 dB	5.9 dB	7.2 dB
1E-6	6.0 dB	7.5 dB	8.6 dB	5.2 dB	6.3 dB	6.6 dB	7.9 dB
1E-7	6.6 dB	8.2 dB	9.3 dB	5.9 dB	6.9 dB	7.3 dB	8.6 dB
1E-8	7.1 dB	8.7 dB	10.2 dB	6.4 dB	7.5 dB	7.8 dB	9.4 dB

7.16.13 Input Level

Refer to Figure 7-13 for the DMD20 power threshold limits.

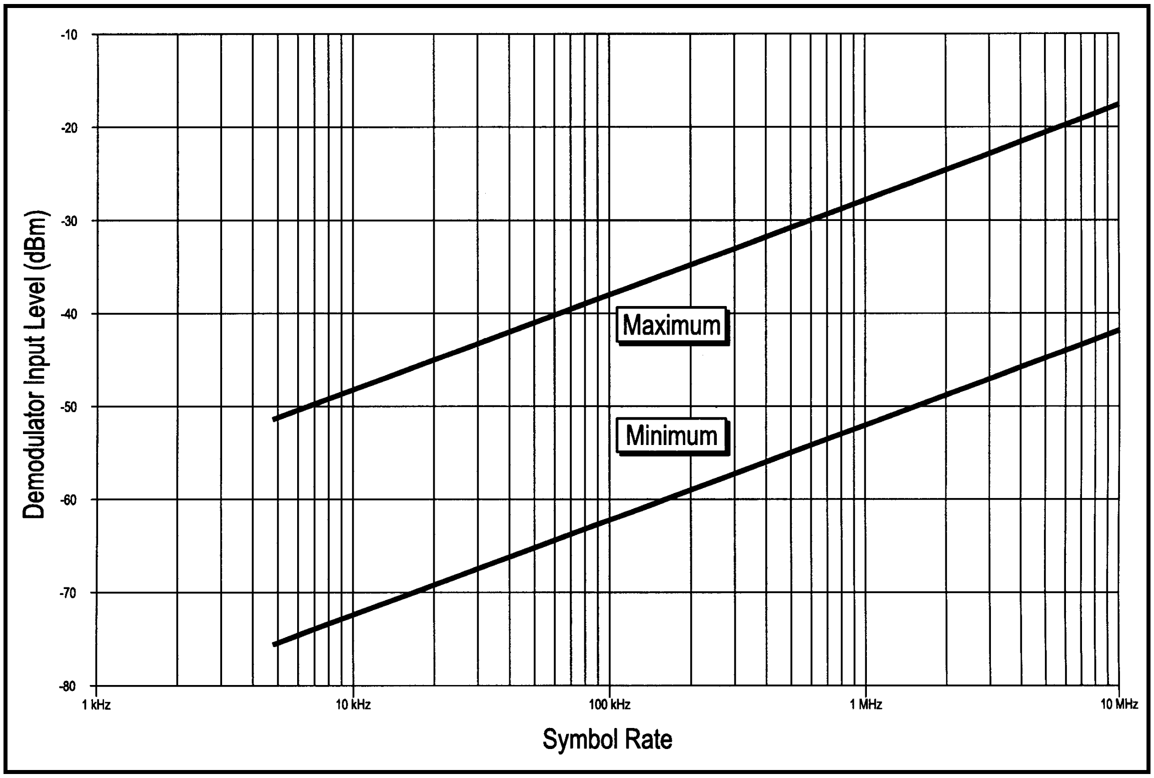


Figure 7-13. Demodulator Input Level Specification

7.16.14 ACG Output Voltage

the AGC Output Voltage is a function of the Input Power Level in dBm. The AGC Output Voltage is found on the Alarm connector Pin 14 of J15.

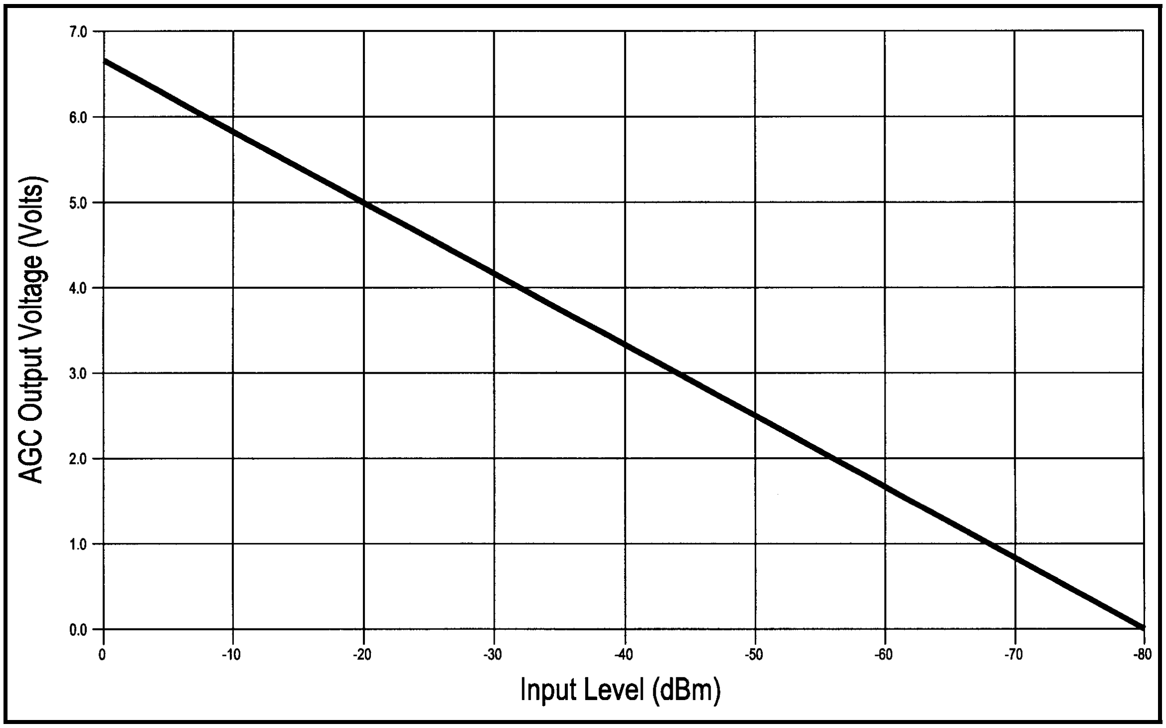


Figure 7-8. AGC Voltage Monitor

Product Options

A

A.0 Hardware Options

The following enhanced interface cards are available.

A.0.1 G.703/IDR ESC Interface

The DMD20 can be equipped with a G.703/IDR ESC Interface.

A.0.2 Turbo Card

The DMD20 can be equipped with an optional Turbo Codec Outer Code. This option must be installed at the factory and may require other options.

A.0.3 Internal High Stability

The DMD20 can be equipped with a $5x10^{-8}$ or better Stability Frequency Reference as an add-on enhancement. This is a factory upgrade only.

A.0.4 DC Input Prime Power

Allows for an optional DC Input Power Source **(standard unit only).**

A.0.5 ASI/RS-422 Parallel

ASI, Serial, BNC (Female)
DVB/M2P, Parallel, RS-422, DB-25 (Female)

A.0.6 ASI/LVDS Parallel

ASI, Serial, BNC (Female)
DVB/M2P, Parallel, LVDS, DB-25 (Female)

A.0.7 HSSI

High-Speed Serial Interface 50-Pin SCSI-2 Type Connector. Complies with Cisco Systems in HSSI Design Specification, Revision 3.0.

A.0.8 Ethernet Data Interface

Four RJ-45, Auto-Crossover, Auto-Sensing, 10/100 Ethernet Data Ports. Complies with IEEE 802.3 and IEEE 802.3u.

A.0.9 Sequential Interface

The DMD20 is equipped with a Sequential option.

A.0.10 AS/5167 Super Card (Variable Reed-Solomon)

The DMD20 can be equipped with an optional AS/5167 Super Card. This card allows variable Reed-Solomon rates as well as Turbo Codec and Sequential Codec Outer Code. This option must be installed at the factory and may require other options.

A.0.11 Custom Reed-Solomon

The DMD20 offers custom Reed-Solomon N+K values as an optional hardware upgrade.

A.1 Customized Options

The DMD20 may be customized for specific customer requirements. Most modifications or customization can be accomplished by means of firmware/software modifications.
The following are examples of the types of customization available to the user:

Customized Data Rates.
Customized Scrambler/Descramblers.
Customized Overhead Framing Structures.
Customized Modulation Formats.
Customized Uses for the ES-ES Overhead Channel.

Contact the Radyne ComStream, Inc. Customer Service or Sales Department at (602) 437-9620 for all requests.

Remote Operations

B

CAUTION!!

When new features are added to Radyne ComStream, Inc. 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, Inc. 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, Inc. Customer Service Department (602-437-9620) to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.

B.0 DMD20 Opcode Command Set

The DMD20 Opcode Command Set is listed below:

B.0.1 Modem Command Set

Command	Opcode
Query Modulator Configuration and Status	2400h
Query Demodulator Configuration and Status	2401h
Query Modem Drop & Insert Map	2402h
Query Modems Identification	2403h
Query Modem Control Mode	2404h
Query Modulator Latched Alarms	2405h
Query Demodulator Latched Alarms	2406h
Query Modem Latched Alarms	2407h
Query Modulator Current Alarms	2408h
Query Demodulator Current Alarms	2409h

Query Modem Current Alarms	240Ah
Query Modulator Status	240Bh
Query Demodulator Status	240Ch
Query Modem Eb/No, BER and Level	240Dh
Query Time	240Eh
Query Date	240Fh
Query Time and Date	2410h
Query Modem Summary Faults	2411h
Query Modem Features	2450h
Query Modulator Async Configuration	2451h
Query Demodulator Async Configuration	2452h
Query Upconverter Configuration	2490h
Query Uplink RF	2491h
Query Downconverter Configuration	2492h
Query Downlink RF	2493h

Command	Opcode
Command Upconverter Configuration	2500h
Command Uplink RF	2501h
Command Downconverter Configuration	2502h
Command Downlink RF	2503h
Command Modem Control Mode	2600h
Command Modulator Configuration	2601h
Command Modulator Frequency	2602h
Command Modulator Strap Code	2603h
Command Modulator Data Rate	2604h
Command Modulator Filter Mask	2605h
Command Modulator Modulation Type	2606h
Command Modulator Convolutional Encoder	2607h
Command Modulator Differential Encoder	2608h
Command Modulator Carrier Control	2609h
Command Modulator Carrier Selection	260Ah
Command Modulator Clock Control	260Bh
Command Modulator Clock Polarity	260Ch
Command Modulator SCT Source	260Dh

Command Modulator Drop Mode	260Eh
Command Modulator Output Level	260Fh
Command Modulator Reed Solomon	2610h
Command Modulator Spectrum	2611h
Command Modulator Operating Mode	2612h
Command Modulator Scrambler Control	2613h
Command Modulator Scrambler Type	2614h
Command Modulator Framing	2615h
Command Modulator External Reference Source	2616h
Command Modulator Terrestrial Loopback	2617h
Command Modulator Baseband Loopback	2618h
Command Modulator Network Spec	2619h
Command Modulator External EXC Clock	261Ah
Command Modulator External Reference Frequency	261Bh
Command Modulator T1 D4 Yellow Alarm Selection	261Dh
Command Modulator Interface Type	261Eh
Command Modulator Circuit ID	261Fh
Command Force Modulator Summary Alarms	2622h
Command Modulator Data Invert	2623h
Clear Modulator Latched Alarm 1	2625h
Command AUPC Local Enable	2629h
Command AUPC Remote Enable	262Ah
Command AUPC Local CL Action	262Bh
Command AUPC Remote CL Action	262Ch
Command AUPC Tracking Rate	262Dh
Command AUPC Remote BB Loopback	262Eh
Command AUPC Remote Test	262Fh
Command AUPC Eb/No	2630h
Command AUPC Minimum Power	2631h
Command AUPC Maximum Power	2632h
Command AUPC Nominal Power	2633h
Command AUPC Local Configuration	2634h
Command AUPC Remote Configuration	2635h
Command Modulator TPC Configuration	2638h
Command Modulator Async Configuration	2640h

Command Demodulator Configuration	2A00h
Command Demodulator Frequency	2A01h
Command Demodulator Data Rate	2A02h
Command Demodulator Strap Code	2A03h
Command Demodulator Sweep Boundary	2A04h
Command Demodulator Demodulation Type	2A07h
Command Demodulator Convolutional Decoder	2A08h
Command Demodulator Differential Decoder	2A09h
Command Demodulator Reed Solomon	2A0Ah
Command Demodulator Network Spec	2A0Bh
Command Demodulator Filter Mask	2A0Ch
Command Demodulator Descrambler Control	2A0Dh
Command Demodulator Descrambler Type	2A0Eh
Command Demodulator Spectrum	2A0Fh
Command Demodulator Buffer Size	2A10h
Command Demodulator Buffer Clock	2A11h
Command Demodulator Buffer Clock Polarity	2A12h
Command Demodulator Insert Mode	2A13h
Command Demodulator T1 E1 Frame Source	2A15h
Command Demodulator Framing	2A16h
Command Demodulator Operating Mode	2A17h
Command Map Summary to Backward Alarm	2A18h
Command Demodulator BER Exponent	2A1Ah
Command Demodulator Circuit ID	2A1Bh
Command Demodulator Terrestrial Loopback	2A1Ch
Command Demodulator Baseband Loopback	2A1Dh
Command Demodulator IF Loopback	2A1Eh
Command Demodulator Interface Type	2A1Fh
Command Center Buffer	2A20h
Command Demodulator Data Invert	2A21h
Command Force Demodulator Summary Alarm	2A22h
Command External EXC Source	2A23h
Clear Demodulator Latched Alarm 1	2A24h
Clear Demodulator Latched Alarm 2	2A25h
Clear Demodulator Latched Alarm 3	2A26h

Command Demodulator Reacquisition Boundary	2A2Fh
Command Demodulator TPC Interleaver	2A34h
Command Demodulator Async Configuration	2A35h
Command Drop and Insert Map Copy	2C00h
Command Drop and Insert Map	2C01h
Command Clear Latched Alarms	2C03h
Command Set Time	2C04h
Command Set Date	2C05h
Command Set Time and Date	2C06h
Clear Modem Common Latched Alarm 1	2C08h
Clear Modem Common Latched Alarm 2	2C09h

B.0.2 Detailed Command Descriptions

B.0.2.1 DMD20 Modulator

Opcode: <2400h> Query a Modulator's Configuration and Status

Query Response		
<1>	Number of nonvol bytes	
<1>	Network Spec	0 = Closed Net 1 = IDR 2 = IBS 3 = D&I 5 = DVB
<4>	Frequency	Selects the IF Frequency in Hz
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT 1 = EUTELSAT 2 = CLOSED NET1 25 = DVB 0.25 35 = DVB 0.35
<4>	Data Rate	Binary value, 1 bps steps
<4>	External EXC Clock	Binary value, 1 Hz Steps. 2.4 kHz to 20 MHz
<4>	External Reference	Binary value, 8 kHz Steps. 256 kHz to 10 MHz
<1>	Freq. Reference Source	0 = Internal, 1 = External, 2 = High stability

<1>	Modulation Type	0 = QPSK 1 = BPSK 2 = 8PSK 3 = 16QAM 4 = OQPSK
<1>	Convolutional Encoder	0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate (DVB Only) 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate (DVB Only) 5 = Viterbi 7/8 Rate 6 = Viterbi 8/9 Rate 7 = Sequential 1/2 Rate 8 = Reserved 9 = Sequential 3/4 Rate 10 = Reserved 11 = Sequential 7/8 Rate 12 = Reserved 13 = Reserved 14 = Trellis 2/3 Rate 15 = Trellis 3/4 Rate (DVB - 16QAM Only) 16 = Trellis 5/6 Rate (DVB - 8PSK Only) 17 = Trellis 7/8 Rate (DVB - 16QAM Only) 18 = Trellis 8/9 Rate (DVB - 8PSK Only) 19 = ComStream 3/4 Rate SEQ 20 = TPC .793 2D 21 = TPC .495 3D 22 = Reserved 23 = TPC 1/2 24 = TPC 3/4 25 = TPC 7/8 26 = TPC 21/44
<1>	ReedSolomon	0 = Disable, 1 = Enable
<1>	Scrambler Control	0 = Disable, 1 = Enable
<1>	Scrambler Type	0 = None 1 = IBS Scrm 2 = V35_IESS 3 = V35_CCITT 4 = V35_EFDATA 5 = V35_FAIRCHILD 6 = OM-73 7 = R-S Scrambler 8 = V35_EFRS 9 = TPC Scrambler 10 = DVB 11 = EDMAC 12 = TPC and IBS 13 = TPC and EDMAC
<2>	Transmit Power Level	Signed value. 0 to -250 (0.0 to -25.0 dBm) (Two's Compliment)
<1>	Differential Encoder	0 = Off, 1 = On

<1>	Carrier Control	0 = Off 1 = On 2 = Auto 3 = VSAT 4 = RTS Refer to Appendix A
<1>	Carrier Selection	0 = Normal 1 = CW 2 = Dual 3 = Offset 4 = Pos Fir 5 = Neg Fir
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Operating Mode	0 = Normal 1 = 2047 Test 2 = 2^{15}-1 3 = 2^{23}-1
<1>	Clock Control	0 = SCTE, 1 = SCT, 2 = EXT EXC
<1>	Clock Polarity	0 = Normal, 1 = Inverted, 2 = Auto
<1>	SCT Source	0 = Internal. 1 = SCR
<1>	Satellite Framing	0 = No Framing 1 = 96K 2 = 1/15 3 = EFAUPC 1/15 4 = DVB 5 = EDMAC
<1>	Drop Mode	0 = Disabled 1 = T1-D4 2 = T1-ESF 3 = PCM-30 4 = PCM-30C 5 = PCM-31 6 = PCM-31C 7 = SLC-96 8 = T1 D4 S 9 = T1 ESF S
<30>	Drop Map	Timeslots to drop organized by satellite channel
<1>	T1D4 Yellow Alarm Sel.	0 = Bit 2 equal 0 for all channels 1 = Frame 12 s-bits equal 1

<1>	Forced Alarms	Bit 0 = Backward Alarm 1 IDR and IBS Bit 1 = Backward Alarm 2 IDR only Bit 2 = Backward Alarm 3 IDR only Bit 3 = Backward Alarm 4 IDR only Bit 4 = AIS Request Bit 5 = Yellow Alarm. D&I Mode Bit 6 = IBS Prompt Bit 7 = IBS Service 0 = None, 1 = Force
<1>	Alarm1Mask	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault (Non-Masking) 0 = Mask, 1 = Allow
<1>	Alarm2Mask	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm1Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm2Mask	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Mask, 1 = Allow
<11>	Tx Circuit ID	11 ASCII characters
<1>	Tx ESC Ch1 Volume	-20 to +10 (+10 dBm to –20 dBm) (Two's Compliment)
<1>	Tx ESC Ch2 Volume	-20 to +10 (+10 dBm to –20 dBm) (Two's Compliment)

<1>	Tx Interface Type	0 = G703-B-T1-AMI 1 = G703-B-T1_B8ZS 2 = G703-B-E1 3 = G703-B-T2 4 = G703-U-E1 5 = G703-U-T2 6 = G703-U-E2 7 = RS-422 8 = V.35 9 = RS-232 10 = HSSI 11 = ASI 12 = Advanced ASI 13 = M2P 14 = DVB 24 = Ethernet Bridge
<1>	Tx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Tx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Drop Status Mask	Bit 0 = Frame lock fault Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Tx RS N Code	2 - 255. Reed-Solomon code word length
<1>	Tx RS K Code	1 - 254. Reed-Solomon message length
<1>	Tx RS Depth	4, 8, or 12
<1>	Data Invert	0 = None 1 = Terrestrial 2 = Baseband 3 = Terrestrial and Baseband
<1>	BPSK Symbol Pairing	0 = Normal Pairing, 1 = Swapped Pairing
<1>	IDR Overhead Type	0 = 32K Voice. 1 = 64K Data
<1>	Terminal Emulation	0 = AddsViewpoint. 1 = VT100, 2 = Wyse50

<1>	Terminal Baud Rate	0 = 300 1 = 600 2 = 1200 3 = 2400 4 = 4800 5 = 9600 6 = 19200 7 = 38400 8 = 150
<1>	FM Orderwire Mode	0 = Disable, 1 = Enable, 2 = FM Only ***(Reserved on DMD20)***
<1>	FM Orderwire Test Tone	0 = Off, 1 = On ***(Reserved on DMD20)***
<1>	AUPC Local Enable	0 = Off, 1 = EFAUPC, 2 = Radyne AUPC
<1>	AUPC Remote Enable	0 = Off, 1 = EFAUPC
<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Tracking Rate	0 = 0.5 dB/Min 1 = 1.0 dB/Min 2 = 1.5 dB/Min 3 = 2.0 dB/Min 4 = 2.5 dB/Min 5 = 3.0 dB/Min 6 = 3.5 dB/Min 7 = 4.0 dB/Min 8 = 4.5 dB/Min 9 = 5.0 dB/Min 10 = 5.5 dB/Min 11 = 6.0 dB/min
<1>	AUPC Remote BB Loopback	0 = Disable, 1 = Enable
<1>	AUPC Remote 2047	0 = Disable, 1 = Enable
<2>	AUPC Target Eb/No	Target Eb/No at Receiver
<2>	AUPC Minimum Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)
<2>	AUPC Maximum Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)

<2>	AUPC Nominal Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)
<1>	TMT Pattern Enable	Reserved
<1>	TMT Pattern Length	Reserved
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm4Mask	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Mask, 1 = Allow
<1>	TPC Interleaver	0 = Disabled 1 = Enabled
<1>	Ethernet Flow Ctl	0 = Disabled 1 = Enabled
<1>	Ethernet Daisy Chain	0 = Disabled 1 = Port 4
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits
<1>	Carrier Enable Delay	0 - 255 in seconds
	Status Bytes	
<1>	Control Mode	0 = Front Panel. 1 = Terminal, 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail

<1>	Alarm2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Common Alarm1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare
<1>	Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares
<1>	Latched Alarm1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = Transmit L-Band Synthesizer Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault (Non-Latching) 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched

<1>	Drop Status	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C, 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	OnlineFlag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	+5V Voltage	+5V. Implied decimal point; 49 = +4.9 V
<1>	+12V Voltage	+12V. Implied decimal point; 121 = +12.1 V
<1>	-12V Voltage	-12V. Implied decimal point and minus sign; 118 = -11.8 V
<2>	Reserved	Ignore
<1>	ESC Source	0 = Internal, 1 = External
<1>	Alarm3	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 - 7 = Spare 0 = No, 1 = Yes
<2>	AUPC Remote Test Mantissa	Binary value with implied decimal point; 795 = 7.95
<1>	AUPC Remote Test BER Exponent	Binary value with implied sign; 6 = -6
<1>	Reserved	Ignore
<4>	Symbol Rate	Binary value, 1sps steps
<1>	Latched Alarm2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Alarm4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 - 7 = Spares

<1>	Latched Alarm4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Reserved	Ignore
<2>	LBST BUC DC Current	Amps. Implied decimal point, 1000 = 1.000A
<2>	LBST BUC DC Voltage	Volts. Implied decimal point, 10 = 1.0V

Opcode: <240Bh> Query a Modulator's Status

Query Response		
<1>	Control Mode	0 = Front Panel. 1 = Terminal, 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail
<1>	Alarm2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Common Alarm1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare
<1>	Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares

<1>	Latched Alarm1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = Transmit L-Band Synthesizer Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault (Non-Latching) 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Drop Status	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	OnlineFlag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	+5V Voltage	+5V. Implied decimal point; 49 = +4.9 V
<1>	+12V Voltage	+12V. Implied decimal point; 121 = +12.1 V
<1>	-12V Voltage	-12V. Implied decimal point and minus sign; 118 = -11.8 V
<2>	Reserved	Ignore
<1>	ESC Source	0 = Internal, 1 = External
<1>	Alarm3	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 - 7 = Spare 0 = No, 1 = Yes

<2>	AUPC Remote Test BER Mantissa	Binary value with implied decimal point; 795 = 7.95
<1>	AUPC Remote Test BER Exponent	Binary value with implied sign; 6 = -6
<1>	Reserved	Ignore
<4>	Symbol Rate	Binary value, 1sps steps
<1>	Latched Alarm2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Alarm4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 - 7 = Spares
<1>	Latched Alarm4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUCDC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Reserved	Ignore
<2>	LBST BUC DC Current	Amps. Implied decimal point, 1000 = 1.000A
<2>	LBST BUC DC Voltage	Volts. Implied decimal point, 10 = 1.0V

Opcode: <2405h> Query a Modulator's Latched Alarms

Query Response		
<1>	Latched Alarm1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault 0 = Not Latched, 1 = Latched

<1>	Latched Common Alarm1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Latched Alarm2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Alarm4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm 0 = Not Latched, 1 = Latched

Opcode: <2408h> Query a Modulator's Current Alarms

Query Response		
<1>	Alarm1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail
<1>	Alarm2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare

<1>	Drop Status	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	Common Alarm1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare
<1>	Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares
<1>	Alarm3	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 - 7 = Spares 0 = No, 1 = Yes
<1>	Alarm4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 - 7 = Spares

Opcode: <2451h> Query Modulator Async Configuration

<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7 Bits 1 = 8 Bits

Opcode: <2600h> Command a Modem's Control Mode

<1>	Modem control mode	0 = Front panel. 1 = Terminal, 2 = Computer

Opcode: <2601h> Command a Modulator's Configuration

<1>	Network Spec.	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D&I, 5 = DVB
<4>	Frequency	Selects the IF Frequency in Hz
<2>	Strap Code	Binary value, 1 through 255
<1>	Filter Mask	0 = INTELSAT 1 = EUTELSAT 2 = CLOSED NET1 25 = DVB 0.25 35 = DVB 0.35
<4>	Data Rate	Binary value, 1 bps steps
<4>	External EXC Clock	Binary value, 1Hz steps. 2.4 kHz to 20 MHz
<4>	External Reference	Binary value, 8 kHz steps. 256 kHz to 10 MHz
<1>	Freq. Reference Source	0 = Internal, 1 = External, 2 = High stability
<1>	Modulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK
<1>	Convolutional Encoder	0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate (DVB Only) 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate (DVB Only) 5 = Viterbi 7/8 Rate 6 = Viterbi 8/9 Rate 7 = Sequential 1/2 Rate 8 = Reserved 9 = Sequential 3/4 Rate 10 = Reserved 11 = Sequential 7/8 Rate 12 = Reserved 13 = Reserved 14 = Trellis 2/3 Rate 15 = Trellis 3/4 Rate (DVB - 16QAM Only) 16 = Trellis 5/6 Rate (DVB - 8PSK Only) 17 = Trellis 7/8 Rate (DVB - 16QAM Only) 18 = Trellis 8/9 Rate (DVB - 8PSK Only) 19 = ComStream 3/4 Rate SEQ 20 = TPC .793 2D 21 = TPC .495 3D 22 = Reserved 23 = TPC 1/2 24 = TPC 3/4 25 = TPC 7/8 26 = TPC 21/44

<1>	ReedSolomon	0 = Disable, 1 = Enable
<1>	Scrambler Control	0 = Disable, 1 = Enable
<1>	Scrambler Type	0 = None 1 = IBS Scrm. 2 = V35_IESS 3 = V35_CCITT 4 = V35_EFDATA 5 = V35_FAIRCHILD 6 = V35_OM-73 7 = R-S Scrambler 8 = V35 EF Scrambler 9 = TPC Scrambler 10 = DVB 11 = EDMAC 12 = TPC and IBS 13 = TPC and EDMAC
<2>	Transmit Power Level	Signed value. 0 to -250 (0.0 to -25.0 dBm) (Two's Compliment)
<1>	Differential Encoder	0 = Off, 1 = On
<1>	Carrier Control	0 = Off 1 = On 2 = Auto 3 = VSAT 4 = RTS Refer to Appendix A
<1>	Carrier Selection	0 = Normal 1 = CW 2 = Dual 3 = Offset 4 = Pos Fir 5 = Neg Fir
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Operating Mode	0 = Normal 1 = 2047 Test 2 = 2^{15}-1 3 = 2^{23}-1
<1>	Clock Control	0 = SCTE, 1 = SCT, 2 = EXT EXC
<1>	Clock Polarity	0 = Normal, 1 = Inverted, 2 = Auto
<1>	SCT Source	0 = Internal. 1 = SCR

<1>	Satellite Framing	0 = No Framing 1 = 96K 2 = 1/15 3 = EFAUPC 1/15 4 = DVB 5 = EDMAC
<1>	Drop Mode	0 = Disabled 1 = T1-D4 2 = T1-ESF 3 = PCM-30 4 = PCM-30C 5 = PCM-31 6 = PCM-31C 7 = SLC-96 8 = T1 D4 S 9 = T1 ESF S
<30>	Drop Map	Timeslots to drop organized by satellite channel
<1>	T1D4 Yellow Alarm Sel.	0 = Bit 2 equal 0 for all channels 1 = Frame 12 s-bits equal 1
<1>	Forced Alarms	Bit 0 = Backward Alarm 1 IDR and IBS Bit 1 = Backward Alarm 2 IDR only Bit 2 = Backward Alarm 3 IDR only Bit 3 = Backward Alarm 4 IDR only Bit 4 = AIS Request Bit 5 = Yellow Alarm. D&I Mode Bit 6 = IBS Prompt Bit 7 = IBS Service 0 = None, 1 = Force
<1>	Alarm1 Mask	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault (Non-Masking) 0 = Mask, 1 = Allow
<1>	Alarm2 Mask	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Mask, 1 = Allow

<1>	Common Alarm1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm2 Mask	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Mask, 1 = Allow
<11>	Tx Circuit ID	11 ASCII Characters
<1>	Tx ESC Ch1 Volume	-20 to +10 (+10 dBm to –20 dBm) (Two's Compliment)
<1>	Tx ESC Ch2 Volume	-20 to +10 (+10 dBm to –20 dBm) (Two's Compliment)
<1>	Tx Interface Type	0 = G703-B-T1_AMI 1 = G703-B-T1_B8ZS 2 = G703-B-E1 3 = G703-B-T2 4 = G703-U-E1 5 = G703-U-T2 6 = G703-U-E2 7 = RS-422 8 = V.35 9 = RS-232 10 = HSSI 11 = ASI 12 = Advanced ASI 13 = M2P 14 = DVB 24 = Ethernet Bridge
<1>	Tx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Tx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Drop Status Mask	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved 0 = Mask, 1 = Allow

<1>	Tx RS N Code	2 - 255. Reed-Solomon code word length
<1>	Tx RS K Code	1 - 254. Reed-Solomon message length
<1>	Tx RS Depth	4, 8, or 12
<1>	Data Invert	0 = None 1 = Terrestrial 2 = Baseband 3 = Terrestrial and Baseband
<1>	BPSK Symbol Pairing	0 = Normal Pairing, 1 = Swapped Pairing
<1>	IDR Overhead Type	0 = 32K Voice. 1 = 64K Data
<1>	Terminal Emulation	0 = AddsViewpoint. 1 = VT100, 2 = Wyse50
<1>	Terminal Baud Rate	0 = 300 1 = 600 2 = 1200 3 = 2400 4 = 4800 5 = 9600 6 = 19200 7 = 38400 8 = 150
<1>	FM Orderwire Mode	0 = Disable, 1 = Enable, 2 = FM Only ***(Reserved on DMD20)***
<1>	FM Orderwire Test Tone	0 = Off, 1 = On ***(Reserved on DMD20)***
<1>	AUPC Local Enable	0 = Off, 1 = EFAUPC, 2 = Radyne AUPC
<1>	AUPC Remote Enable	0 = Off, 1 = EFAUPC
<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Tracking Rate	0 = 0.5 dB/Min 1 = 1.0 dB/Min 2 = 1.5 dB/Min 3 = 2.0 dB/Min 4 = 2.5 dB/Min 5 = 3.0 dB/Min 6 = 3.5 dB/Min 7 = 4.0 dB/Min 8 = 4.5 dB/Min 9 = 5.0 dB/Min 10 = 5.5 dB/Min 11 = 6.0 dB/Min

<1>	AUPC Remote BB Loopback	0 = Disable, 1 = Enable
<1>	AUPC Remote 2047	0 = Disable, 1 = Enable
<2>	AUPC Target Eb/No	Target Eb/No at Receiver
<2>	AUPC Minimum Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)
<2>	AUPC Maximum Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)
<2>	AUPC Nominal Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)
<1>	TMT Pattern Enable	Reserved
<1>	TMT Pattern Length	Reserved
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm4 Mask	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Mask, 1 = Allow
<1>	TPC Interleaver	0 = Disabled, 1 = Enabled
<1>	Ethernet Flow Ctl	0 = Disabled, 1 = Enabled
<1>	Ethernet Daisy Chain	0 = Disabled, 1 = Port 4
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits
<1>	Carrier Enable Delay	0 - 255 in seconds

Opcode: <2602h> Command a Modulator's Frequency

<4>	Frequency	Binary value, 1 Hz Steps. Selects the IF Frequency in Hz NOTE ***This command also turns the carrier off to protect the satellite.***

Opcode: <2603h> Command a Modulator's Strap Code

<2>	Strap code	Binary value NOTE ***This command also turns the carrier off to protect the satellite.***

Opcode: <2604h> Command a Modulator's Data Rate

<4>	Data rate	Binary value, 1 bps steps NOTE ***This command also turns the carrier off to protect the satellite.***

Opcode: <2605h> Command a Modulator's Filter Mask

<1>	Filter Mask	0 = INTELSAT, 1 = EUTELSAT, 2 = CLOSED NET1, 25 = DVB 0.25, 35 = DVB 0.35

Opcode: <2606h> Command a Modulator's Modulation Type

<1>	Modulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK NOTE ***This command also turns the carrier off to protect the satellite.***

Opcode: <2607h> Command a Modulator's Convolutional Encoder

<1>	Convolutional Encoder	NOTE ***This command also turns the carrier off to protect the satellite.*** 0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate (DVB Only) 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate (DVB Only) 5 = Viterbi 7/8 Rate 6 = Viterbi 8/9 Rate 7 = Sequential 1/2 Rate 8 = Reserved 9 = Sequential 3/4 Rate 10 = Reserved 11 = Sequential 7/8 Rate 12 = Reserved 13 = Reserved 14 = Trellis 2/3 Rate 15 = Trellis 3/4 Rate (DVB - 16QAM Only) 16 = Trellis 5/6 Rate (DVB - 8PSK Only) 17 = Trellis 7/8 Rate (DVB - 16QAM Only) 18 = Trellis 8/9 Rate (DVB - 8PSK Only) 19 = ComStream SEQ 3/4 Rate 20 = TPC .793 2D 21 = TPC .495 3D 22 = Reserved 23 = TPC 1/2 24 = TPC 3/4 25 = TPC 7/8 26 = TPC 21/44

Opcode: <2608h> Command a Modulator's Differential Encoder

<1>	Differential Encoder	0 = Off, 1 = On

Opcode: <2609h> Command a Modulator's Carrier Control

<1>	Carrier Control	0 = Off 1 = On 2 = Auto 3 = VSAT 4 = RTS Refer to Appendix A

Opcode: <260Ah> Command a Modulator's Carrier Selection

<1>	Carrier Selection	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, 2 = EXT EXC

Opcode: <260Ch> Command a Modulator's Clock Polarity

<1>	Clock Polarity	0 = Normal, 1 = Inverted, 2 = Auto

Opcode: <260Dh> Command a Modulator's SCT Source

<1>	SCT source	0 = Internal. 1 = SCR

Opcode: <260Eh> Command a Modulator's Drop Mode

<1>	Drop Mode	0 = Disabled 1 = T1-D4 2 = T1-ESF 3 = PCM-30 4 = PCM-30C 5 = PCM-31 6 = PCM-31C 7 = SLC-96 8 = T1 D4 S 9 = T1 ESF S

Opcode: <260Fh> Command a Modulator's Output Level

<2>	Transmit Power Level	Signed value. 0 to -250 (0.0 to -25.0 dBm) (Two's Compliment)

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

<1>	ReedSolomon	0 = Disable, 1 = Enable NOTE ***This command also turns the Carrier off.***

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 1 = 2047 Test 2 = 2^{15}-1 3 = 2^{23}-1

Opcode: <2613h> Command a Modulator's Scrambler Control

<1>	Scrambler Control	0 = Disable, 1 = Enable

Opcode: <2614h> Command a Modulator's Scrambler Type

<1>	Scrambler Type	0 = None 1 = IBS Scrambler 2 = V.35IESS 3 = V.35CCITT 4 = V.35EFDATA 5 = V.35FAIRCHILD 6 = OM-73 7 = R-S Scrambler 8 = V.35EF R-S Scrambler 9 = TPC Scrambler 10 = DVB 11 = EDMAC 12 = TPC and IBS 13 = TPC and EDMAC

Opcode: <2615h> Command a Modulator's Framing

<1>	Framing	0 = No Framing 1 = 96K 2 = 1/15 3 = EFAUPC 1/15 4 = DVB 5 = EDMAC **NOTE** ***This command also turns the carrier off to protect the satellite.***

Opcode: <2616h> Command a Modem's External Reference Source

<1>	External Ref. Source	0 = Internal, 1 = External, 2 = High Stability

Opcode: <2617h> Command a Modulator's Terrestrial Loopback

<1>	Terrestrial Loopback	0 = Disable, 1 = Enable

Opcode: <2618h> Command a Modulator's Baseband Loopback

<1>	Baseband Loopback	0 = Disable, 1 = Enable

Opcode: <2619h> Command a Modulator's Network Specification

<1>	Network Spec	0 = Closed Net. 1 = IDR, 2 = IBS, 3 = D&I, 5 = DVB

Opcode: <261Ah> Command a Modem's External EXC Clock

<4>	External EXC Clock	Binary value, 1 Hz Steps. 2.4 kHz to 20 MHz

Opcode: <261Bh> Command a Modem's External Reference Frequency

<4>	External Ref. Freq.	Binary value, 8 kHz Steps. 256 kHz to 10 MHz

Opcode: <261Dh> Command a Modulator's T1D4 Yellow Alarm Selection

<1>	T1D4 Yellow Alarm sel.	0 = Bit2 eq. 0 for all channels. 1 = Frame 12 s-bits eq. 1

Opcode: <261Eh> Command a Modulator's Interface Type

<1>	Tx Interface Type	0 = G703-B-T1_AMI 1 = G703-B-T1_B8ZS 2 = G703-B-E1 3 = G703-B-T2 4 = G703-U-E1 5 = G703-U-T2 6 = G703-U-E2 7 = RS-422 8 = V.35 9 = RS-232 10 = HSSI 11 = ASI 12 = Advanced ASI 13 = M2P 14 = DVB 24 = Ethernet Bridge

Opcode: <261Fh> Command a Modulator's Circuit ID

<11>	Circuit ID	11 ASCII characters

Opcode: <2622h> Command Force Mod Summary Alarms

<1>	Summary Alarm	0 = Do not force, 1 = Force

Opcode: <2623h> Command Modulator Data Invert

<1>	Data Invert	0 = None 1 = Terrestrial 2 = Baseband 3 = Terrestrial and Baseband

Opcode: <2625h> Clear a Modulator's Latched Alarm 1 (No Data)

Opcode: <2629h> Command AUPC Local Enable

<1>	AUPC Local Enable	0 = Off, 1 = EFAUPC, 2 = Radyne AUPC

Opcode: <262Ah> Command AUPC Remote Enable

<1>	AUPC Remote Enable	0 = Off, 1 = EFAUPC

Opcode: <262Bh> Command AUPC Local CL Action

<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum

Opcode: <262Ch> Command AUPC Remote CL Action

<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum

Opcode: <262Dh> Command AUPC Tracking Rate

<1>	AUPC Tracking Rate	0 = 0.5 dB/min. 1 = 1.0 dB/min. 2 = 1.5 dB/min. 3 = 2.0 dB/min. 4 = 2.5 dB/min. 5 = 3.0 dB/min. 6 = 3.5 dB/min. 7 = 4.0 dB/min. 8 = 4.5 dB/min. 9 = 5.0 dB/min. 10 = 5.5 dB/min. 11 = 6.0 dB/min.

Opcode: <262Eh> Command AUPC Remote Baseband Loopback

<1>	AUPC Remote Baseband Loopback	0 = Disable, 1 = Enable

Opcode: <262Fh> Command AUPC Remote Test

<1>	AUPC Remote 2047	0 = Disable, 1 = Enable

Opcode: <2630h> Command AUPC Eb/No

<2>	AUPC Eb/No	Target Eb/No at the receiver

Opcode: <2631h> Command AUPC Minimum Power

<2>	AUPC Min. Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)

Opcode: <2632h> Command AUPC Maximum Power

<2>	AUPC Max. Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)

Opcode: <2633h> Command AUPC Nominal Power

<2>	AUPC Nominal Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)

Opcode: <2634h> Command AUPC Local Configuration

<1>	AUPC Local Enable	0 = Off, 1 = EFAUPC, 2 = Radyne AUPC
<1>	AUPC Local CL Action	0 = Hold 1 = Nominal 2 = Maximum
<1>	AUPC Tracking Rate	0 = 0.5 dB/min. 1 = 1.0 dB/min. 2 = 1.5 dB/min. 3 = 2.0 dB/min. 4 = 2.5 dB/min. 5 = 3.0 dB/min. 6 = 3.5 dB/min. 7 = 4.0 dB/min. 8 = 4.5 dB/min. 9 = 5.0 dB/min. 10 = 5.5 dB/min. 11 = 6.0 dB/min.
<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<2>	AUPC Eb/No	Binary value, Target Eb/No at the receiver
<2>	AUPC Min Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)
<2>	AUPC Max. Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)
<2>	AUPC Nominal Power	Signed value 0 to -2500 with implied decimal point (0.00 to -25.00 dBm) (Two's Compliment)

Opcode: <2635h> Command AUPC Remote Configuration

<1>	AUPC Remote Enable	0 = Off, 1 = EFAUPC
<1>	AUPC Remote Baseband Loopback	0 = Disable, 1 = Enable
<1>	AUPC Remote 2047	0 = Disable, 1 = Enable

Opcode: <2638h> Command Modulator TPC Interleaver

<1>	TPC Interleaver	0 = Disable, 1 = Enable

Opcode: <2640h> Command Modulator Async Configuration

<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7 Bits 1 = 8 Bits

B.0.2.2 DMD20 Demodulator

Opcode: <2401h> Query a Demodulator's Configuration and Status

Query Response		
<1>	Number of nonvol bytes	
<1>	Network Spec.	0 = Closed Net. 1 = IDR, 2 = IBS, 3 = D&I, 5 = DVB
<4>	Frequency	Selects the IF Frequency in Hz
<2>	Sweep Delay	Binary value, 0.1 second steps, Implied Decimal Point
<4>	Data Rate	Binary value, 1 bps steps
<1>	Sweep Boundary	Sweep limits. Max of ± 255 kHz in kHz steps 1 - 255
<1>	Input Level Limit	Lower level limit, binary value, 1 dB steps, implied sign, 29 to 90 (-29 to -90 dBm)
<2>	StrapCode	Binary value
<1>	Filter Mask	0 = INTELSAT, 1 = EUTELSAT, 2 = CLOSED NET1
<1>	Demodulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK

<1>	Convolutional Decoder	0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate (DVB Only) 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate (DVB Only) 5 = Viterbi 7/8 Rate 6 = Viterbi 8/9 Rate 7 = Sequential 1/2 Rate 8 = Reserved 9 = Sequential 3/4 Rate 10 = Reserved 11 = Sequential 7/8 Rate 12 = Reserved 13 = Reserved 14 = Trellis 2/3 Rate 15 = Trellis 3/4 Rate (DVB - 16QAM Only) 16 = Trellis 5/6 Rate (DVB - 8PSK Only) 17 = Trellis 7/8 Rate (DVB - 16QAM Only) 18 = Trellis 8/9 Rate (DVB - 8PSK Only) 19 = ComStream SEQ 3/4 Rate 20 = TPC .793 2D 21 = TPC .495 3D 22 = Reserved 23 = TPC 1/2 24 = TPC 3/4 25 = TPC 7/8 26 = TPC 21/44
<1>	ReedSolomon	0 = Disable, 1 = Enable
<1>	Differential Decoder	0 = Off, 1 = On
<1>	Descrambler Control	0 = Disable, 1 = Enable
<1>	Descrambler Type	0 = None 1 = IBS Scrm. 2 = V35_IESS 3 = V35_CCITT 4 = V35_EFDATA 5 = V35_FAIRCHILD 6 = V35_OM-73 7 = R-S Descrambler 8 = V.35 EFRS Descrambler 9 = TPC Scrambler 10 = DVB 11 = EDMAC 12 = TPC and IBS 13 = TPC and EDMAC
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Buffer Size msec	Indicates buffer size in msecs. 0 through 64
<1>	Buffer Clock	0 = SCTE, 1 = SCT, 2 = EXT EXC, 3 = RX SAT
<1>	Buffer Clock Polarity	0 = Normal, 1 = Inverted

<1>	Insert Mode	0 = Disabled 1 = T1-D4 2 = T1-ESF 3 = PCM-30 4 = PCM-30C 5 = PCM-31 6 = PCM-31C 7 = SLC-96 8 = T1 D4 S 9 = T1 ESF S
<1>	T1E1 Frame Source	0 = Internal, 1 = External
<30>	Insert Map	Timeslots to insert organized by satellite channel
<1>	Satellite Framing	0 = No Framing 1 = 96K 2 = 1/15 3 = EFAUPC 1/15 4 = DVB 5 = EDMAC
<1>	Operating Mode	0 = Normal 1 = 2047 Test 2 = 2^{15}-1 3 = 2^{23}-1
<1>	Map Summary To Backward Alarm	0 = None 1 = BK1 2 = BK2 3 = BK1 & 2 4 = BK3 5 = BK1 & 3 6 = BK2 & 3 7 = BK1, 2 & 3 8 = BK4 9 = BK1 & 4 10 = BK2 & 4 11 = BK1, 2 & 4 12 = BK3 & 4 13 = BK1, 3 & 4 14 = BK2, 3 & 4 15 = BK1, 2, 3 & 4
<1>	Forced Alarms	0 = None, 1 = Send the Alarm Bit 0 = Rx Summary Alarm Bits 1 - 4 = Spares

<1>	Alarm1 Mask	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx Level 0 = Mask, 1 = Allow
<1>	Alarm2 Mask	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Demod Summary Fault (Non-Masking) 0 = Mask, 1 = Allow
<1>	Alarm3 Mask	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm4 Mask	Bit 0 = Buffer Clock Activity Detect Bit 1 = External BNC Activity Detect Bit 2 = Rx Satellite Clock Activity Detect Bit 3 = Insert Clock Activity Detect Bit 4 = External Reference Activity Detect Bit 5 = High Stability Reference PLL Activity Bit 6 = Rx Clock Fallback Bit 7 = Low EbNo 0 = Mask, 1 = Allow
<1>	Common Alarm1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm2 Mask	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Mask, 1 = Allow

<1>	ESC Channel1 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm (Two's Compliment)
<1>	ESC Channel2 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm(Two's Compliment)
<1>	BER Exponent	6 through 9 for Viterbi, 5 through 7 for Sequential
<11>	Rx Circuit ID	11 ASCII characters
<1>	Rx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Rx IF Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Interface Type	0 = G703-B-T1_AMI 1 = G703-B-T1_B8ZS 2 = G703-B-E1 3 = G703-B-T2 4 = G703-U-E1 5 = G703-U-T2 6 = G703-U-E2 7 = RS-422 8 = V.35 9 = RS-232 10 = HSSI 11 = ASI 12 = Advanced ASI 13 = M2P 14 = DVB 24 = Ethernet Bridge
<1>	Insert Status Mask	Bit 0 = Frame lock Bit 1 = Multiframe lock. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock. Valid in T1ESF, and E1 CRC enabled Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Rx RS N Code	2 - 255 Reed-Solomon code word length
<1>	Rx RS K Code	1 - 254 Reed-Solomon message length
<1>	Rx RS Depth	4, 8, or 12
<1>	External Clock Source	0 = BNC EXC 1 = Balanced EXC 2 = IDI 3 = SYS (RCS10 Only) 4 = None

<1>	Data Invert	0 = None 1 = Terrestrial 2 = Baseband 3 = Terrestrial and Baseband
<1>	Alarm5 Mask	Bit 0 = Trellis Decoder Lock Bit 1 = Reserved Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	BPSK Symbol Pairing	0 = Normal, 1 = Swapped
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7 Bits 1 = 8 Bits
<1>	IDR Overhead Type	0 = 32K Voice, 1 = 64K Data
<1>	FM Orderwire Mode	0 = Disable, 1 = Enable, 2 = FM Only ***(Reserved on DMD20)***
<1>	TMT Pattern Length	Reserved
<1>	EbNo Threshold	Unsigned binary value, 0 to 99, implied decimal point (0.0 to 9.9 dB)
<2>	Reacquisition Sweep Limit	Binary value, 1 Hz Steps. 0 to 255000
<1>	Terrestial Streaming	0 = Continuous, 1 = Burst
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm6Mask	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Mask, 1 = Allow
<1>	TPC DeInterleaver	0 = Disable, 1 = Enable

Status Bytes		
<1>	Control Mode	0 = Front Panel. 1 = Terminal, 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx Level, 1 = Fail
<1>	Alarm2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail
<1>	Alarm3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Reserved
<1>	Alarm4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Rx Clock Fallback, 1 = Fail Bit 7 = Low EbNo, 1 = Fail
<1>	Common Alarm1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare
<1>	Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares

<1>	Latched Alarm1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx Level 0 = Not Latched, 1 = Latched
<1>	Latched Alarm2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Demod Summary Fault (Non-Latching) 0 = Not Latched, 1 = Latched
<1>	Latched Alarm3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Backward	Bit 0 = Backward Alarm 1 IDR and IBS Bit 1 = Backward Alarm 2 IDR only Bit 2 = Backward Alarm 3 IDR only Bit 3 = Backward Alarm 4 IDR only Bits 4 - 7 = Reserved 0 = No, 1 = Yes
<4>	Error Counter	Binary value

<4>	Test Error Counter	Binary value
<2>	Raw BER Mantissa	Bytes 1 - 2 = Binary value Raw BER; 896 = 8.96
<2>	Corrected BER Mantissa	Bytes 1 - 2 = Binary value corrected BER
<2>	EbNo	Binary value, 1 decimal point implied; 700 = 7.00
<4>	Offset Frequency	Binary value, 1 Hz Steps
<2>	Test BER Mantissa	Bytes 1 - 2 = Binary value test BER
<1>	Raw BER Exponent	Byte 3 = Binary value exponent
<1>	Corrected BER Exponent	Byte 3 = Binary value exponent
<1>	Test BER Exponent	Byte 3 = Binary value exponent
<1>	Offset Frequency Sign	If <> 0, '-' offset
<1>	BER/EbNo Status	Bit 0 = Raw BER and corrected BER status. 1 = Valid Bit 1 = Test BER status. 1 = Valid Bits 2 - 3 = EbNo status, 0 = EbNo is invalid 1 = EbNo is valid, 2 = EbNo is smaller than indicated value, 3 = EbNo is greater than indicated value Bit 4 = BER Counter Overflow. 1 = Overflow Condition Bit 5 = Test BER Counter Overflow 1 = Overflow Condition Bits 6 – 7 = Reserved
<1>	Buffer Percent Full	Binary value representing % buffer full, 0 - 100 in 1% steps
<1>	Input Level	Binary value in 1 dB steps, implied sign
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	Online Flag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	Loss Flag	1 = Loss of Signal, DMD20

<1>	Alarm5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = Reserved Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Latched Alarm4	Bit 6 = Rx Clock Fallback, 1 = Fail Bit 7 = Low EbNo 0 = Not Latched, 1 = Latched
<4>	Symbol Rate	Binary value, 1sps steps
<1>	Latched Alarm5	Bit 2 = T1/E1 Signaling Bit 6 = DVB Frame Lock Fault 0 = Not Latched, 1 = Latched
<1>	Alarm6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares
<1>	Latched Alarm6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Not Latched, 1 = Latched
<2>	LBST LNB DC Current	Amps. Implied decimal point, 1000 = 1.000A
<2>	LBST LNB DC Voltage	Volts. Implied decimal point, 10 = 1.0V
<2>	Ethernet Bridge PER Mantissa	Bytes 1 - 2 = Binary value of Packet Error Rate
<1>	Ethernet Bridge PER Exponent	Byte 3 = Binary exponent of Packet Error Rate
<4>	Ethernet Bridge Packet Error Count	Binary value
<4>	Ethernet Bridge Packet Total Count	Binary Value
<1>	Ethernet Bridge Port 1 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full

<1>	Ethernet Bridge Port 2 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full
<1>	Ethernet Bridge Port 3 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full
<1>	Ethernet Bridge Port 4 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full
<1>	Ethernet Bridge WAN Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full

Opcode: <240Ch> Query a Demodulator's Status

Query Response		
<1>	Control Mode	0 = Front Panel. 1 = Terminal, 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx Level, 1 = Fail
<1>	Alarm2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail

<1>	Alarm3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Reserved
<1>	Alarm4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Rx Clock Fallback, 1 = Fail Bit 7 = Low EbNo, 1 = Fail
<1>	Common Alarm1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare
<1>	Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares
<1>	Latched Alarm1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx Level 0 = Not Latched, 1 = Latched
<1>	Latched Alarm2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Demod Summary Fault (Non-Latching) 0 = Not Latched, 1 = Latched

<1>	Latched Alarm3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Backward	Bit 0 = Backward Alarm 1 IDR and IBS Bit 1 = Backward Alarm 2 IDR only Bit 2 = Backward Alarm 3 IDR only Bit 3 = Backward Alarm 4 IDR only Bits 4 - 7 = Reserved 0 = No, 1 = Yes
<4>	Error Counter	Binary value
<4>	Test Error Counter	Binary value
<2>	Raw BER Mantissa	Bytes 1 - 2 = Binary value Raw BER
<2>	Corrected BER Mantissa	Bytes 1 - 2 = Binary value corrected BER
<2>	EbNo	Binary value, 1 decimal point implied
<4>	Offset Frequency	Binary value, 1 Hz Steps
<2>	Test BER Mantissa	Bytes 1 - 2 = Binary value test BER
<1>	Raw BER Exponent	Byte 3 = Binary value exponent
<1>	Corrected BER Exponent	Byte 3 = Binary value exponent
<1>	Test BER Exponent	Byte 3 = Binary value exponent

<1>	Offset Frequency Sign	If <> 0, '-' offset
<1>	BER/EbNo Status	Bit 0 = Raw BER and corrected BER status. 1 = Valid Bit 1 = Test BER status. 1 = Valid Bits 2 - 3 = EbNo status 0 = EbNo is invalid 1 = EbNo is valid 2 = EbNo is smaller than indicated value 3 = EbNo is greater than indicated value Bit 4 = BER Counter Overflow. 1 = Overflow Condition Bit 5 = Test BER Counter Overflow 1 = Overflow Condition Bits 6 – 7 = Reserved
<1>	Buffer Percent Full	Binary value representing % buffer full, 0 - 100 in 1% steps
<1>	Input Level	Binary value in 1 dB steps, implied sign (negative).
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	Online Flag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	Loss Flag	1 = Loss of Signal, DMD20
<1>	Alarm5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = Reserved Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Latched Alarm4	Bit 6 = Rx Clock Fallback Bit 7 = Low EbNo 0 = Not Latched, 1 = Latched
<4>	Symbol Rate	Binary value, 1sps steps
<1>	Latched Alarm5	Bit 2 = T1/E1 Signaling Bit 6 = DVB Frame Lock Fault 0 = Not Latched, 1 = Latched

<1>	Alarm6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 - 7 = Spares
<1>	Latched Alarm6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Not Latched, 1 = Latched
<2>	LBST LNB DC Current	Amps. Implied decimal point, 1000 = 1.000A
<2>	LBST LNB DC Voltage	Volts. Implied decimal point, 10 = 1.0V
<2>	Ethernet Bridge PER Mantissa	Bytes 1 - 2 = Binary value of Packet Error Rate
<1>	Ethernet Bridge PER Exponent	Byte 3 = Binary exponent of Packet Error Rate
<4>	Ethernet Bridge Packet Error Count	Binary value
<4>	Ethernet Bridge Packet Total Count	Binary Value
<1>	Ethernet Bridge Port 1 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full
<1>	Ethernet Bridge Port 2 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full
<1>	Ethernet Bridge Port 3 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full

<1>	Ethernet Bridge Port 4 Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full
<1>	Ethernet Bridge WAN Status	0 = Down 1 = Unresolved 2 = 10 Mbps Half 3 = 100 Mbps Half 4 = 10 Mbps Full 5 = 100 Mbps Full

Opcode: <2406h> Query a Demodulator's Latched Alarms

Query Response		
<1>	Latched Alarm1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx Level 0 = Not Latched, 1 = Latched
<1>	Latched Alarm2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Demod Summary Fault (Non-Latching) 0 = Not Latched, 1 = Latched
<1>	Latched Alarm3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Not Latched, 1 = Latched

<1>	Latched Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Latched Alarm4	Bit 6 = Rx Clock Fallback Bit 7 = Low EbNo 0 = Not Latched, 1 = Latched
<1>	Latched Alarm5	Bit 2 = T1/E1 Signaling Bit 6 = DVB Frame Lock Fault 0 = Not Latched, 1 = Latched
<1>	Latched Alarm6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched

Opcode: <2409h> Query a Demodulator's Current Alarms

Query Response		
<1>	Alarm1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx Level, 1 = Fail
<1>	Alarm2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail
<1>	Alarm3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Reserved

<1>	Alarm4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Rx Clock Fallback, 1 = Fail Bit 7 = Low EbNo, 1 = Fail
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	Common Alarm1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare
<1>	Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares
<1>	Alarm5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = Reserved Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Alarm6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 - 7 = Spares

Opcode: <2452h> Query Demodulator Async Configuration

<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7 Bits 1 = 8 Bits

Opcode: <2A00h> Command a Demodulator's Configuration

<1>	Network Spec.	0 = Closed Net. 1 = IDR, 2 = IBS, 3 = D&I, 5 = DVB
<4>	Frequency	Selects the IF Frequency in Hz
<2>	Sweep Delay	Binary value, 0.1 second steps, implied decimal point
<4>	Data Rate	Binary value, 1 bps steps
<1>	Sweep Boundry	Sweep limits. Max of ± 255 kHz, from 1 to 255 kHz in 1 kHz steps
<1>	Input Level Limit	Lower level limit, binary value, 1 dB steps, 29 to 90 (-29 to -90 dBm) implied sign
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT, 1 = EUTELSAT, 2 = CLOSED NET1
<1>	Demodulation Type	0 = QPSK 1 = BPSK 2 = 8PSK 3 = 16QAM 4 = OQPSK
<1>	Convolutional Decoder	0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate (DVB Only) 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate (DVB Only) 5 = Viterbi 7/8 Rate 6 = Viterbi 8/9 Rate 7 = Sequential 1/2 Rate 8 = Reserved 9 = Sequential 3/4 Rate 10 = Reserved 11 = Sequential 7/8 Rate 12 = Reserved

		13 = Reserved 14 = Trellis 2/3 Rate 15 = Trellis 3/4 Rate (DVB - 16QAM Only) 16 = Trellis 5/6 Rate (DVB - 8PSK Only) 17 = Trellis 7/8 Rate (DVB - 16QAM Only) 18 = Trellis 8/9 Rate (DVB - 8PSK Only) 19 = ComStream SEQ 3/4 Rate 20 = TPC .793 2D 21 = TPC .495 3D 22 = Reserved 23 = TPC 1/2 24 = TPC 3/4 25 = TPC 7/8 26 = TPC 21/44
<1>	ReedSolomon	0 = Disable, 1 = Enable
<1>	Differential Decoder	0 = Off, 1 = On
<1>	Descrambler Control	0 = Disable, 1 = Enable
<1>	Descrambler Type	0 = None 1 = IBS Scrm. 2 = V35_IESS 3 = V35_CCITT 4 = V35_EFDATA 5 = V35_FAIRCHILD 6 = OM-73 7 = R-S Scrambler 8 = V.35 EFRS Scrambler 9 = TPC Scrambler 10 = DVB 11 = EDMAC 12 = TPC and IBS 13 = TPC and EDMAC
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Buffer Size Msec	Indicates buffer size in msecs. 0 through 64
<1>	Buffer Clock	0 = SCTE, 1 = SCT, 2 = EXT EXC, 3 = RX SAT
<1>	Buffer Clock Polarity	0 = Normal, 1 = Inverted
<1>	Insert Mode	0 = Disabled 1 = T1-D4 2 = T1-ESF 3 = PCM-30 4 = PCM-30C 5 = PCM-31 6 = PCM-31C 7 = SLC-96 8 = T1 D4 S 9 = T1 ESF S
<1>	T1E1 Frame Source	0 = Internal, 1 = External

<30>	Insert Map	Timeslots to insert organized by satellite channel
<1>	Satellite Framing	0 = No Framing 1 = 96K 2 = 1/15 3 = EFAUPC 1/15 4 = DVB 5 = EDMAC
<1>	Operating Mode	0 = Normal 1 = 2047 Test 2 = 2^{15}-1 3 = 2^{23}-1
<1>	Map Summary To Backward Alarm	0 = None 1 = BK1 2 = BK2 3 = BK1 & 2 4 = BK3 5 = BK1 & 3 6 = BK2 & 3 7 = BK1, 2 & 3 8 = BK4 9 = BK1 & 4 10 = BK2 & 4 11 = BK1, 2 & 4 12 = BK3 & 4 13 = BK1, 3 & 4 14 = BK2, 3 & 4 15 = BK1, 2, 3 & 4
<1>	Forced Alarms	0 = None, 1 = Send the alarm Bit 0 = Rx Summary Alarms Bit 1 - 7 = Spares
<1>	Alarm1 Mask	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx Level 0 = Mask, 1 = Allow
<1>	Alarm2 Mask	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Demod Summary Fault (Non-Masking) 0 = Mask, 1 = Allow

<1>	Alarm3 Mask	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm4 Mask	Bit 0 = Buffer Clock Activity Detect Bit 1 = External BNC Activity Detect Bit 2 = Rx Satellite Clock Activity Detect Bit 3 = Insert Clock Activity Detect Bit 4 = External Reference Activity Detect Bit 5 = High Stability Reference PLL Activity Bit 6 = Rx Clock Fallback Bit 7 = Low EbNo 0 = Mask, 1 = Allow
<1>	Common Alarm1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm2 Mask	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Mask, 1 = Allow
<1>	ESC Channel1 Volume	Binary value [valid in IDR only] +10 dBm to –20 dBm (Two's Compliment)
<1>	ESC Channel 2 Volume	Binary value [valid in IDR only] +10 dBm to –20 dBm (Two's Compliment)
<1>	BER Exponent	6 through 9
<11>	Rx Circuit ID	11 ASCII characters
<1>	Rx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Rx IF Loopback	0 = Disabled, 1 = Enabled

<1>	Rx Interface Type	0 = G703-B-T1_AMI 1 = G703-B-T1_B8ZS 2 = G703-B-E1 3 = G703-B-T2 4 = G703-U-E1 5 = G703-U-T2 6 = G703-U-E2 7 = RS-422 8 = V.35 9 = RS-232 10 = HSSI 11 = ASI 12 = Advanced ASI 13 = M2P 14 = DVB 24 = Ethernet Bridge
<1>	Insert Status Mask	Bit 0 = Frame lock Bit 1 = Multiframe lock. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock. Valid in T1ESF, and E1 CRC enabled Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Rx RS N Code	2 - 255. Reed-Solomon code word length
<1>	Rx RS K Code	1 - 254. Reed-Solomon message length
<1>	Rx RS Depth	4, 8, or 12
<1>	External Clock Source	0 = BNC EXC 1 = Balanced EXC 2 = IDI 3 = Sys (RCS10 Only) 4 = None
<1>	Data Invert	0 = None 1 = Terrestrial 2 = Baseband 3 = Terrestrial and Baseband
<1>	Alarm5 Mask	Bit 0 = Trellis Decoder Lock Bit 1 = Reserved Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	BPSK Symbol Pairing	0 = Normal, 1 = Swapped
<1>	ES Mode	0 = Normal, 1 = Enhanced

<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7, 1 = 8
<1>	IDR Overhead Type	0 = 32K Voice. 1 = 64K Data
<1>	FM Orderwire Mode	0 = Disable, 1 = Enable, 2 = FM Only ***(Reserved on DMD20)***
<1>	TMT Pattern Length	Reserved
<1>	EbNo Threshold	Unsigned binary value, 0 to 99, implied decimal point (0.0 to 9.9 dB)
<2>	Reacquisition Sweep Limit	Binary value, 1 Hz Steps. 0 to 255000
<1>	Terrestial Streaming	0 = Continuous, 1 = Burst
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm6Mask	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Mask, 1 = Allow
<1>	TPC DeInterleaver	0 = Disable, 1 = Enable

Opcode: <2A01h> Command a Demodulator's Frequency

<4>	Frequency	Binary value, 1 Hz Steps. (Selects the IF Frequency in Hz)

Opcode: <2A02h> Command a Demodulator's Data Rate

<4>	Data Rate	Binary value, 1 bps steps

Opcode: <2A03h> Command a Demodulator's Strap Code

<2>	StrapCode	Binary value

Opcode: <2A04h> Command a Demodulator's Sweep Boundary

<1>	Sweep Boundary	Set in 1 kHz steps, max of 255 kHz

Opcode: <2A07h> Command a Demodulator's Demodulation Type

<1>	Demodulation Type	0 = QPSK 1 = BPSK 2 = 8PSK 3 = 16QAM 4 = OQPSK

Opcode: <2A08h> Command a Demodulator's Convolutional Decoder

<1>	Convolutional Decoder	0 = None 1 = Viterbi 1/2 Rate 2 = Viterbi 2/3 Rate (DVB Only) 3 = Viterbi 3/4 Rate 4 = Viterbi 5/6 Rate (DVB Only) 5 = Viterbi 7/8 Rate 6 = Viterbi 8/9 Rate 7 = Sequential 1/2 Rate 8 = Reserved 9 = Sequential 3/4 Rate 10 = Reserved 11 = Sequential 7/8 Rate 12 = Reserved 13 = Reserved 14 = Trellis 2/3 Rate 15 = Trellis 3/4 Rate (DVB - 16QAM Only) 16 = Trellis 5/6 Rate (DVB - 8PSK Only) 17 = Trellis 7/8 Rate (DVB - 16QAM Only) 18 = Trellis 8/9 Rate (DVB - 8PSK Only) 19 = ComStream SEQ 3/4 Rate 20 = TPC .793 2D 21 = TPC .495 3D 22 = Reserved 23 = TPC 1/2 24 = TPC 3/4 25 = TPC 7/8 26 = TPC 21/44

Opcode: <2A09h> Command a Demodulator's Differential Decoder

<1>	Differential Decoder	0 = Off, 1 = On

Opcode: <2A0Ah> Command a Demodulator's Reed-Solomon

<1>	ReedSolomon	0 = Disable, 1 = Enable

Opcode: <2A0Bh> Command a Demodulator's Network Specification

<1>	Network Spec	0 = ClosedNet. 1 = IDR, 2 = IBS, 3 = D&I, 5 = DVB

Opcode: <2A0Ch> Command a Demodulator's Filter Mask

<1>	Filter Mask	0 = IntelSat. 1 = EutelSat, 2 = ClosedNet1

Opcode: <2A0Dh> Command a Demodulator's Descrambler Control

<1>	Descrambler Control	0 = Disable, 1 = Enable

Opcode: <2A0Eh> Command a Demodulator's Descrambler Type

<1>	Descrambler Type	0 = None 1 = IBS Scrm. 2 = V35_IESS 3 = V35_CCITT 4 = V35_EFDATA 5 = V35_FAIRCHILD 6 = V35_OM-73 7 = R-S Descrambler 8 = V.35 EFRS Descrambler 9 = TPC Scrambler 10 = DVB 11 = EDMAC 12 = TPC and IBS 13 = TPC and EDMAC

Opcode: <2A0Fh> Command a Demodulator's Spectrum

<1>	Spectrum	0 = Normal, 1 = Inverted

Opcode: <2A10h> Command a Demodulator's Buffer Size

<1>	Buffer Size Msec	Indicates buffer size in msecs. 0 through 64

Opcode: <2A11h> Command a Demodulator's Buffer Clock

<1>	Buffer Clock	0 = SCTE, 1 = SCT, 2 = EXT EXC, 3 = RX SAT

Opcode: <2A12h> Command a Demodulator's Buffer Clock Polarity

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

Opcode: <2A13h> Command a Demodulator's Insert Mode

<1>	Insert Mode	0 = Disabled 1 = T1-D4 2 = T1-ESF 3 = PCM-30 4 = PCM-30C 5 = PCM-31 6 = PCM-31C 7 = SLC-96 8 = T1 D4 S 9 = T1 ESF S

Opcode: <2A15h> Command a Demodulator's T1E1 Frame Source

<1>	T1E1 Frame Source	0 = Internal, 1 = External

Opcode: <2A16h> Command a Demodulator's Framing

<1>	Framing	0 = No Framing 1 = 96K 2 = 1/15 3 = EFAUPC 1/15 4 = DVB 5 = EDMAC

Opcode: <2A17h> Command a Demodulator's Operating Mode

<1>	OperatingMode	0 = Stop 1 = 2047 Test 2 = 2^{15}-1 3 = 2^{23}-1

Opcode: <2A18h> Command Map Summary to Backward Alarm

<1>	Map Summary To Backward Alarm	0 = None 1 = BK1 2 = BK2 3 = BK1 & 2 4 = BK3 5 = BK1 & 3 6 = BK2 & 3 7 = BK1, 2 & 3 8 = BK4 9 = BK1 & 4 10 = BK2 & 4 11 = BK1, 2 & 4 12 = BK3 & 4 13 = BK1, 3 & 4 14 = BK2, 3 & 4 15 = BK1, 2, 3 & 4

Opcode: <2A1Ah> Command a Demodulator's BER Exponent

<1>	BER Exponent	6 - 9 for Viterbi 5 - 7 for Sequential

Opcode: <2A1Bh> Command a Demodulator's Circuit ID

<11>	Rx Circuit ID	11 ASCII characters

Opcode: <2A1Ch> Command a Demodulator's Terrestrial Loopback

<1>	Rx Terrestrial Loopback	0 = Disabled, 1 = Enabled

Opcode: <2A1Dh> Command a Demodulator's Baseband Loopback

<1>	Rx Baseband Loopback	0 = Disabled, 1 = Enabled

Opcode: <2A1Eh> Command a Demodulator's IF Loopback

<1>	Rx IF Loopback	0 = Disabled, 1 = Enabled

Opcode: <2A1Fh> Command a Demodulator's Interface Type

<1>	Rx Interface Type	0 = G703-B-T1_AMI 1 = G703-B-T1_B8ZS 2 = G703-B-E1 3 = G703-B-T2 4 = G703-U-E1 5 = G703-U-T2 6 = G703-U-E2 7 = RS-422 8 = V.35 9 = RS-232 10 = HSSI 11 = ASI 12 = Advanced ASI 13 = M2P 14 = DVB 24 = Ethernet Bridge

Opcode: <2A20h> Command Center Buffer (No Parameters)

Opcode: <2A21h> Command a Demodulator’s Data Invert

<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband

Opcode: <2A22h> Command Force Demod Summary Alarms

<1>	Summary Alarm	0 = Do not force. 1 = Force

Opcode: <2A23h> Command External EXC Source

<1>	External EXC Source	0 = BNC EXC. 1 = BAL EXC, 2 = IDI, 3 = Sys (RCS10 Only), 4 = None

Opcode: <2A24h> Clear Demodulator Latched Alarm 1 (No Data)

Opcode: <2A25h> Clear Demodulator Latched Alarm 2 (No Data)

Opcode: <2A26h> Clear Demodulator Latched Alarm 3 (No Data)

Opcode: <2A2Fh> Command Demodulator Reacquisition Boundry

<2>	Reacquisition Boundry	Unsigned binary 0 to 255000. 1 Hz steps

Opcode: <2A34h> Command Demodulator TPC De-Interleaver

<1>	TPC De-Interleaver	0 = Disable, 1 = Enable

Opcode: <2A35h> Command Demodulator Async Configuration

<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 = 150 1 = 300 2 = 600 3 = 1200 4 = 2400 5 = 4800 6 = 9600 7 = 19200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits

B.0.5.3 Modem Queries & Commands

Opcode: <2403h> Query a Modem's Identification

Query Response		
<1>	Modem ID	DMD20 Modulator = 20 DMD20 Demodulator = 21 DMD20 Modem = 22

Opcode: <2404h> Query a Modem's Control Mode

Query Response		
<1>	Modem control mode	0 = Front panel, 1 = Terminal, 2 = Computer

Opcode: <2407h> Query a Modem's Latched Alarms

Query Response		
<1>	Mod Latched Alarm1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault (Non-Latching) 0 = Not Latched, 1 = Latched
<1>	Demod Latched Alarm1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx Level 0 = Not Latched, 1 = Latched

<1>	Demod Latched Alarm2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Demod Summary Fault (Non-Latching) 0 = Not Latched, 1 = Latched
<1>	Demod Latched Alarm3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Mod Latched Alarm2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Mod Latched Alarm4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Not Latched, 1 = Latched
<1>	Demod Latched Alarm4	Bit 6 = Rx Clock Fallback Bit 7 = Low EbNo 0 = Not Latched, 1 = Latched

<1>	Demod Latched Alarm5	Bit 2 = T1/E1 Signaling Bit 6 = DVB Frame Lock Fault 0 = Not Latched, 1 = Latched
<1>	Demod Latched Alarm6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 - 7 = Spares 0 = Not Latched, 1 = Latched

Opcode: <240Ah> Query a Modem's Current Alarms

Query Response		
<1>	Mod Alarm1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Reserved Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail
<1>	Mod Alarm2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Framelock Fault, 1 = Fail Bit 7 = Spare
<1>	Drop Status Fault	Bit 0 = Frame lock fault, 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	Demod Alarm1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx Level, 1 = Fail

<1>	Demod Alarm2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail
<1>	Demod Alarm3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Reserved Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Reserved
<1>	Demod Alarm4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Rx Clock Fallback, 1 = Fail Bit 7 = Low EbNo, 1 = Fail
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Reserved
<1>	Common Alarm1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bit 3 = Reserved Bit 4 = Reserved Bit 5 = Reserved Bit 6 = Reserved Bit 7 = Spare
<1>	Common Alarm2	Bit 0 = Reserved Bit 1 = Reserved Bit 2 = Reserved Bits 3 – 7 = Spares

<1>	Mod Alarm3	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 - 7 = Spare 0 = No, 1 = Yes
<1>	Mod Alarm4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 – 7 = Spares
<1>	Demod Alarm5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = Reserved Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bits 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Demod Alarm6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 - 7 = Spares

Opcode: <240Dh> Query a Modem's Eb/No, BER, and Level

	Query Response	
<2>	Raw BER Mantissa	Bytes 1 - 2 = Binary value Raw BER
<2>	Corrected BER Mantissa	Bytes 1 - 2 = Binary value corrected BER
<2>	EbNo	Binary value, 1 decimal point implied
<1>	Raw BER Exponent	Byte 3 = Binary value exponent
<1>	Corrected BER Exponent	Byte 3 = Binary value exponent
<1>	BER/EbNo Status	Bit 0 = Raw BER and corrected BER status. 1 = Valid Bit 1 = Test BER status. 1 = Valid Bits 2 – 3 = EbNo status 0 = EbNo is invalid 1 = EbNo is valid 2 = EbNo is smaller than indicated value 3 = EbNo is greater than indicated value Bit 4 = BER Counter Overflow. 1 = Overflow Condition Bit 5 = Test BER Counter Overflow 1 = Overflow Condition Bits 6 – 7 = Reserved
<1>	Input Level	Binary value in 1 dB steps

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	0 - 11
<1>	Day	0 - 30

Opcode: <2410h> Query 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: <2411h> Query Modem Summary Faults

<1>	Mod Summary Fault	0 = Pass, 1 = Fail
<1>	Demod Summary Fault	0 = Pass, 1 = Fail

Opcode: <2402h> Query a Modem's Drop & Insert Map

<1>	Requested map	0 = Drop active map 1 = Insert active map 2 = Drop edit map 3 = Insert edit map 4 - 11 = User map #1 through #8 12 - 19 = ROM maps #1 - #8
	Query Response	
<1>	Requested map number	0 = Drop active map 1 = Insert active map 2 = Drop edit map 3 = Insert edit map 4 - 11 = User map #1 through #8 12 - 19 = ROM maps #1 - #8
<30>	Requested map	

Opcode: <2C00h> Command Drop & Insert Map Copy

<1>	From Map	0 = Drop active map 1 = Insert active map 2 = Drop edit map 3 = Insert edit map 4 - 11 = User map #1 through #8 12 - 19 = ROM maps #1..#8
<1>	To Map	0 = Drop active map 1 = Insert active map 2 = Drop edit map 3 = Insert edit map 4 - 11 = User map #1 through #8

Opcode: <2C01h> Command Drop & Insert Map

<1>	Map to Change	0 = Drop active map 1 = Insert active map 2 = Drop edit map 3 = Insert edit map 4 - 11 = User map #1 through #8
<30>	New map	

Opcode: <2C03h> Command Clear Latched Alarms (No Parameters)

Opcode: <2C04h> Command Set Time

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

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: <2C08h> Clear Modem Common Latched Alarm 1 (No Data)

Opcode: <2C09h> Clear Modem Common Latched Alarm 2 (No Data)

Opcode: <2490h> Query Upconverter Configuration

<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side
<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable

Opcode: <2491h> Query Uplink RF

<8>	RF	Hz

Opcode: <2492h> Query Downconverter Configuration

<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side
<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Select	13, 16, 18, 24, 48

Opcode: <2493h> Query Downlink RF

<8>	RF	Hz

Opcode: <2500h> Command Upconverter Configuration

<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side
<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable

Opcode: <2501h> Command Uplink RF

<8>	RF	Hz

Opcode: <2502h> Command Downconverter Configuration

<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side
<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Select	13, 16, 18, 24, 48

Opcode: <2503h> Command Downlink RF

<8>	RF	Hz

NOTE

The following opcode is for customer purchased and installed features only.

Opcode: <2450h> Query a Module's Installed Features (Customer Purchased)

Query Response		
<1>	Installed Features 1	Bit 0 = 1 Mbps data rate Bit 1 = 5 Mbps data rate Bit 2 = 10 Mbps data rate Bit 3 = 20 Mbps data rate Bit 4 = Rx IF band Bit 5 = Rx L band Bit 6 = Tx IF band Bit 7 = Tx L band 0 = Feature not installed, 1 = Feature installed
<1>	Installed Features 2	Bit 0 = Enhanced Async feature Bit 1 = IDR feature Bit 2 = Sequential feature Bit 3 = ReedSolomon Bit 4 = Custom ReedSolomon feature Bit 5 = IBS feature Bit 6 = Drop & Insert feature Bit 7 = Aupc feature 0 = Feature not installed, 1 = Feature installed

<1>	Installed Features 3	Bit 0 = 8PSK feature Bit 1 = 16QAM feature Bit 2 = 5 MHz Turbo Codec feature Bit 3 = 20 MHz Turbo Codec feature Bit 4 = OM73 feature Bit 5 = DVB feature Bit 6 = Edmac feature Bit 7 = 512 Kbps data rate 0 = Feature not installed, 1 = Feature installed
<1>	Installed Features 4	Bits 0 - 7 = Spares
<1>	Installed Features 5	Bits 0 - 7 = Spares
<1>	Installed Features 6	Bits 0 - 7 = Spares **NOTE** ***The features that are set, refer to options purchased by the customer. These could be a subset of the overall physical capabilities of the product.*** ***The highest data rate feature that is set, indicates the highest data rate the product can attain. This is also true for the Turbo Codec rates.***

SNMP MIB

C

```
DMD20-MIB DEFINITIONS ::= BEGIN

  IMPORTS
    enterprises
      FROM RFC1155-SMI
    MODULE-IDENTITY, OBJECT-TYPE, Unsigned32, NOTIFICATION-TYPE, Counter64
      FROM SNMPv2-SMI
    TEXTUAL-CONVENTION
      FROM SNMPv2-TC
    OBJECT-GROUP, NOTIFICATION-GROUP
      FROM SNMPv2-CONF;

  radyne             OBJECT IDENTIFIER ::= { enterprises 2591 }

dmd20 MODULE-IDENTITY
  LAST-UPDATED "200406211100Z"
  ORGANIZATION "Radyne Comstream Inc."
  CONTACT-INFO
      "Customer Service
      Postal: RadyneComstream, Inc. - Phoenix.
      3138 E. Elwood Street
      Phoenix, AZ 85034
      USA
      Tel: (602) 437-9620
      Fax: (602) 437-4811
      Website: www.radynecomstream.com"

  DESCRIPTION
      "RadyneComstream REDUX MIB module."

  REVISION      "200306211100Z"
  DESCRIPTION   "Initial version of the RadyneComstream DMD20
           MIB module. This is a PRELIMINARY document whose contents
           are subject to change without prior notice. DMD20 MIB
           Object Identifiers description. The private enterprise
           number 2591 is a unique identifier assigned to Radyne
           by the Internet Assigned Numbers Authority (IANA).
           This number is used to uniquely define vendor specific
           information such as private MIBs."

  ::= { radyne 15 }



-- groups in Radyne specific MIB

-- radyne             OBJECT IDENTIFIER ::= { enterprises 2591 }

  dmd20MibObjects         OBJECT IDENTIFIER ::= { dmd20 1 }

  radDmd20ModNVStatus       OBJECT IDENTIFIER ::= { dmd20MibObjects 1 }
  radDmd20ModStatus         OBJECT IDENTIFIER ::= { dmd20MibObjects 2 }

  radDmd20DemodNVStatus     OBJECT IDENTIFIER ::= { dmd20MibObjects 3 }
  radDmd20DemodStatus       OBJECT IDENTIFIER ::= { dmd20MibObjects 4 }

  radDmd20CommonNVStatus    OBJECT IDENTIFIER ::= { dmd20MibObjects 5 }
  radDmd20CommonStatus      OBJECT IDENTIFIER ::= { dmd20MibObjects 6 }
```

```
  radDmd20Traps            OBJECT IDENTIFIER ::= { dmd20MibObjects 7 }

  radDmd20Lbst             OBJECT IDENTIFIER ::= { dmd20MibObjects 8 }
  radDmd20ModLbstNVStatus    OBJECT IDENTIFIER ::= { radDmd20Lbst 1 }
  radDmd20ModLbstStatus      OBJECT IDENTIFIER ::= { radDmd20Lbst 2 }
  radDmd20DemodLbstNVStatus  OBJECT IDENTIFIER ::= { radDmd20Lbst 3 }
  radDmd20DemodLbstStatus    OBJECT IDENTIFIER ::= { radDmd20Lbst 4 }

  radDmd20MibConformance     OBJECT IDENTIFIER ::= { dmd20 2 }
  radDmd20Groups             OBJECT IDENTIFIER ::= { radDmd20MibConformance 1 }
  radDmd20AgentCapabilities  OBJECT IDENTIFIER ::= { radDmd20MibConformance 2 }

-- ---------------------------------------------------------------------------------------------------
-- ---------------------------------------------------------------------------------------------------
-- Textual Conventions

RadTransmitPowerLevel ::= TEXTUAL-CONVENTION
  DISPLAY-HINT   "d-1"
  STATUS         current
  DESCRIPTION    "Power level in tenths of a dBm."
  SYNTAX         INTEGER (-250..0)

RadAupcTransmitPowerLevel ::= TEXTUAL-CONVENTION
  DISPLAY-HINT   "d-2"
  STATUS         current
  DESCRIPTION    "Power level in hundreds of a dBm."
  SYNTAX         INTEGER (-2500..0)

RadReceivePowerLevel ::= TEXTUAL-CONVENTION
  STATUS         current
  DESCRIPTION    "Receive power level in dBm."
  SYNTAX         INTEGER

RadESCGain ::= TEXTUAL-CONVENTION
  STATUS         current
  DESCRIPTION    "Sets the ESC channel volume in dB."
  SYNTAX         INTEGER (-20..10)

RadVoltageLevel ::= TEXTUAL-CONVENTION
  DISPLAY-HINT   "d-1"
  STATUS         current
  DESCRIPTION    "Voltage level in tenths of a volt."
  SYNTAX         INTEGER

RadCurrentLevel ::= TEXTUAL-CONVENTION
  DISPLAY-HINT   "d-3"
  STATUS         current
  DESCRIPTION    "Current level in milliamps."
  SYNTAX         INTEGER

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

OffOnType ::= TEXTUAL-CONVENTION
  STATUS         current
  DESCRIPTION    "Represents a boolean Off/ON control value."
  SYNTAX         INTEGER { off(1), on(2) }

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

```
BerStatusStringType ::= TEXTUAL-CONVENTION
  DISPLAY-HINT  "8a"
  STATUS        current
  DESCRIPTION   "Raw BER status"
  SYNTAX        OCTET STRING (SIZE (10))

CarrierSweepDelayType ::= TEXTUAL-CONVENTION
  DISPLAY-HINT  "d-1"
  STATUS        current
  DESCRIPTION   "Sets the carrier sweep delay in secs. There is one implied decimal point.
           A value of 215 corresponds to a 21.5 sec sweep delay."
  SYNTAX        INTEGER (0..65535)

EbnoType ::= TEXTUAL-CONVENTION
  DISPLAY-HINT  "d-2"
  STATUS        current
  DESCRIPTION   "EbNo in db. There is an implied decimal point."
  SYNTAX        INTEGER (0..2500)

EbnoAlarmThresholdType ::= TEXTUAL-CONVENTION
  DISPLAY-HINT  "d-2"
  STATUS        current
  DESCRIPTION   "EbNo alarm threshold. There is an implied decimal point."
  SYNTAX        INTEGER (0..990)

FirmwareNameType ::= TEXTUAL-CONVENTION
  DISPLAY-HINT  "15a"
  STATUS        current
  DESCRIPTION   "This is the modem firmware name."
  SYNTAX        OCTET STRING (SIZE (16))

-- -----------------------------------------------------------------------------------------------------
-- Dmd20 modem non-volatile status information.

radDmd20TxCarrierControl OBJECT-TYPE
  SYNTAX      INTEGER {
          off(1),
          on(2),
          auto(3),
          vsat(4),
          rts(5)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the carrier control mode."
  ::= { radDmd20ModNVStatus 1 }

radDmd20TxNetworkSpec OBJECT-TYPE
  SYNTAX      INTEGER {
          closedNet(1),
          idr(2),
          ibs(3),
          dropInsert(4),
          dvbSat(5)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the modulator's mode of operation. The mode sets a
          number of parameters within the modulator to meet a set of
          specifications. The purpose is to eliminate additional
          commands and compatibility problems."
  ::= { radDmd20ModNVStatus 2 }

radDmd20TxCarrierLeveldBmX100 OBJECT-TYPE
```

```
  SYNTAX      RadTransmitPowerLevel
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the Tx power level in dBm. There is an implied decimal point.
          For example, a value of -100 represents a transmit power level
          of -10.0 dBm."
  ::= { radDmd20ModNVStatus 3 }

radDmd20TxCarrierFrequencyHz OBJECT-TYPE
  SYNTAX      Unsigned32 (50000000..180000000|950000000..2050000000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects IF frequency in Hz steps. The range is 50 MHz to 180 MHz
          for the 70/140 MHz modems and 950 MHz to 2050 MHz for the LBand
          modems. It is based on whatever options are installed."
  ::= { radDmd20ModNVStatus 4 }

radDmd20TxTerrDataRateHz OBJECT-TYPE
  SYNTAX      Unsigned32 (4800..10000000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the data rate in BPS. The data rate minimum is 4800 bps.
          It varies based on modulation and code rate.
          Please refer to the Dmd20 modem technical specifications manual
          for maximum Data Rate Limits."
  ::= { radDmd20ModNVStatus 5 }

radDmd20TxStrapCode OBJECT-TYPE
  SYNTAX      INTEGER (0..1000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the modulator strap code. This is a quick set key that
          configures many of the modem parameters. When a strap code is
          entered, the modulator is automatically configured for the
          corresponding data rate, overhead, code rate, framing, scrambler
          type, and modulation."
  ::= { radDmd20ModNVStatus 6 }

radDmd20TxInnerFecRate OBJECT-TYPE
  SYNTAX      INTEGER {
          none(1),          viterbi1_2(2),    viterbi2_3(3),
          viterbi3_4(4),     viterbi5_6(5),    viterbi7_8(6),
          reserved3(7),      sequential1_2(8), reserved4(9),
          sequential3_4(10),  reserved5(11),    sequential7_8(12),
          reserved6(13),      reserved7(14),    trellis2_3(15),
          trellis3_4(16),     trellis5_6(17),   trellis7_8(18),
          trellis8_9(19),     comstream3_4(20), tpc_793_2d(21),
          tpc_495_3d(22),     tpc1_2(23),       tpc3_4(24),
          tpc7_8(25),         tpc21_44(26)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects Tx code rate and type. The reserved selections are
          unimplemented types reserved for future use."
  ::= { radDmd20ModNVStatus 7 }

radDmd20TxModulationType OBJECT-TYPE
  SYNTAX      INTEGER {
          qpsk(1),
          bpsk(2),
          psk8(3),
```

```
            qam16(4),
            oqpsk(5)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the modulation type."
  ::= { radDmd20ModNVStatus 8 }

radDmd20TxSatFraming OBJECT-TYPE
  SYNTAX      INTEGER {
            framingNone(1),
            framing96kIdr(2),
            framingIbs(3),
            framingEfAupc(4),
            framingDvb(5),
            framingEdmac(6)
            }
  MAX-ACCESS  read-write
  STATUS      current
   DESCRIPTION
            "Selects framing type."
  ::= { radDmd20ModNVStatus 9 }

radDmd20TxOuterFecEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Disables/enables the ReedSolomon encoder"
  ::= { radDmd20ModNVStatus 10 }

radDmd20TxOuterFecRate OBJECT-TYPE
  SYNTAX      INTEGER {
            rsN126K112(1),
            rsN194K178(2),
            rsN219K201(3),
            rsN225K205(4),
            rsN204K188(5),
            rsCustomNK(6)
            }
  MAX-ACCESS  read-write
  STATUS      obsolete
  DESCRIPTION
            "ReedSolomon N code is the codeword length or block length.
            It is the sum of message and check symbols. N = K + R.
            ReedSolomon K code is the message length or user data. It is
            the number of user data symbols in one message block. Message
            length is K = N - R.

            This object is obsolete, N and K values are no longer limited
            to the five selections listed above.
            see radDmd20TxRsOfecRate"
  ::= { radDmd20ModNVStatus 11 }

radDmd20TxInterleaverDepth OBJECT-TYPE
  SYNTAX      INTEGER {
            interleaverDepth4(1),
            interleaverDepth8(2),
            interleaverDepth12(3)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "ReedSolomon interleaver depth. It can either be a value of 4
            or 8."
```

```
  ::= { radDmd20ModNVStatus 12 }

radDmd20TxDropMode OBJECT-TYPE
  SYNTAX      INTEGER {
          disable(1),
          t1d4(2),
          t1esf(3),
          pcm30(4),
          pcm30c(5),
          pcm31(6),
          pcm31c(7),
          slc96(8),
          t1d4s(9),
          t1esfs(10)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the modulator drop mode. SLC-96 is not yet implemented
          and is reserved for future use."
  ::= { radDmd20ModNVStatus 13 }

radDmd20TxDropMap OBJECT-TYPE
  SYNTAX      OCTET STRING (SIZE (30))
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the modulator drop map. Current mapping of satellite channels to
          dropped terrestrial time slots. Valid drop channels are 1 through 31. If the
          drop mode is either PCM-30 or PCM-30C, then the channel number 16 is reserved
          for signaling."
  ::= { radDmd20ModNVStatus 14 }

radDmd20TxClockSource OBJECT-TYPE
  SYNTAX      INTEGER {
          externalScte(1),
          internalSct(2),
          externalBnc(3)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects Tx clock source. 1 selects the terrestrial clock (SCTE),
          2 selects the internal clock (SCT), and 3 the external BNC clock."
  ::= { radDmd20ModNVStatus 15 }

radDmd20TxClockPolarity OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          inverted(2),
          auto(3)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects clock polarity for Tx terrestrial clock relative to
          Tx data."
  ::= { radDmd20ModNVStatus 16 }

radDmd20TxSCTClockSource OBJECT-TYPE
  SYNTAX      INTEGER {
          internal(1),
          scr(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
```

```
  DESCRIPTION
          "Selects the SCT source to be either the SCT oscillator, or Rx
          satellite clock. SCR selection is used for loop timing."
  ::= { radDmd20ModNVStatus 17 }

radDmd20TxDataPolarity OBJECT-TYPE
  SYNTAX      INTEGER {
          none(1),
          terrestrial(2),
          baseband(3),
          terrestrialAndBaseband(4)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects data polarity"
  ::= { radDmd20ModNVStatus 18 }

radDmd20TxSpectrum OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          inverted(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Inverts the direction of rotation for PSK modulation."
  ::= { radDmd20ModNVStatus 19 }

radDmd20TxScramblingEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Enables scrambler operation"
  ::= { radDmd20ModNVStatus 20 }

radDmd20TxScramblingType OBJECT-TYPE
  SYNTAX      INTEGER {
          none(1),
          ibsScrambler(2),
          v35IESS(3),
          v35CCITT(4),
          v35EfData(5),
          v35FC(6),
          om73(7),
          rsScrambler(8),
          v35EfRs(9),
          tpcScrambler(10),
          dvbScrambler(11),
          edmac(12),
          tpcIbs(13),
          tpcEdmac(14)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects scrambler type. The reserved settings are unimplemented and
          are set aside for future use."
  ::= { radDmd20ModNVStatus 21 }

radDmd20TxDifferentialEncoder OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
```

```
        "Turns the differential encoder off and on."
  ::= { radDmd20ModNVStatus 22 }

radDmd20TxBpskSymbolPairingSwap OBJECT-TYPE
  SYNTAX      INTEGER {
        normal(1),
        swapped(2)
        }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
        "Selects symbol pairing."
  ::= { radDmd20ModNVStatus 23 }

radDmd20TxEscOverheadType OBJECT-TYPE
  SYNTAX      INTEGER {
        voice(1),
        data(2)
        }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
        "Selects IDR overhead type."
  ::= { radDmd20ModNVStatus 24 }

radDmd20TxEsc1GaindBX100 OBJECT-TYPE
  SYNTAX      RadESCGain
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
        "Sets the ESC transmit channel #1 volume in dB."
  ::= { radDmd20ModNVStatus 25 }

radDmd20TxEsc2GaindBX100 OBJECT-TYPE
  SYNTAX      RadESCGain
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
       "Sets the ESC transmit channel #2 volume in dB."
  ::= { radDmd20ModNVStatus 26 }

radDmd20TxTerrInterfaceType OBJECT-TYPE
  SYNTAX      INTEGER {
        g703BT1Ami(1),
        g703BT1B8zs(2),
        g703BE1(3),
        g703BT2(4),
        g703UE1(5),
        g703UT2(6),
        g703UE2(7),
        rs422(8),
        v35(9),
        rs232(10),
        hssi(11),
        asi(12),
        aasi(13),
        m2p(14),
        dvb(15),
        ethernetBridge(25)
        }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
        "Selects the various interface types."
  ::= { radDmd20ModNVStatus 27 }
```

```
radDmd20TxAupcLocalMode OBJECT-TYPE
  SYNTAX      INTEGER {
            disabled(1),
            efAupc(2),
            radyne(3)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Turns the AUPC local off and on. This applies only if EF_AUPC framing is used,
            and the AUPC option is installed."
  ::= { radDmd20ModNVStatus 28 }

radDmd20TxAupcRemoteMode OBJECT-TYPE
  SYNTAX      INTEGER {
            disabled(1),
            efAupc(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Turns the AUPC remote off and on. This applies only if EF_AUPC framing is used,
            and the AUPC option is installed."
  ::= { radDmd20ModNVStatus 29 }

radDmd20TxAupcLocalCarrierLossAction OBJECT-TYPE
  SYNTAX      INTEGER {
            hold(1),
            nominal(2),
            maximum(3)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects what action to take at the local site if the carrier is lost while
            using AUPC. This applies only if AUPC option is enabled."
  ::= { radDmd20ModNVStatus 30 }

radDmd20TxAupcRemoteCarrierLossAction OBJECT-TYPE
  SYNTAX      INTEGER {
            hold(1),
            nominal(2),
            maximum(3)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects what action to take at the remote site if the carrier is lost while
            using AUPC. This applies only if AUPC option is enabled."
  ::= { radDmd20ModNVStatus 31 }

radDmd20TxAupcTrackingRate OBJECT-TYPE
  SYNTAX      INTEGER {
            zeroPointFivedbPerMin(1),
            onedbPerMin(2),
            onePointFivedbPerMin(3),
            twodbPerMin(4),
            twoPointFivedbPerMin(5),
            threeonedbPerMin(6),
            threePointFivedbPerMin(7),
            fourbPerMin(8),
            fourPointFivedbPerMin(9),
            fivedbPerMin(10),
            fivePointFivedbPerMin(11),
            sixdbPerMin(12)
            }
```

```
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the AUPC tracking rate in dB/min. This applies only if AUPC option
          is enabled."
  ::= { radDmd20ModNVStatus 32 }

radDmd20TxAupcRemoteBasebandLoopback OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Disables/Enables the remote site baseband loopback. This applies only if AUPC
          option is enabled."
  ::= { radDmd20ModNVStatus 33 }

radDmd20TxAupcRemoteTestPattern OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Disables/Enables the remote site test pattern. This applies only if AUPC
          option is enabled."
  ::= { radDmd20ModNVStatus 34 }

radDmd20TxAupcTargetEbnoDbX100 OBJECT-TYPE
  SYNTAX      INTEGER (400..2000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the AUPC EbNo. There is an implied decimal point. This applies
          only if the AUPC option is enabled."
  ::= { radDmd20ModNVStatus 35 }

radDmd20TxAupcMinCarrierLeveldBmX100 OBJECT-TYPE
  SYNTAX      RadAupcTransmitPowerLevel
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the AUPC minimum power limit. There is an implied decimal point.
          This applies only if AUPC option is enabled."
  ::= { radDmd20ModNVStatus 36 }

radDmd20TxAupcMaxCarrierLeveldBmX100 OBJECT-TYPE
  SYNTAX      RadAupcTransmitPowerLevel
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the AUPC maximum power limit. There is an implied decimal point.
          This applies only if AUPC option is enabled."
  ::= { radDmd20ModNVStatus 37 }

radDmd20TxAupcNomCarrierLeveldBmX100 OBJECT-TYPE
  SYNTAX      RadAupcTransmitPowerLevel
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the AUPC default power level. There is an implied decimal point.
          The default level must be between the minimum and the
          maximum power limits. This applies only if AUPC option is enabled."
  ::= { radDmd20ModNVStatus 38 }

radDmd20TxTestPattern OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          test2047(2),
```

```
            testPattern2To15Minus1(3),
            testPattern2To23Minus1(4)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Enables test pattern operation."
  ::= { radDmd20ModNVStatus 39 }

radDmd20TxCircuitName OBJECT-TYPE
  SYNTAX      OCTET STRING (SIZE (11))
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Provides entry of Tx circuit identifier. Circuits can be given up to
            11 character alphanumeric identity such as LINK1."
  ::= { radDmd20ModNVStatus 40 }

radDmd20TxAlarms1Mask OBJECT-TYPE
  SYNTAX      BITS {
            txFpgaProcessorFault(0),
            bit1Reserved(1),
            txSymbolClockLock(2),
            bit3Reserved(3),
            ifLBandSynthesizerLock(4),
            bit5Reserved(5),
            bit6Reserved(6),
            modSummaryFault(7)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
  ::= { radDmd20ModNVStatus 41 }

radDmd20TxAlarms2Mask OBJECT-TYPE
  SYNTAX      BITS {
            terrClockActivity(0),
            internalClockActivity(1),
            satClockActivity(2),
            dataActivity(3),
            dataAISFault(4),
            clockFallbackFault(5),
            dvbFrameFault(6)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
  ::= { radDmd20ModNVStatus 42 }

radDmd20TxForcedAlarms OBJECT-TYPE
  SYNTAX      BITS {
            backwardAlarm1(0),
            backwardAlarm2(1),
            backwardAlarm3(2),
            backwardAlarm4(3),
            dataAISRequest(4),
            yellowAlarm(5),
            ibsPromptAlarm(6),
            ibsServiceAlarm(7)
            }
  MAX-ACCESS  read-write
  STATUS      current
```

```
  DESCRIPTION
          "Tx forced alarms:
          Bit 0 = IDR and IBS backward alarm 1
          Bit 1 = IDR only backward alarm 2
          Bit 2 = IDR only backward alarm 3
          Bit 3 = IDR only backward alarm 4
          Bit 4 = Tx data AIS request
          Bit 5 = Yellow alarm (D&I mode)
          0=Do not force, 1=Force alarm"
  ::= { radDmd20ModNVStatus 43 }

radDmd20TxDropStatusMask OBJECT-TYPE
  SYNTAX      BITS {
          terrFrameFault(0),
          terrMultiframeFault(1),
          terrCrcFault(2),
          bit3Reserved(3),
          bit4Reserved(4),
          bit5Reserved(5),
          bit6Reserved(6),
          bit7Reserved(7)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Alarm mask:
          Bit 0 = Terrestrial frame lock fault (all modes)
          Bit 1 = Terrestrial multi-frame lock fault (PCM-30 and PCM-30C only)
          Bit 2 = Terrestrial CRC lock fault (PCM-30C and PCM-31C only)
          0 = Mask, 1 = Allow"
  ::= { radDmd20ModNVStatus 44 }

radDmd20TxTerrestrialFraming OBJECT-TYPE
  SYNTAX      INTEGER {
          noFraming(1),
          dvb188(2),
          dvb204(3)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the terrestrial framing."
  ::= { radDmd20ModNVStatus 45 }

radDmd20TxSpectralMask OBJECT-TYPE
  SYNTAX      INTEGER {
          intelsat035(1),
          dvbSat025(2),
          dvbSat035(3)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the transmit spectral mask and roll off."
  ::= { radDmd20ModNVStatus 46 }

radDmd20TxAlarms4Mask OBJECT-TYPE
  SYNTAX      BITS {
          bucCurrentFault(0),
          bucVoltageFault(1),
          ethernetWanMajorAlarm(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Alarm mask:
```

```
            0 = Mask, 1 = Allow"
  ::= { radDmd20ModNVStatus 47 }

radDmd20TxEthFlowControl OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Disables/Enables the flow control of the Ethernet Bridge card."
  ::= { radDmd20ModNVStatus 48 }

radDmd20TxEthDaisyChain OBJECT-TYPE
  SYNTAX      INTEGER {
            disable(1),
            port4(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects PORT 4 Daisy Chain for Ethernet Bridge card."
  ::= { radDmd20ModNVStatus 49 }

radDmd20TxRsOfecRate OBJECT-TYPE
  SYNTAX      INTEGER
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "This provides the ReedSolomon N and K Values, the integer
            fieldValue = (N * 1000) + K

            Example: a Dvb Code Rate of 188/204 has a field value of 204188 = (204 * 1000) + 188

            A ReedSolomon N code is the codeword length or block length.
            It is the sum of message and check symbols. N = K + R.
            ReedSolomon K code is the message length or user data. It is
            the number of user data symbols in one message block. Message
            length is K = N - R."
  ::= { radDmd20ModNVStatus 50 }

radDmd20TxTpcInterleaver OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Disables/Enables the TPC interleaver. Valid only for Radyne turbo codes
            TPC.495 and TPC.793"
  ::= { radDmd20ModNVStatus 51 }

radDmd20TxEsEnhancedEnable OBJECT-TYPE
  SYNTAX      INTEGER {
            normal(1),
            enhanced(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the async mode. Enhanced mode is only valid in Closed Net mode."
  ::= { radDmd20ModNVStatus 52 }

radDmd20TxEsSerialControlInterface OBJECT-TYPE
  SYNTAX      INTEGER {
            rs232(1),
            rs485(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
```

```
  DESCRIPTION
          "Selects the port type for enhanced async. This applies only if the async
          mode is set to enhanced. This affects both transmit and receive interface
          types."
  ::= { radDmd20ModNVStatus 53 }

radDmd20TxEsBaudRate OBJECT-TYPE
  SYNTAX      INTEGER {
          baud150(1),
          baud300(2),
          baud600(3),
          baud1200(4),
          baud2400(5),
          baud4800(6),
          baud9600(7),
          baud19200(8)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the baud rate for enhanced async. This applies only if the async
          mode is set to enhanced."
  ::= { radDmd20ModNVStatus 54 }

radDmd20TxEsBitsPerChar OBJECT-TYPE
  SYNTAX      INTEGER {
          seven(1),
          eight(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the data bits setting for enhanced async. This applies only if the async
          mode is set to enhanced."
  ::= { radDmd20ModNVStatus 55 }

radDmd20TxCarrierDelaySec OBJECT-TYPE
  SYNTAX      INTEGER (0..255)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "LBST systems- selects the minimum number of seconds the modulator waits between
          power-up and enabling the carrier for the first time. This allows time for
          the BUC to stabilize.
          Non-LBST systems- set to zero."
  ::= { radDmd20ModNVStatus 56 }


-- -----------------------------------------------------------------------------------------------------
-- Dmd20 modulator status information.

radDmd20TxAlarms1 OBJECT-TYPE
  SYNTAX      BITS {
          txFpgaProcessorFault(0),
          bit1Reserved(1),
          txSymbolClockLock(2),
          bit3Reserved(3),
          ifLBandSynthesizerLock(4),
          bit5Reserved(5),
          bit6Reserved(6),
          modSummaryFault(7)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
```

```
        Activity/Lock: 1 = Pass, 0 = Fail
        Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20ModStatus 1 }

radDmd20TxAlarms2 OBJECT-TYPE
  SYNTAX      BITS {
        terrClockActivity(0),
        internalClockActivity(1),
        satClockActivity(2),
        dataActivity(3),
        dataAISFault(4),
        clockFallbackFault(5),
        dvbFrameFault(6)
        }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
        "A bit field.  On startup, the agent initializes this to the value '00000000'B.
        Activity/Lock: 1 = Pass, 0 = Fail
        Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20ModStatus 2 }

radDmd20TxDropStatus OBJECT-TYPE
  SYNTAX      BITS {
        terrFrameFault(0),
        terrMultiframeFault(1),
        terrCrcFault(2),
        bit3Reserved(3),
        bit4Reserved(4),
        bit5Reserved(5),
        bit6Reserved(6),
        bit7Reserved(7)
        }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
        "A bit field.  On startup, the agent initializes this to the value '00000000'B.
        Bit 0 = Terrestrial frame lock fault (all modes)
        Bit 1 = Terrestrial multi-frame lock fault (PCM-30 and PCM-30C only)
        Bit 2 = Terrestrial CRC lock fault (PCM-30C and PCM-31C only)

        Activity/Lock: 1 = Pass, 0 = Fail
        Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20ModStatus 3 }

radDmd20TxBackwardAlarms OBJECT-TYPE
  SYNTAX      BITS {
        backwardAlarm1Transmitted(0),
        backwardAlarm2Transmitted(1),
        backwardAlarm3Transmitted(2),
        backwardAlarm4Transmitted(3)
        }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
        "A bit field.  On startup, the agent initializes this to the value '00000000'B.
        0 = Not transmitted, 1 = Transmitted"
  ::= { radDmd20ModStatus 4 }

radDmd20TxLatchedAlarms1 OBJECT-TYPE
  SYNTAX      BITS {
        txFpgaProcessorFault(0),
        bit1Reserved(1),
        txSymbolClockLock(2),
        bit3Reserved(3),
        ifLBandSynthesizerLock(4),
```

```
            bit5Reserved(5),
            bit6Reserved(6),
            modSummaryFault(7)
            }
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            0 = Pass, 1 = Fail"
   ::= { radDmd20ModStatus 5 }

radDmd20TxLatchedAlarms2 OBJECT-TYPE
   SYNTAX      BITS {
            terrClockActivity(0),
            internalClockActivity(1),
            satClockActivity(2),
            dataActivity(3),
            dataAISFault(4),
            clockFallbackFault(5),
            dvbFrameFault(6)
            }
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            0 = Pass, 1 = Fail"
   ::= { radDmd20ModStatus 6 }

radDmd20TxSymbolRateHz OBJECT-TYPE
   SYNTAX      Unsigned32 (9600..10000000)
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
            "Modulator symbol rate"
   ::= { radDmd20ModStatus 7 }

radDmd20TxAlarms4 OBJECT-TYPE
   SYNTAX      BITS {
            bucCurrentFault(0),
            bucVoltageFault(1),
            ethernetWanMajorAlarm(2)
            }
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            Activity/Lock: 1 = Pass, 0 = Fail
            Alarm/Fault:   0 = Pass, 1 = Fail"
   ::= { radDmd20ModStatus 8 }

radDmd20TxLatchedAlarms4 OBJECT-TYPE
   SYNTAX      BITS {
            bucCurrentFault(0),
            bucVoltageFault(1),
            ethernetWanMajorAlarm(2)
            }
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            0 = Pass, 1 = Fail"
   ::= { radDmd20ModStatus 9 }

-- ---------------------------------------------------------------------------------------------------
-- Dmd20 demodulator non-volatile status information.
```

```
radDmd20RxNetworkSpec OBJECT-TYPE
  SYNTAX      INTEGER {
            closednet(1),
            idr(2),
            ibs(3),
            dropInsert(4),
            dvbSat(5)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the demodulator's mode of operation. The mode sets a
            number of parameters within the demodulator to meet a set of
            specifications. The purpose is to eliminate additional
            commands and compatibility problems."
  ::= { radDmd20DemodNVStatus 1 }

radDmd20RxCarrierFrequencyHz OBJECT-TYPE
  SYNTAX      Unsigned32 (50000000..180000000|950000000..2050000000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects IF frequency in Hz steps. The range is 50 MHz to 180 MHz
            for the 70/140 MHz type modems and 950 MHz to 2050 MHz for the
            LBand modems."
  ::= { radDmd20DemodNVStatus 2 }

radDmd20RxTerrDataRateHz OBJECT-TYPE
  SYNTAX      Unsigned32 (4800..10000000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the data rate in BPS. The data rate is variable from
            4800 bps to 10 Mbps. It varies based on demodulation and code rate.
            Please refer to the Dmd20 modem technical specifications manual
            for Data Rate Limits."
  ::= { radDmd20DemodNVStatus 3 }

radDmd20RxStrapCode OBJECT-TYPE
  SYNTAX      INTEGER (0..1000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the demodulator strap code. This is a quick set key that
            configures many of the modem parameters. When a strap code is
            entered, the demodulator is automatically configured for the
            corresponding data rate, overhead, code rate, framing, descrambler
            type, and demodulation."
  ::= { radDmd20DemodNVStatus 4 }

radDmd20RxInnerFecRate OBJECT-TYPE
  SYNTAX      INTEGER {
            none(1),           viterbi1_2(2),    viterbi2_3(3),
            viterbi3_4(4),     viterbi5_6(5),    viterbi7_8(6),
            reserved3(7),      sequential1_2(8), reserved4(9),
            sequential3_4(10), reserved5(11),    sequential7_8(12),
            reserved6(13),     reserved7(14),    trellis2_3(15),
            trellis3_4(16),    trellis5_6(17),   trellis7_8(18),
            trellis8_9(19),    comstream3_4(20), tpc_793_2d(21),
            tpc_495_3d(22),    tpc1_2(23),       tpc3_4(24),
            tpc7_8(25),        tpc21_44(26)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects Rx code rate and type. The reserved selections are
```

```
        unimplemented types reserved for future use."
  ::= { radDmd20DemodNVStatus 5 }

radDmd20RxDemodulationType OBJECT-TYPE
  SYNTAX      INTEGER {
        qpsk(1),
        bpsk(2),
        psk8(3),
        qam16(4),
        oqpsk(5)
        }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
        "Selects the demodulation type."
  ::= { radDmd20DemodNVStatus 6 }

radDmd20RxSatFraming OBJECT-TYPE
  SYNTAX      INTEGER {
        framingNone(1),
        framing96kIdr(2),
        framingIbs(3),
        framingEfAupc(4),
        framingDvb(5),
        framingEdmac(6)
        }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
        "Selects framing type."
  ::= { radDmd20DemodNVStatus 7 }

radDmd20RxOuterFecEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
        "Disables/enables the ReedSolomon decoder"
  ::= { radDmd20DemodNVStatus 8 }

radDmd20RxOuterFecRate OBJECT-TYPE
  SYNTAX      INTEGER {
        rsN126K112(1),
        rsN194K178(2),
        rsN219K201(3),
        rsN225K205(4),
        rsN204K188(5),
        rsCustomNK(6)
        }
  MAX-ACCESS  read-write
  STATUS      obsolete
  DESCRIPTION
        "ReedSolomon N code is the codeword length or block length.
        It is the sum of message and check symbols. N = K + R.
        ReedSolomon K code is the message length or user data. It is
        the number of user data symbols in one message block. Message
        length is K = N - R.

        This object is obsolete, N and K values are no longer limited
        to the five selections listed above.
        see radDmd20RxRsOfecRate"
  ::= { radDmd20DemodNVStatus 9 }

radDmd20RxInterleaverDepth OBJECT-TYPE
  SYNTAX      INTEGER {
        interleaverDepth4(1),
```

```
            interleaverDepth8(2),
            interleaverDepth12(3)
            }
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "ReedSolomon interleaver depth. It can either be a value of 4
            or 8."
   ::= { radDmd20DemodNVStatus 10 }

radDmd20RxInsertMode OBJECT-TYPE
   SYNTAX      INTEGER {
            disable(1),
            t1d4(2),
            t1esf(3),
            pcm30(4),
            pcm30c(5),
            pcm31(6),
            pcm31c(7),
            slc96(8),
            t1d4s(9),
            t1esfs(10)
            }
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Selects the demodulator insert mode. SLC-96 is not yet implemented and
            is reserved for future use."
   ::= { radDmd20DemodNVStatus 11 }

radDmd20RxInsertMap OBJECT-TYPE
   SYNTAX      OCTET STRING (SIZE (30))
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Selects the demodulator insert map. Current mapping of satellite channels
            to insert terrestrial time slots. Valid insert channels are 1 through 31.
            If the insert mode is either PCM-30 or PCM-30C, then the channel number
            16 is invalid. It is used for signaling."
   ::= { radDmd20DemodNVStatus 12 }

radDmd20RxBufferClockSource OBJECT-TYPE
   SYNTAX      INTEGER {
            externalScte(1),
            internalSct(2),
            externalExc(3),
            rxSat(4),
            insertClock(5)
            }
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Selects Rx buffer clock. "
   ::= { radDmd20DemodNVStatus 13 }

radDmd20RxBufferClockPolarity OBJECT-TYPE
   SYNTAX      INTEGER {
            normal(1),
            inverted(2)
            }
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Selects Rx buffer clock polarity."
   ::= { radDmd20DemodNVStatus 14 }
```

```
radDmd20RxBufferSize OBJECT-TYPE
  SYNTAX      INTEGER (0..64)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects Rx buffer size in msecs."
  ::= { radDmd20DemodNVStatus 15 }

radDmd20RxDataPolarity OBJECT-TYPE
  SYNTAX      INTEGER {
          none(1),
          terrestrial(2),
          baseband(3),
          terrestrialAndBaseband(4)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects data polarity"
  ::= { radDmd20DemodNVStatus 16 }

radDmd20RxSpectrum OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          inverted(2),
          autoDetect(3)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Inverts the direction of rotation for PSK demodulation."
  ::= { radDmd20DemodNVStatus 17 }

radDmd20RxDescramblingEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Enables descrambler operation"
  ::= { radDmd20DemodNVStatus 18 }

radDmd20RxDescramblingType OBJECT-TYPE
  SYNTAX      INTEGER {
          none(1),
          ibsDescrambler(2),
          v35IESS(3),
          v35CCITT(4),
          v35EfData(5),
          v36FC(6),
          om73(7),
          rsDescrambler(8),
          v35EfRs(9),
          tpcDescrambler(10),
          dvbDescrambler(11),
          edmac(12),
          tpcIbs(13),
          tpcEdmac(14)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects scrambler type. The reserved settings are unimplemented and
          are set aside for future use."
  ::= { radDmd20DemodNVStatus 19 }

radDmd20RxDifferentialDecoder OBJECT-TYPE
```

```
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Disables/enables differential decoder"
  ::= { radDmd20DemodNVStatus 20 }

radDmd20RxBpskSymbolPairingSwap OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          swapped(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects symbol pairing."
  ::= { radDmd20DemodNVStatus 21 }

radDmd20RxT1E1FramingSource OBJECT-TYPE
  SYNTAX      INTEGER {
          internal(1),
          external(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "This applies only if an IDR or IBS interface card is installed."
  ::= { radDmd20DemodNVStatus 22 }

radDmd20RxExtClockSource OBJECT-TYPE
  SYNTAX      INTEGER {
          none(1),
          balancedExc(2),
          bncExc(3),
          idi(4)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the external clock source"
  ::= { radDmd20DemodNVStatus 23 }

radDmd20RxCarrierSweepRange OBJECT-TYPE
  SYNTAX      INTEGER (0..255)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "The value will used as a negative and positive limit
          Example: 25 implies [-25 .. +25]"
  ::= { radDmd20DemodNVStatus 24 }

radDmd20RxCarrierLevelLimitdBmX100 OBJECT-TYPE
  SYNTAX      INTEGER (29..90)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects lower level limit in 1 dB steps, implied sign"
  ::= { radDmd20DemodNVStatus 25 }

radDmd20RxEscOverheadType OBJECT-TYPE
  SYNTAX      INTEGER {
          voice(1),
          data(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
```

```
  DESCRIPTION
          "Selects IDR overhead type. This applies only if an IDR or IBS interface card is
          installed and the receive mode is set to IDR mode. If not ignore."
  ::= { radDmd20DemodNVStatus 26 }

radDmd20RxEsc1GaindBX100 OBJECT-TYPE
  SYNTAX      RadESCGain
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Sets the ESC receive channel #1 volume in dB. This applies only if an IDR or IBS
          interface card is installed and the receive mode is set to IDR mode. If not ignore."
  ::= { radDmd20DemodNVStatus 27 }

radDmd20RxEsc2GaindBX100 OBJECT-TYPE
  SYNTAX      RadESCGain
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Sets the ESC receive channel #2 volume in dB. This applies only if an IDR or IBS
          interface card is installed and the receive mode is set to IDR mode. If not ignore."
  ::= { radDmd20DemodNVStatus 28 }

radDmd20RxTerrInterfaceType OBJECT-TYPE
  SYNTAX      INTEGER {
          g703BT1Ami(1),
          g703BT1B8zs(2),
          g703BE1(3),
          g703BT2(4),
          g703UE1(5),
          g703UT2(6),
          g703UE2(7),
          rs422(8),
          v35(9),
          rs232(10),
          hssi(11),
          asi(12),
          aasi(13),
          m2p(14),
          dvb(15),
          ethernetBridge(25)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects scrambler type. The reserved settings are unimplemented and
          are set aside for future use."
  ::= { radDmd20DemodNVStatus 29 }

radDmd20RxEsEnhancedEnable OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          enhanced(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the async mode. Enhanced mode is only valid in Closed Net mode."
  ::= { radDmd20DemodNVStatus 30 }

radDmd20RxEsSerialControlInterface OBJECT-TYPE
  SYNTAX      INTEGER {
          rs232(1),
          rs485(2)
          }
  MAX-ACCESS  read-write
```

```
  STATUS      current
  DESCRIPTION
          "Selects the port type for enhanced async. This applies only if the async
          mode is set to enhanced."
  ::= { radDmd20DemodNVStatus 31 }

radDmd20RxEsBaudRate OBJECT-TYPE
  SYNTAX      INTEGER {
          baud150(1),
          baud300(2),
          baud600(3),
          baud1200(4),
          baud2400(5),
          baud4800(6),
          baud9600(7),
          baud19200(8)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the baud rate for enhanced async. This applies only if the async
          mode is set to enhanced."
  ::= { radDmd20DemodNVStatus 32 }

radDmd20RxEsBitsPerChar OBJECT-TYPE
  SYNTAX      INTEGER {
          seven(1),
          eight(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the data bits setting for enhanced async. This applies only if the async
          mode is set to enhanced."
  ::= { radDmd20DemodNVStatus 33 }

radDmd20RxTestPattern OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          test2047(2),
          testPattern2To15Minus1(3),
          testPattern2To23Minus1(4)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Enables test pattern operation."
  ::= { radDmd20DemodNVStatus 34 }

radDmd20RxCircuitName OBJECT-TYPE
  SYNTAX      OCTET STRING (SIZE (11))
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Provides entry of Rx circuit identifier. Circuits can be given up to 11
          character alphanumeric identity such as LINK1."
  ::= { radDmd20DemodNVStatus 35 }

radDmd20RxForcedAlarms OBJECT-TYPE
  SYNTAX      BITS {
          forceSummaryAlarm(0)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Rx forced alarms:
```

```
            0=Do not force, 1=Force alarm"
    ::= { radDmd20DemodNVStatus 36 }

radDmd20RxAlarms1Mask OBJECT-TYPE
    SYNTAX      BITS {
            rxFpgaProcessorFault(0),
            carrierFault(1),
            multiframeSyncFault(2),
            frameSyncFault(3),
            ibsBerFault(4),
            satelliteAisFault(5),
            dataActivity(6),
            agcLevelFault(7)
            }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
    ::= { radDmd20DemodNVStatus 37 }

radDmd20RxAlarms2Mask OBJECT-TYPE
    SYNTAX      BITS {
            bufferUnderflow(0),
            bufferOverflow(1),
            bufferUnder10Percent(2),
            bufferOver90Percent(3),
            rsDecoderFault(4),
            rsDeinterleaverFault(5),
            rsDecoderUncorrectableWordFault(6),
            summaryFault(7)
            }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
    ::= { radDmd20DemodNVStatus 38 }

radDmd20RxAlarms3Mask OBJECT-TYPE
    SYNTAX      BITS {
            lBandSynthesizerLock(0),
            bit1Reserved(1),
            bufferClockLock(2),
            viterbiDecoderLock(3),
            sequentialDecoderLock(4),
            testPatternLock(5),
            externalReferenceLock(6),
            bit7Reserved(7)
            }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
    ::= { radDmd20DemodNVStatus 39 }

radDmd20RxAlarms4Mask OBJECT-TYPE
    SYNTAX      BITS {
            bufferClockActivity(0),
            externalBncActivity(1),
            satelliteClockActivity(2),
            insertClockActivity(3),
            externalReferenceActivity(4),
            hsReferenceActivity(5),
            clockFallbackFault(6),
```

```
            ebnoFault(7)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
  ::= { radDmd20DemodNVStatus 40 }

radDmd20RxAlarms5Mask OBJECT-TYPE
  SYNTAX      BITS {
            trellisDecoderLock(0),
            bit1Reserved(1),
            insertSignalingFault(2),
            turboDecoderFault(3),
            reservedbit4(4),
            reservedbit5(5),
            dvbFrameFault(6)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
  ::= { radDmd20DemodNVStatus 41 }

radDmd20RxInsertStatusMask OBJECT-TYPE
  SYNTAX      BITS {
            terrFrameFault(0),
            terrMultiframeFault(1),
            terrCrcFault(2),
            bit3Reserved(3),
            bit4Reserved(4),
            bit5Reserved(5),
            bit6Reserved(6),
            bit7Reserved(7)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
  ::= { radDmd20DemodNVStatus 42 }

radDmd20RxTerrestrialFraming OBJECT-TYPE
  SYNTAX      INTEGER {
            noFraming(1),
            dvb188(2),
            dvb204(3)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the receive terrestrial framing."
  ::= { radDmd20DemodNVStatus 43 }

radDmd20RxTerrestrialStreaming OBJECT-TYPE
  SYNTAX      INTEGER {
            packetOutput(1),
            byteOutput(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the receive terrestrial streaming."
  ::= { radDmd20DemodNVStatus 44 }
```

```
radDmd20RxAlarms6Mask OBJECT-TYPE
  SYNTAX      BITS {
            lnbCurrentFault(0),
            lnbVoltageFault(1),
            ethernetWanMajorAlarm(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Alarm mask:
            0 = Mask, 1 = Allow"
  ::= { radDmd20DemodNVStatus 45 }

radDmd20RxCarrierReacqRange OBJECT-TYPE
  SYNTAX      INTEGER (0..255000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Reacquisition range is -/+ selected value."
  ::= { radDmd20DemodNVStatus 46 }

radDmd20RxRsOfecRate OBJECT-TYPE
  SYNTAX      INTEGER
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "This provides the ReedSolomon N and K Values, the integer
            fieldValue = (N * 1000) + K

            Example: a Dvb Code Rate of 188/204 has a field value of 204188 = (204 * 1000) + 188

            A ReedSolomon N code is the codeword length or block length.
            It is the sum of message and check symbols. N = K + R.
            ReedSolomon K code is the message length or user data. It is
            the number of user data symbols in one message block. Message
            length is K = N - R."
  ::= { radDmd20DemodNVStatus 47 }

radDmd20RxTpcInterleaver OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Disables/Enables the TPC interleaver. Valid only for Radyne turbo codes
            TPC.495 and TPCTPC.793"
  ::= { radDmd20DemodNVStatus 48 }

radDmd20RxCarrierSweepDelay OBJECT-TYPE
  SYNTAX      CarrierSweepDelayType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Sets the carrier sweep delay in secs. There is an implied decimal point.
            A value of 215 corresponds to a 21.5 sec sweep delay."
  ::= { radDmd20DemodNVStatus 49 }

radDmd20RxEbnoAlarmThreshold OBJECT-TYPE
  SYNTAX      EbnoAlarmThresholdType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "EbNo alarm threshold. There is an implied decimal point."
  ::= { radDmd20DemodNVStatus 50 }

radDmd20RxBufferReset OBJECT-TYPE
```

```
  SYNTAX      INTEGER
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Any write to this object reset the buffer."
  ::= { radDmd20DemodNVStatus 51 }

radDmd20RxRestartTestPattern  OBJECT-TYPE
  SYNTAX      INTEGER
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Any write to this object restarts the test pattern."
  ::= { radDmd20DemodNVStatus 52 }

-- ------------------------------------------------------------------------------------------------------
-- Dmd20 demodulator volatile status information.

radDmd20RxAlarms1 OBJECT-TYPE
  SYNTAX      BITS {
          rxFpgaProcessorFault(0),
          carrierFault(1),
          multiframeSyncFault(2),
          frameSyncFault(3),
          ibsBerFault(4),
          satelliteAisFault(5),
          dataActivity(6),
          agcLevelFault(7)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          Activity/Lock: 1 = Pass, 0 = Fail
          Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 1 }

radDmd20RxAlarms2 OBJECT-TYPE
  SYNTAX      BITS {
          bufferUnderflow(0),
          bufferOverflow(1),
          bufferUnder10Percent(2),
          bufferOver90Percent(3),
          rsDecoderFault(4),
          rsDeinterleaverFault(5),
          rsDecoderUncorrectableWordFault(6),
          summaryFault(7)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          Activity/Lock: 1 = Pass, 0 = Fail
          Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 2 }

radDmd20RxAlarms3 OBJECT-TYPE
  SYNTAX      BITS {
          lBandSynthesizerLock(0),
          bit1Reserved(1),
          bufferClockLock(2),
          viterbiDecoderLock(3),
          sequentialDecoderLock(4),
          testPatternLock(5),
          externalReferenceLock(6),
          bit7Reserved(7)
```

```
            }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            Activity/Lock: 1 = Pass, 0 = Fail
            Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 3 }

radDmd20RxAlarms4 OBJECT-TYPE
  SYNTAX      BITS {
            bufferClockActivity(0),
            externalBncActivity(1),
            satelliteClockActivity(2),
            insertClockActivity(3),
            externalReferenceActivity(4),
            hsReferenceActivity(5),
            clockFallbackFault(6),
            ebnoFault(7)
            }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            Activity/Lock: 1 = Pass, 0 = Fail
            Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 4 }

radDmd20RxAlarms5 OBJECT-TYPE
  SYNTAX      BITS {
            trellisDecoderLock(0),
            bit1Reserved(1),
            insertSignalingFault(2),
            turboDecoderFault(3),
            reservedbit4(4),
            reservedbit5(5),
            dvbFrameFault(6)
            }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            Activity/Lock: 1 = Pass, 0 = Fail
            Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 5 }

radDmd20RxInsertStatus OBJECT-TYPE
  SYNTAX      BITS {
            terrFrameFault(0),
            terrMultiframeFault(1),
            terrCrcFault(2),
            bit3Reserved(3),
            bit4Reserved(4),
            bit5Reserved(5),
            bit6Reserved(6),
            bit7Reserved(7)
            }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            Activity/Lock: 1 = Pass, 0 = Fail
            Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 6 }

radDmd20RxBackwardAlarms OBJECT-TYPE
```

```
  SYNTAX      BITS {
          idrBackwardAlarm1(0),
          idrBackwardAlarm2(1),
          idrBackwardAlarm3(2),
          idrBackwardAlarm4(3),
          reservedBit4(4),
          reservedBit5(5),
          ibsPromptAlarm(6),
          ibsServiceAlarm(7)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          Activity/Lock: 1 = Pass, 0 = Fail
          Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 7 }

radDmd20RxLatchedAlarms1 OBJECT-TYPE
  SYNTAX      BITS {
          rxFpgaProcessorFault(0),
          carrierFault(1),
          multiframeSyncFault(2),
          frameSyncFault(3),
          ibsBerFault(4),
          satelliteAisFault(5),
          dataActivity(6),
          agcLevelFault(7)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 8 }

radDmd20RxLatchedAlarms2 OBJECT-TYPE
  SYNTAX      BITS {
          bufferUnderflow(0),
          bufferOverflow(1),
          bufferUnder10Percent(2),
          bufferOver90Percent(3),
          rsDecoderFault(4),
          rsDeinterleaverFault(5),
          rsDecoderUncorrectableWordFault(6),
          summaryFault(7)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 9 }

radDmd20RxLatchedAlarms3 OBJECT-TYPE
  SYNTAX      BITS {
          lBandSynthesizerLock(0),
          bit1Reserved(1),
          bufferClockLock(2),
          viterbiDecoderLock(3),
          sequentialDecoderLock(4),
          testPatternLock(5),
          externalReferenceLock(6),
          bit7Reserved(7)
          }
  MAX-ACCESS  read-only
```

```
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 10 }

radDmd20RxLatchedAlarms4 OBJECT-TYPE
  SYNTAX      BITS {
          bufferClockActivity(0),
          externalBncActivity(1),
          satelliteClockActivity(2),
          insertClockActivity(3),
          externalReferenceActivity(4),
          hsReferenceActivity(5),
          clockFallbackFault(6),
          ebnoFault(7)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 11 }

radDmd20RxLatchedAlarms5 OBJECT-TYPE
  SYNTAX      BITS {
          trellisDecoderLock(0),
          bit1Reserved(1),
          insertSignalingFault(2),
          turboDecoderFault(3),
          reservedbit4(4),
          reservedbit5(5),
          dvbFrameFault(6)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 12 }

radDmd20RxBerEbnoStatus OBJECT-TYPE
  SYNTAX      INTEGER (0..255)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B
          Bit 0 = Raw BER and corrected BER status. 1 = Valid
          Bit 1 = Test BER status                   1 = Valid
          Bit 2,3 = EbNo status
            0 = EbNo invalid
            1 = EbNo valid
            2 = EbNo is smaller than indicated value
            3 = EbNo is greater than indicated value
          Bit 4..7 = Reserved"
  ::= { radDmd20DemodStatus 13 }

radDmd20RxEbno OBJECT-TYPE
  SYNTAX      EbnoType
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Estimated EbNo as seen by the demodulator, 2 implied decimal places."
  ::= { radDmd20DemodStatus 14 }

radDmd20RxBufferLevel OBJECT-TYPE
```

```
  SYNTAX      INTEGER (0..100)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Pleisiochronous buffer percent full status. Unsigned binary value in 1% steps."
  ::= { radDmd20DemodStatus 15 }

radDmd20RxCarrierLeveldBmX100 OBJECT-TYPE
  SYNTAX      RadReceivePowerLevel  (-100..0)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Estimated receive signal level, implied decimal point"
  ::= { radDmd20DemodStatus 16 }

radDmd20RxBitErrorCount OBJECT-TYPE
  SYNTAX      Counter32
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Shows the number of errors detected in the data stream"
  ::= { radDmd20DemodStatus 17 }

radDmd20RxTestPatternErrorCount OBJECT-TYPE
  SYNTAX      Counter32
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Shows the number of errors detected by the test pattern checker."
  ::= { radDmd20DemodStatus 18 }

radDmd20RxLossOfTerrInputSignal OBJECT-TYPE
  SYNTAX      INTEGER {
          normal(1),
          lossOfSignal(2)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          ""
  ::= { radDmd20DemodStatus 19 }

radDmd20RxSymbolRateHz OBJECT-TYPE
  SYNTAX      Unsigned32 (9600..10000000)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Demodulator symbol rate."
  ::= { radDmd20DemodStatus 20 }

radDmd20RxAlarms6 OBJECT-TYPE
  SYNTAX      BITS {
          lnbCurrentFault(0),
          lnbVoltageFault(1),
          ethernetWanMajorAlarm(2)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          Activity/Lock: 1 = Pass, 0 = Fail
          Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 21 }

radDmd20RxLatchedAlarms6 OBJECT-TYPE
  SYNTAX      BITS {
```

```
            lnbCurrentFault(0),
            lnbVoltageFault(1),
            ethernetWanMajorAlarm(2)
            }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "A bit field.  On startup, the agent initializes this to the value '00000000'B.
            0 = Pass, 1 = Fail"
  ::= { radDmd20DemodStatus 22 }

radDmd20RxEthPktErrorCount OBJECT-TYPE
  SYNTAX      Counter32
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "Ethernet Bridge card packet error count."
  ::= { radDmd20DemodStatus 23 }

radDmd20RxEthPktTotalCount OBJECT-TYPE
  SYNTAX      Counter32
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "Ethernet Bridge card total packet count."
  ::= { radDmd20DemodStatus 24 }

radDmd20RxEthPort1Status OBJECT-TYPE
  SYNTAX      INTEGER {
            down(1),
            unresolved(2),
            halfDuplex10mbs(3),
            halfDuplex100mbs(4),
            fullDuplex10mbs(5),
            fullDuplex100mbs(6)
            }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "Ethernet Bridge card Port 1 Status."
  ::= { radDmd20DemodStatus 25 }

radDmd20RxEthPort2Status OBJECT-TYPE
  SYNTAX      INTEGER {
            down(1),
            unresolved(2),
            halfDuplex10mbs(3),
            halfDuplex100mbs(4),
            fullDuplex10mbs(5),
            fullDuplex100mbs(6)
            }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "Ethernet Bridge card Port 2 Status."
  ::= { radDmd20DemodStatus 26 }

radDmd20RxEthPort3Status OBJECT-TYPE
  SYNTAX      INTEGER {
            down(1),
            unresolved(2),
            halfDuplex10mbs(3),
            halfDuplex100mbs(4),
            fullDuplex10mbs(5),
            fullDuplex100mbs(6)
            }
```

```
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Ethernet Bridge card Port 3 Status."
  ::= { radDmd20DemodStatus 27 }

radDmd20RxEthPort4Status OBJECT-TYPE
  SYNTAX      INTEGER {
          down(1),
          unresolved(2),
          halfDuplex10mbs(3),
          halfDuplex100mbs(4),
          fullDuplex10mbs(5),
          fullDuplex100mbs(6)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Ethernet Bridge card Port 4 Status."
  ::= { radDmd20DemodStatus 28 }

radDmd20RxEthWanStatus OBJECT-TYPE
  SYNTAX      INTEGER {
          down(1),
          unresolved(2),
          halfDuplex10mbs(3),
          halfDuplex100mbs(4),
          fullDuplex10mbs(5),
          fullDuplex100mbs(6)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Ethernet Bridge card WAN Status."
  ::= { radDmd20DemodStatus 29 }

radDmd20RxRawBerStatus OBJECT-TYPE
  SYNTAX      BerStatusStringType
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Raw BER status"
  ::= { radDmd20DemodStatus 30 }

radDmd20RxCorrectedBerStatus OBJECT-TYPE
  SYNTAX      BerStatusStringType
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Corrected BER status"
  ::= { radDmd20DemodStatus 31 }

radDmd20RxTestPatternBerStatus OBJECT-TYPE
  SYNTAX      BerStatusStringType
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Test pattern BER status"
  ::= { radDmd20DemodStatus 32 }

radDmd20RxAupcRemoteBerStatus OBJECT-TYPE
  SYNTAX      BerStatusStringType
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "AUPC remote BER status"
```

```
  ::= { radDmd20DemodStatus 33 }

radDmd20RxCarrierFrequencyOffset OBJECT-TYPE
  SYNTAX      INTEGER
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "Carrier frequency offset in Hz."
  ::= { radDmd20DemodStatus 34 }

-- ---------------------------------------------------------------------------------------------------
-- Dmd20 common non-volatile status information.

radDmd20CommonExternalExcClock OBJECT-TYPE
  SYNTAX      INTEGER (2400..20000000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the external EXC clock."
  ::= { radDmd20CommonNVStatus 1 }

radDmd20CommonExternalReference OBJECT-TYPE
  SYNTAX      INTEGER (256000..10000000)
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the external frequency reference in Hz. Valid settings are
          from 256 KHz to 10 Mhz in 8 kHz steps."
  ::= { radDmd20CommonNVStatus 2 }

radDmd20CommonFrequencyReferenceSource OBJECT-TYPE
  SYNTAX      INTEGER {
          internal(1),
          external(2),
          highStab(3)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects the frequency reference source."
  ::= { radDmd20CommonNVStatus 3 }

radDmd20CommonAlarms1Mask OBJECT-TYPE
  SYNTAX      BITS {
          minus12VoltAlarm(0),
          plus12VoltAlarm(1),
          plus5VoltAlarm(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Alarm mask:
          0 = Mask, 1 = Allow"
  ::= { radDmd20CommonNVStatus 4 }

radDmd20CommonAlarms2Mask OBJECT-TYPE
  SYNTAX      BITS {
          bit0Reserved(0)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Alarm mask:
          0 = Mask, 1 = Allow"
  ::= { radDmd20CommonNVStatus 5 }
```

```
radDmd20CommonCarrierType OBJECT-TYPE
  SYNTAX      INTEGER {
            normal(1),
            cw(2),
            dual(3),
            offset(4),
            posFir(5),
            negFir(6)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the carrier type"
  ::= { radDmd20CommonNVStatus 6 }

radDmd20CommonLoopback OBJECT-TYPE
  SYNTAX      INTEGER {
            none(1),
            terrTx(2),
            terrRx(3),
            terrTxRx(4),
            basebandTx(5),
            basebandRx(6),
            basebandTxRx(7),
            if(8)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects the loopback type"
  ::= { radDmd20CommonNVStatus 7 }

radDmd20CommonSerialRemoteControl OBJECT-TYPE
  SYNTAX      INTEGER {
            computer(1),
            terminal(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects wheather the serial remote control is terminal or computer."
  ::= { radDmd20CommonNVStatus 8 }

radDmd20CommonTerminalBaudRate OBJECT-TYPE
  SYNTAX      INTEGER {
            baud150(1),
            baud300(2),
            baud600(3),
            baud1200(4),
            baud2400(5),
            baud4800(6),
            baud9600(7),
            baud19200(8),
            baud38400(9),
            baud57600(10)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects terminal baud rate."
  ::= { radDmd20CommonNVStatus 9 }

radDmd20CommonTerminalEmulation OBJECT-TYPE
  SYNTAX      INTEGER {
            addsvp(1),
            vt100(2),
```

```
            wyse50(3)
            }
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Selects terminal emulation."
   ::= { radDmd20CommonNVStatus 10 }

radDmd20CommonRemoteAddress OBJECT-TYPE
   SYNTAX      INTEGER (32..255)
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Remote port address, 32 through 255."
   ::= { radDmd20CommonNVStatus 11 }

radDmd20CommonRemoteBaudRate OBJECT-TYPE
   SYNTAX      INTEGER {
            baud150(1),
            baud300(2),
            baud600(3),
            baud1200(4),
            baud2400(5),
            baud4800(6),
            baud9600(7),
            baud19200(8),
            baud38400(9),
            baud57600(10)
            }
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Selects remote port Baud Rate."
   ::= { radDmd20CommonNVStatus 12 }

radDmd20CommonRemoteInterface OBJECT-TYPE
   SYNTAX      INTEGER {
            rs232(1),
            rs485(2)
            }
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Selects remote line interface type."
   ::= { radDmd20CommonNVStatus 13 }

radDmd20CommonEventClear  OBJECT-TYPE
   SYNTAX      INTEGER
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Any write to this object clears the event buffer."
   ::= { radDmd20CommonNVStatus 14 }

radDmd20CommonLatchedAlarmsClear  OBJECT-TYPE
   SYNTAX      INTEGER
   MAX-ACCESS  read-write
   STATUS      current
   DESCRIPTION
            "Any write to this object clears the latched alarms."
   ::= { radDmd20CommonNVStatus 15 }

-- ----------------------------------------------------------------------------------------------------
-- Dmd20 common status information.

radDmd20CommonAlarms1 OBJECT-TYPE
```

```
  SYNTAX      BITS {
          minus12VoltAlarm(0),
          plus12VoltAlarm(1),
          plus5VoltAlarm(2)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          Activity/Lock: 1 = Pass, 0 = Fail
          Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20CommonStatus 1 }

radDmd20CommonAlarms2 OBJECT-TYPE
  SYNTAX      BITS {
          bit0Reserved(0)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          Activity/Lock: 1 = Pass, 0 = Fail
          Alarm/Fault:   0 = Pass, 1 = Fail"
  ::= { radDmd20CommonStatus 2 }

radDmd20CommonLatchedAlarms1 OBJECT-TYPE
  SYNTAX      BITS {
          minus12VoltAlarm(0),
          plus12VoltAlarm(1),
          plus5VoltAlarm(2)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          0 = Pass, 1 = Fail"
  ::= { radDmd20CommonStatus 3 }

radDmd20CommonLatchedAlarms2 OBJECT-TYPE
  SYNTAX      BITS {
          bit0Reserved(0)
          }
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "A bit field.  On startup, the agent initializes this to the value '00000000'B.
          0 = Pass, 1 = Fail"
  ::= { radDmd20CommonStatus 4 }

radDmd20CommonPos5VDcX10 OBJECT-TYPE
  SYNTAX      RadVoltageLevel (0..255)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "+5V voltage. Implied decimal point, 49 means 4.9Volts"
  ::= { radDmd20CommonStatus 5 }

radDmd20CommonPos12VDcX10 OBJECT-TYPE
  SYNTAX      RadVoltageLevel (0..255)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "+12V voltage. Implied decimal point, 121 means 12.1Volts"
  ::= { radDmd20CommonStatus 6 }

radDmd20CommonNeg12VDcX10 OBJECT-TYPE
```

```
  SYNTAX      RadVoltageLevel (0..255)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "-12V voltage. Implied decimal point and sign, 121 means -12.1Volts"
  ::= { radDmd20CommonStatus 7 }

radDmd20CommonFirmwareName OBJECT-TYPE
  SYNTAX      FirmwareNameType
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "This is the modem firmware name."
  ::= { radDmd20CommonStatus 8 }

-- ---------------------------------------------------------------------------------------------------
-- Dmd20 Trap definitions.

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

radDmd20TrapPrefix   OBJECT IDENTIFIER ::= { radDmd20Traps 0 }

radDmd20TxMajorAlarmTrap NOTIFICATION-TYPE
  OBJECTS     {
          radDmd20TxAlarms1
          }
  STATUS      current
  DESCRIPTION "Transmit major alarm trap."
  ::= { radDmd20TrapPrefix 1 }

radDmd20TxMinorAlarmTrap NOTIFICATION-TYPE
  OBJECTS     {
          radDmd20TxAlarms2,
          radDmd20TxDropStatus,
          radDmd20TxBackwardAlarms,
          radDmd20TxAlarms4
          }
  STATUS      current
  DESCRIPTION "Transmit minor alarm trap."
  ::= { radDmd20TrapPrefix 2 }

radDmd20RxMajorAlarmTrap NOTIFICATION-TYPE
  OBJECTS     {
          radDmd20RxAlarms1,
          radDmd20RxAlarms2,
          radDmd20RxAlarms3
          }
  STATUS      current
  DESCRIPTION "Receive major alarm trap."
  ::= { radDmd20TrapPrefix 3 }

radDmd20RxMinorAlarmTrap NOTIFICATION-TYPE
  OBJECTS     {
          radDmd20RxAlarms4,
          radDmd20RxAlarms5,
          radDmd20RxInsertStatus,
          radDmd20RxBackwardAlarms
          }
  STATUS      current
  DESCRIPTION "Receive minor alarm trap."
  ::= { radDmd20TrapPrefix 4 }

radDmd20CommonAlarmTrap NOTIFICATION-TYPE
  OBJECTS     {
          radDmd20CommonAlarms1,
```

```
            radDmd20CommonAlarms2
            }
  STATUS      current
  DESCRIPTION "Common alarm trap."
  ::= { radDmd20TrapPrefix 5 }

-- ---------------------------------------------------------------------------------------------------------
-- DMD20 LBST
-- Dmd20 Mod Lbst nonvolatile status information.

radDmd20LbstTxUplinkFrequencyHz OBJECT-TYPE
  SYNTAX      Counter64
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects RF frequency in Hz steps. 2GHz to 99 GHz."
  ::= { radDmd20ModLbstNVStatus 1 }

radDmd20LbstTxLoFrequencyHz OBJECT-TYPE
  SYNTAX      Counter64
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Selects local oscillator frequency in Hz steps. 2GHz to 99 GHz."
  ::= { radDmd20ModLbstNVStatus 2 }

radDmd20LbstTxSideBand OBJECT-TYPE
  SYNTAX      INTEGER {
            highSide(1),
            lowSide(2)
            }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "Oscillator side band select."
  ::= { radDmd20ModLbstNVStatus 3 }

radDmd20LbstTx10MhzReferenceEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "10 MHz BUC reference enable."
  ::= { radDmd20ModLbstNVStatus 4 }

radDmd20LbstTxVoltageEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
            "BUC supply voltage enable."
  ::= { radDmd20ModLbstNVStatus 5 }

-- ---------------------------------------------------------------------------------------------------------
-- Dmd20 Mod Lbst volatile status information.

radDmd20LbstTxBucVoltageX10 OBJECT-TYPE
  SYNTAX      RadVoltageLevel (0..550)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
            "BUC voltage. Implied decimal point, 482 means 48.2Volts"
  ::= { radDmd20ModLbstStatus 1 }

radDmd20LbstTxBucCurrentX1000 OBJECT-TYPE
  SYNTAX      RadCurrentLevel (0..8000)
```

```
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "BUC current. Implied decimal point, 5500 means 5.500Amps"
  ::= { radDmd20ModLbstStatus 2 }

-- ------------------------------------------------------------------------------------------------------
-- Dmd20 Demod Lbst nonvolatile status information.

radDmd20LbstRxDownlinkFrequencyHz OBJECT-TYPE
  SYNTAX      Counter64
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects RF frequency in Hz steps. 2GHz to 99 GHz."
  ::= { radDmd20DemodLbstNVStatus 1 }

radDmd20LbstRxLoFrequencyHz OBJECT-TYPE
  SYNTAX      Counter64
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Selects local oscillator frequency in Hz steps. 2GHz to 99 GHz."
  ::= { radDmd20DemodLbstNVStatus 2 }

radDmd20LbstRxSideBand OBJECT-TYPE
  SYNTAX      INTEGER {
          highSide(1),
          lowSide(2)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "Oscillator side band select."
  ::= { radDmd20DemodLbstNVStatus 3 }

radDmd20LbstRx10MhzReferenceEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "10 MHz LNB reference enable."
  ::= { radDmd20DemodLbstNVStatus 4 }

radDmd20LbstRxVoltageEnable OBJECT-TYPE
  SYNTAX      ControlType
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "LNB supply voltage enable."
  ::= { radDmd20DemodLbstNVStatus 5 }

radDmd20LbstRxVoltageSelect OBJECT-TYPE
  SYNTAX      INTEGER {
          select13Volts(1),
          select15Volts(2),
          select18Volts(3),
          select20Volts(4)
          }
  MAX-ACCESS  read-write
  STATUS      current
  DESCRIPTION
          "LNB supply voltage. Valid settings are 13, 15, 18, and 20 volts."
  ::= { radDmd20DemodLbstNVStatus 6 }

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

```
-- Dmd20 Demod Lbst volatile status information.

radDmd20LbstRxLnbVoltageX10 OBJECT-TYPE
  SYNTAX      RadVoltageLevel (0..240)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "LNB voltage. Implied decimal point, 181 means 18.1Volts"
  ::= { radDmd20DemodLbstStatus 1 }

radDmd20LbstRxLnbCurrentX1000 OBJECT-TYPE
  SYNTAX      RadCurrentLevel (0..5000)
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
          "LNB current. Implied decimal point, 498 means 0.498Amps"
  ::= { radDmd20DemodLbstStatus 2 }

-- ---------------------------------------------------------------------------------------------------
-- DMD20 MIB conformance

radDmd20ModNVStatusGroup OBJECT-GROUP
  OBJECTS  {
          radDmd20TxCarrierControl,
          radDmd20TxNetworkSpec,
          radDmd20TxCarrierLeveldBmX100,
          radDmd20TxCarrierFrequencyHz,
          radDmd20TxTerrDataRateHz,
          radDmd20TxStrapCode,
          radDmd20TxInnerFecRate,
          radDmd20TxModulationType,
          radDmd20TxSatFraming,
          radDmd20TxOuterFecEnable,
          radDmd20TxOuterFecRate,
          radDmd20TxInterleaverDepth,
          radDmd20TxDropMode,
          radDmd20TxDropMap,
          radDmd20TxClockSource,
          radDmd20TxClockPolarity,
          radDmd20TxSCTClockSource,
          radDmd20TxDataPolarity,
          radDmd20TxSpectrum,
          radDmd20TxScramblingEnable,
          radDmd20TxScramblingType,
          radDmd20TxDifferentialEncoder,
          radDmd20TxBpskSymbolPairingSwap,
          radDmd20TxEscOverheadType,
          radDmd20TxEsc1GaindBX100,
          radDmd20TxEsc2GaindBX100,
          radDmd20TxTerrInterfaceType,
          radDmd20TxAupcLocalMode,
          radDmd20TxAupcRemoteMode,
          radDmd20TxAupcLocalCarrierLossAction,
          radDmd20TxAupcRemoteCarrierLossAction,
          radDmd20TxAupcTrackingRate,
          radDmd20TxAupcRemoteBasebandLoopback,
          radDmd20TxAupcRemoteTestPattern,
          radDmd20TxAupcTargetEbnoDbX100,
          radDmd20TxAupcMinCarrierLeveldBmX100,
          radDmd20TxAupcMaxCarrierLeveldBmX100,
          radDmd20TxAupcNomCarrierLeveldBmX100,
          radDmd20TxTestPattern,
          radDmd20TxCircuitName,
          radDmd20TxAlarms1Mask,
          radDmd20TxAlarms2Mask,
          radDmd20TxForcedAlarms,
```

```
            radDmd20TxDropStatusMask,
            radDmd20TxTerrestrialFraming,
            radDmd20TxSpectralMask,
            radDmd20TxAlarms4Mask,
            radDmd20TxEthFlowControl,
            radDmd20TxEthDaisyChain,
            radDmd20TxRsOfecRate,
            radDmd20TxTpcInterleaver,
            radDmd20TxEsEnhancedEnable,
            radDmd20TxEsSerialControlInterface,
            radDmd20TxEsBaudRate,
            radDmd20TxEsBitsPerChar,
            radDmd20TxCarrierDelaySec
            }
  STATUS     current
  DESCRIPTION "Modulator non-volatile status group."
::= { radDmd20Groups 1 }

radDmd20ModStatusGroup OBJECT-GROUP
  OBJECTS  {
            radDmd20TxAlarms1,
            radDmd20TxAlarms2,
            radDmd20TxDropStatus,
            radDmd20TxBackwardAlarms,
            radDmd20TxLatchedAlarms1,
            radDmd20TxLatchedAlarms2,
            radDmd20TxSymbolRateHz,
            radDmd20TxAlarms4,
            radDmd20TxLatchedAlarms4
            }
  STATUS     current
  DESCRIPTION "Modulator volatile status group."
::= { radDmd20Groups 2 }

radDmd20DemodNVStatusGroup OBJECT-GROUP
  OBJECTS  {
            radDmd20RxNetworkSpec,
            radDmd20RxCarrierFrequencyHz,
            radDmd20RxTerrDataRateHz,
            radDmd20RxStrapCode,
            radDmd20RxInnerFecRate,
            radDmd20RxDemodulationType,
            radDmd20RxSatFraming,
            radDmd20RxOuterFecEnable,
            radDmd20RxOuterFecRate,
            radDmd20RxInterleaverDepth,
            radDmd20RxInsertMode,
            radDmd20RxInsertMap,
            radDmd20RxBufferClockSource,
            radDmd20RxBufferClockPolarity,
            radDmd20RxBufferSize,
            radDmd20RxDataPolarity,
            radDmd20RxSpectrum,
            radDmd20RxDescramblingEnable,
            radDmd20RxDescramblingType,
            radDmd20RxDifferentialDecoder,
            radDmd20RxBpskSymbolPairingSwap,
            radDmd20RxT1E1FramingSource,
            radDmd20RxExtClockSource,
            radDmd20RxCarrierSweepRange,
            radDmd20RxCarrierLevelLimitdBmX100,
            radDmd20RxEscOverheadType,
            radDmd20RxEsc1GaindBX100,
            radDmd20RxEsc2GaindBX100,
            radDmd20RxTerrInterfaceType,
            radDmd20RxEsEnhancedEnable,
```

```
            radDmd20RxEsSerialControlInterface,
            radDmd20RxEsBaudRate,
            radDmd20RxEsBitsPerChar,
            radDmd20RxTestPattern,
            radDmd20RxCircuitName,
            radDmd20RxForcedAlarms,
            radDmd20RxAlarms1Mask,
            radDmd20RxAlarms2Mask,
            radDmd20RxAlarms3Mask,
            radDmd20RxAlarms4Mask,
            radDmd20RxAlarms5Mask,
            radDmd20RxInsertStatusMask,
            radDmd20RxTerrestrialFraming,
            radDmd20RxTerrestrialStreaming,
            radDmd20RxAlarms6Mask,
            radDmd20RxCarrierReacqRange,
            radDmd20RxRsOfecRate,
            radDmd20RxTpcInterleaver,
            radDmd20RxCarrierSweepDelay,
            radDmd20RxEbnoAlarmThreshold,
            radDmd20RxBufferReset,
            radDmd20RxRestartTestPattern
            }
  STATUS      current
  DESCRIPTION "Demodulator non-volatile status group."
::= { radDmd20Groups 3 }

radDmd20DemodStatusGroup OBJECT-GROUP
  OBJECTS  {
            radDmd20RxAlarms1,
            radDmd20RxAlarms2,
            radDmd20RxAlarms3,
            radDmd20RxAlarms4,
            radDmd20RxAlarms5,
            radDmd20RxInsertStatus,
            radDmd20RxBackwardAlarms,
            radDmd20RxLatchedAlarms1,
            radDmd20RxLatchedAlarms2,
            radDmd20RxLatchedAlarms3,
            radDmd20RxLatchedAlarms4,
            radDmd20RxLatchedAlarms5,
            radDmd20RxBerEbnoStatus,
            radDmd20RxEbno,
            radDmd20RxBufferLevel,
            radDmd20RxCarrierLeveldBmX100,
            radDmd20RxBitErrorCount,
            radDmd20RxTestPatternErrorCount,
            radDmd20RxLossOfTerrInputSignal,
            radDmd20RxSymbolRateHz,
            radDmd20RxAlarms6,
            radDmd20RxLatchedAlarms6,
            radDmd20RxEthPktErrorCount,
            radDmd20RxEthPktTotalCount,
            radDmd20RxEthPort1Status,
            radDmd20RxEthPort2Status,
            radDmd20RxEthPort3Status,
            radDmd20RxEthPort4Status,
            radDmd20RxEthWanStatus,
            radDmd20RxRawBerStatus,
            radDmd20RxCorrectedBerStatus,
            radDmd20RxTestPatternBerStatus,
            radDmd20RxAupcRemoteBerStatus,
            radDmd20RxCarrierFrequencyOffset
            }
  STATUS      current
  DESCRIPTION "Demodulator volatile status group."
```

```
::= { radDmd20Groups 4 }

radDmd20CommonNVStatusGroup OBJECT-GROUP
  OBJECTS {
          radDmd20CommonExternalExcClock,
          radDmd20CommonExternalReference,
          radDmd20CommonFrequencyReferenceSource,
          radDmd20CommonAlarms1Mask,
          radDmd20CommonAlarms2Mask,
          radDmd20CommonCarrierType,
          radDmd20CommonLoopback,
          radDmd20CommonSerialRemoteControl,
          radDmd20CommonTerminalBaudRate,
          radDmd20CommonTerminalEmulation,
          radDmd20CommonRemoteAddress,
          radDmd20CommonRemoteBaudRate,
          radDmd20CommonRemoteInterface,
          radDmd20CommonEventClear,
          radDmd20CommonLatchedAlarmsClear
          }
  STATUS     current
  DESCRIPTION "Common non-volatile status group."
  ::= { radDmd20Groups 5 }

radDmd20CommonStatusGroup OBJECT-GROUP
  OBJECTS {
          radDmd20CommonAlarms1,
          radDmd20CommonAlarms2,
          radDmd20CommonLatchedAlarms1,
          radDmd20CommonLatchedAlarms2,
          radDmd20CommonPos5VDcX10,
          radDmd20CommonPos12VDcX10,
          radDmd20CommonNeg12VDcX10,
          radDmd20CommonFirmwareName
          }
  STATUS     current
  DESCRIPTION "Common volatile status group."
  ::= { radDmd20Groups 6 }

radDmd20NotificationsGroup NOTIFICATION-GROUP
  NOTIFICATIONS
          {
          radDmd20TxMajorAlarmTrap,
          radDmd20TxMinorAlarmTrap,
          radDmd20RxMajorAlarmTrap,
          radDmd20RxMinorAlarmTrap,
          radDmd20CommonAlarmTrap
          }
  STATUS     current
  DESCRIPTION
          "Cold start trap and authentication failure trap are the two notifications
          which an SNMPv2 entity is required to implement. Major, minor, and common
          alarm traps are specific to the DMD20."
  ::= { radDmd20Groups 7 }

-- -----------------------------------------------------------------------------------------------------
radDmd20ModLbstNVStatusGroup OBJECT-GROUP
  OBJECTS {
          radDmd20LbstTxUplinkFrequencyHz,
          radDmd20LbstTxLoFrequencyHz,
          radDmd20LbstTxSideBand,
          radDmd20LbstTx10MhzReferenceEnable,
          radDmd20LbstTxVoltageEnable
          }
  STATUS     current
  DESCRIPTION
```

```
          "Mod Lbst nonvolatile status group."
  ::= { radDmd20Groups 8 }

radDmd20ModLbstStatusGroup OBJECT-GROUP
  OBJECTS  {
          radDmd20LbstTxBucVoltageX10,
          radDmd20LbstTxBucCurrentX1000
          }
  STATUS     current
  DESCRIPTION
          "Mod Lbst volatile status group."
  ::= { radDmd20Groups 9 }

radDmd20DemodLbstNVStatusGroup OBJECT-GROUP
  OBJECTS  {
          radDmd20LbstRxDownlinkFrequencyHz,
          radDmd20LbstRxLoFrequencyHz,
          radDmd20LbstRxSideBand,
          radDmd20LbstRx10MhzReferenceEnable,
          radDmd20LbstRxVoltageEnable,
          radDmd20LbstRxVoltageSelect
          }
  STATUS     current
  DESCRIPTION
          "Demod Lbst nonvolatile status group."
  ::= { radDmd20Groups 10 }

radDmd20DemodLbstStatusGroup OBJECT-GROUP
  OBJECTS  {
          radDmd20LbstRxLnbVoltageX10,
          radDmd20LbstRxLnbCurrentX1000
          }
  STATUS     current
  DESCRIPTION
          "Demod Lbst volatile status group."
  ::= { radDmd20Groups 11 }

END
```

RADYNE COMSTREAM

Front Panel Upgrade Procedure

D

D.0 Introduction

The DMD20 Universal Satellite Modem offers the ability to perform field upgrades of the modem's feature set quickly and easily from the front panel. Purchased upgrades will become part of the modems permanent configuration. Demonstration upgrades will enable the optional features for a 30-day evaluation period.

D.1 Required Equipment

The DMD20 Universal Satellite Modem is the only equipment required for this procedure.

D.2 Upgrade Procedure

The following paragraphs describe the procedure for permanently updating the feature set of the DMD20 Universal Satellite Modem

1. The following steps allow users to quickly determine from the front panel whether or not the desired feature(s) are supported by the hardware currently installed in the modem.

   a. From the modem's Main Menu, scroll right to the SYSTEM Menu.
   b. Scroll down.
   c. Scroll right to the HW/FW CONFIG Menu.
   d. Scroll down
   e. Scroll right to the FEATURES Menu. The second line will display NORMAL.
   f. Scroll down.
   g. Scroll right to the UPGRADE LIST Menu.
   h. Scroll down.
   i. Scroll right through the available list of options.

   The top line identifies the options and the second line identifies the following options status:

   INSTALLED indicates that the option is already available as part of the modems feature set.

   HW & KEY REQ indicates that additional hardware is required to support the option. Contact your Radyne ComStream sales representative for more information regarding the required hardware upgrade.

   KEY CODE REQ indicates that the desired option is available as a front panel upgrade.

2. Contact Radyne ComStream with the Unit ID and Desired Upgrades. The modem's Unit ID can be found on the front panel as follows:

   a. From the modem's Main Menu, scroll right to the SYSTEM Menu.
   b. Scroll down.
   c. Scroll right to the HW/FW CONFIG Menu.
   d. Scroll down.
   e. Scroll right to the FEATURES Menu. The second line will display NORMAL
   f. Scroll down

   The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed as on the front panel of the modem as 3 sets of 4 digits in a dot-delineated format as follows:

   1 2 3 4 . 1 2 3 4 . 1 2 3 4

   Your Radyne ComStream sales representative will ask you for this number along with your desired feature set upgrades when placing your order.

3. Once your order has been processed, you will be issued a 12-digit feature set upgrade code. This code is only good on the modem for which it was ordered. To enter this code from the front panel, perform the following:

   a. From the modem's Main Menu, scroll right to the SYSTEM Menu.
   b. Scroll down.
   c. Scroll right to the HW/FW CONFIG Menu.
   d. Scroll down.
   e. Scroll right to the FEATURES Menu. The second line will display NORMAL.
   f. Scroll down.

   The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed on the front panel of the modem as 3 sets of 4 digits in a dot-delineated format indicated in Step 2. The second line is the data entry area and is displayed as 3 sets of 4 underscores in a dot-delineated format.

   g. Press <ENTER>. A cursor will begin flashing in the data entry area.
   h. Using the numeric keypad, enter your 12-digit upgrade code.
   i. Press <ENTER>.

   If the code entered is correct, the display will display **CODE ACCEPTED**, otherwise the display will display **INVALID CODE.**

NOTE

Care should be taken to insure that the upgrade code is entered properly. After three unsuccessful attempts to enter a code, the front panel upgrade and demonstration capability will be locked out and it will be necessary to cycle power on the modem in order to continue.

D.3 Demonstration Procedure

The procedure for enabling a 30-day demo of the DMD20 options is similar to the procedure used for permanently updating the modems feature set. The one big difference being that at the end of 30 days, the demo features will automatically be disabled and the modem will revert back to its permanent configuration.

NOTE

At the end of the demonstration period, when the modem reverts back to its permanent configuration an interrupt in traffic will occur, regardless of whether or not a demo enabled features was being run at the time. In addition, operator intervention may be required to restore the data paths. In order to avoid this interruption in service, the user can cancel the demonstration at any time by following the instructions outlined in the section on "Canceling Demonstration Mode."

1. The following steps allow users to quickly determine from the front panel whether or not the desired feature(s) are supported by the hardware currently installed in the modem.

   a. From the modem's Main Menu, scroll right to the SYSTEM Menu.
   b. Scroll down.
   c. Scroll right to the HW/FW CONFIG Menu.
   d. Scroll down.
   e. Scroll right to the FEATURES Menu. The second line will display NORMAL.
   f. Scroll down.
   g. Scroll right to the UPGRADE LIST Menu.
   h. Scroll down.
   i. Scroll right through the available list of options.

   The top line identifies the options and the second line identifies the options status.

   INSTALLED indicates that the option is already available as part of the modems feature set.

   HW & KEY REQ indicates that additional hardware is required to support the option. Contact your Radyne ComStream sales representative for more information regarding the required hardware upgrade.

   KEY CODE REQ indicates that the desired option can be enabled as a demonstration from the front panel.

2. Contact Radyne ComStream with the Unit ID and Request a Demonstration.

The modem's Unit ID can be found on the front panel as follows:

a. From the modem's Main Menu, scroll right to the SYSTEM Menu.
b. Scroll down.
c. Scroll right to the HW/FW CONFIG Menu.
d. Scroll down.
e. Scroll right to the FEATURES Menu. The second line will display NORMAL.
f. Scroll down.

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed as on the front panel of the modem as 3 sets of 4 digits in a dot-delineated format as follows:

1 2 3 4 . 1 2 3 4 . 1 2 3 4

Your Radyne ComStream sales representative will ask you for this number along with the features you wish to demo.

3. Once your order has been processed, you will be issued a 12-digit demonstration code. This code can only be used one time and it is only good on the modem for which it was originally requested. To enter this code from the front panel, perform the following:

a. From the modem's Main Menu, scroll right to the SYSTEM Menu.
b. Scroll down.
c. Scroll right to the HW/FW CONFIG Menu.
d. Scroll down.
e. Scroll right to the FEATURES Menu. The second line will display NORMAL.
f. Scroll down.

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed on the front panel of the modem as 3 sets of 4 digits. The second line is the data entry area and is displayed as 3 sets of 4 underscores in a dot-delineated format.

Press <ENTER> and a cursor will begin flashing in the data entry area

Using the numeric keypad, enter your 12-digit demonstration code
Press <ENTER>.

If the code entered is correct, the display will display CODE ACCEPTED, otherwise the display will read INVALID CODE

NOTE

Care should be taken to insure that the demonstration code is entered properly. After three unsuccessful attempts to enter a code, the front panel upgrade and demonstration capability will be locked out and it will be necessary to cycle power on the modem in order to continue.

D.3.3 Running in Demonstration Mode

Because of the possible interruption in traffic when the demonstration mode expires, several indicators are used to inform an operator that the modem is indeed, operating in demonstration mode. The most obvious of these are the flashing LEDs.

When the modem is running in demonstration mode, the Mod and Demod Test LEDs will be flashing. The flashing will occur even when the modem is placed in a test mode where the LED would normally be lit continuously.

A second indication can be found on the Features Menu as follows:

1. From the modem's Main Menu, scroll right to the SYSTEM Menu.
2. Scroll down.
3. Scroll right to the HW/FW CONFIG Menu.
4. Scroll down.
5. Scroll right to the FEATURES Menu. The second line will display DEMO.

A third indication can be found in the upgrade list as follows:

1. From the FEATURES Menu.
2. Scroll down.
3. Scroll right to the UPGRADE LIST Menu.
4. Scroll down.
5. Scroll right through the available list of options.

The top line identifies the options and the second line identifies the options status.

DEMO MODE indicates that the option is has been temporarily activated and is now available for evaluation as part of the modems feature set.

At the end of the demonstration period, the modem will revert back to its permanent configuration. When it does, an interrupt in traffic will occur, regardless of whether or not a demo enabled features was being run at the time. In addition, operator intervention may be required to restore the data paths. In order to avoid this interruption in service, the user can cancel the demonstration at any time by following the instructions outlined in the section on Canceling Demonstration Mode.

D.3.4 Canceling Demonstration Mode

At any time, a demonstration may be canceled and have the modem return to its normal operation. Once the demonstration has been canceled, it cannot be restarted using the old demonstration code. In order to restart a demonstration, it will be necessary to obtain a new demonstration code.

To cancel a demonstration from the front panel, perform the following:

1. From the modem's Main Menu, scroll right to the SYSTEM Menu..
2. Scroll down.
3. Scroll right to the HW/FW CONFIG Menu.
4. Scroll down.
5. Scroll right to the FEATURES Menu. The second line will display DEMO.
6. Scroll down.

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed on the front panel of the modem as 3 sets of 4 digits in a dot-delineated format indicated in section 4.2. The second line is the data entry area and is displayed as 3 sets of 4 underscores in a dot-delineated format.

Press <ENTER> and a cursor will begin flashing in the data entry area

Using the numeric keypad, enter 0000 0000 0000

Press <ENTER>.

The modem will immediately terminate the demonstration and the feature set will revert back to the permanent configuration.

The Mod and Demod Test LED's will stop flashing.

Carrier Control

E

E.0 States

The DMD20 transmitter will turn off the carrier output automatically when the modem determines there is a major alarm. This is done to prevent the carrier from outputting an unknown spectrum and possibly disturbing adjacent carriers. This automatic drop of the carrier can be overridden by masking the alarm that is causing the fault. This will keep the modulator output spectrum transmitting, even when the fault occurs. The following Carrier Control states are available:

Carrier **OFF**
Carrier **ON**
Carrier **AUTO**
Carrier **VSAT**
Carrier **RTS**

E.1 Carrier Off

Modulator output is disabled.

E.2 Carrier On

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, and the user is required to enter “Yes” to re-enable output after the change. When using the terminal, the modulator is turned off while re-programming modulator functions that may alter the output spectrum, and the user is required to manually turn on the output after the reprogramming.

E.3 Carrier Auto

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, but the output is automatically turned on after the change. When using the terminal, the modulator is turned off while re-programming modulator functions that may alter the output spectrum, and but the output is automatically turned on after the change.

E.4 Carrier VSat

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, and the user is required to enter “Yes” to re-enable output after the change. When using the terminal, the modulator is turned off while re-programming modulator functions that may alter the output spectrum, and the user is required to manually turn on the output after the reprogramming (same as “Carrier On”). Additionally “VSat” mode disables the modulators output is the modems demodulator does not have signal lock. When signal lock returns to the demodulator, the modems modulator turns the carrier back on.

E.5 Carrier RTS

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, and the user is required to enter “Yes” to re-enable output after the change. When using the terminal, the modulator is turned off while re-programming modulator functions that may alter the output spectrum, and the user is required to manually turn on the output after the reprogramming (same as “Carrier On”). Additionally “RTS” (Request To Send) mode enables the modulator’s output based on the RTS lead of the data interface. When RTS is enabled on the data interface, the modulator turns on the carrier, when the RTS is disabled the modulator turns off the carrier.

Glossary

G

A	
A	Ampere
AC	Alternating Current
ADC	Analog to Digital Converter
AGC	Automatic Gain Control
AIS	Alarm Indication System. A signal comprised of all binary 1s.
AMSL	Above Mean Sea Level
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASIC	Application Specific Integrated Circuit
ATE	Automatic Test Equipment
B	
BER	Bit Error Rate
BERT	Bit Error Rate Test
Bit/BIT	Binary Digit or Built-In Test
BITE	Built-In Test Equipment
bps	Bits Per Second
BPSK	Binary Phase Shift Keying
BUC	Block Upconverter
Byte	8 Binary Digits

C	
C	Celsius
CATS	Computer Aided Test Software
CA/xxxx	Cable Assembly
CD-ROM	Compact Disk – Read Only Memory
CLK	Clock
cm	Centimeter
COM	Common
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check. A system of error checking performed at the transmitting and receiving stations.
CW	Continuous Wave
C/N	Carrier to Noise Ratio
D	
DAC	Digital to Analog Converter
dB	Decibels
dBc	Decibels Referred to Carrier
dBm	Decibels Referred to 1.0 milliwatt
DC	Direct Current
Demod	Demodulator or Demodulated
DPLL	Digital Phase Locked Loop
DVB	Digital Video Broadcast
D&I	Drop and Insert
E	
E_b/N_0	Ratio of Energy per bit to Noise Power Density in a 1 Hz Bandwidth.
EEPROM	Electrically Erasable Programmable Read Only Memory
EIA	Electronic Industries Association
EMI	Electromagnetic Interference
ESC	Engineering Service Circuits
ES-ES	Earth Station to Earth Station Communication
ET	Earth Terminal

F	
F	Fahrenheit
FAS	Frame Acquisition Sync. A repeating series bits, which allow acquisition of a frame.
FCC	Federal Communications Commission
FEC	Forward Error Correction
FIFO	First In, First Out
FPGA	Field Programmable Gate Arrays
FW	Firmware
G	
g	Force of Gravity
GHz	Gigahertz
GND	Ground
H	
HSSI	High Speed Serial Interface
HW	Hardware
Hz	Hertz (Unit of Frequency)
I	
IBS	Intelsat Business Services
IDR	Intermediate Data Rate
I/O	Input/Output
IEEE	International Electrical and Electronic Engineers
IESS	INTELSAT Earth Station Standards
IF	Intermediate Frequency
INTELSAT	International Telecommunication Satellite Organization
ISO	International Standards Organization
I & Q	Analog In-Phase (I) and Quadrature Signals (Q)
J	
J	Joule

K	
Kbps	Kilobits per Second
Kbps	Kilobytes per Second
kg	Kilogram
kHz	Kilohertz
Ksps	Kilosymbols per Second
L	
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LO	Local Oscillator
M	
mA	Milliampere
Mbps	Megabits per Second
MFAS	Multi-Frame Acquisition Sync. See FAS.
MHz	Megahertz
MIB	Management Information Base
Mod	Modulator or Modulated
ms or msec	Millisecond
M&C	Monitor and Control
N	
NC	Normally Closed
NO	Normally Open
ns	Nanoseconds
NVRAM	Non-Volatile Random Access Memory
N/C	No Connection or Not Connected
O	
OQPSK	Offset Quadrature Phase Shift Keying
P	
PC	Personal Computer
PD Buffer	Plesiochronous/ Doppler Buffer
PLL	Phase Locked Loop
ppb	Parts per Billion
ppm	Parts per Million
P/N	Part Number

Q	
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
R	
RAM	Random Access Memory
RF	Radio Frequency
ROM	Read Only Memory
rms	Root Mean Square
RU	Rack Unit. 1 RU = 1.75"/4.45 cm
Rx	Receive (Receiver)
RxD	Receive Data
R-S	Reed-Solomon Coding. Reed-Solomon codes are block-based error correcting codes with a wide range of applications in digital communications and storage.
S	
SCC	Satellite Control Channel. A Radyne ComStream satellite format.
SEQ	Sequential
SYNC	Synchronize
T	
TBD	To Be Designed or To Be Determined
TM	Technical Manual
TPC	Turbo Product Codes
TRE	Trellis
TT	Terminal Timing
Tx	Transmit (Transmitter)
TxD	Transmit Data
U	
UART	Universal Asynchronous Receiver/Transmitter
UUT	Unit Under Test
V	
V	Volts
VAC	Volts, Alternating Current
VCO	Voltage Controlled Oscillator
VDC	Volts, Direct Current
VIT	Viterbi Decoding

W X Y Z	
W	Watt
Misc.	
µs	Microsecond
16QAM	16 Quadrature Amplitude Modulation
8PSK	8 Phase Shift Keying