

UPCOM UC-250L

L-BAND DVB MODULATOR

OPERATIONS MANUAL



UPCOM TECHNOLOGIES INC.
SAN JOSE, CA - USA © 2007

Operations Manual UC-250L

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Notice

The information in this document was believed to be correct at the time of publication, and every effort was made to ensure that the most current information was shipped with each machine. If subsequent modifications were made to your unit, and you need information on these, please contact the UPCOM documentation department.

If you have technical or editorial comments concerning this manual, please write them on photocopies of the relevant pages and send them to the documentation department or contact the Customer Service Department. This assistance will be greatly appreciated

Manual Applicability and Symbols

This is the general operating manual for UPCOM L-BAND Modulators Please make sure that the correct manual is being used by verifying part number and serial number with UPCOM technical support team or your local distributor.

Be prepared to furnish:

Serial Number

Exact Model Number

Symbols

The following warning and caution symbols are used throughout this manual:



Warning: A hazard exists that may result in personal injury or loss of life.



Caution: Failure to follow the procedures given may result in damage to the equipment.

WARNING

- ◆ This equipment operates at potentially lethal voltages. Only trained, qualified personnel should operate, maintain, or service it. Service work must be performed only by technicians thoroughly familiar with such equipment.
- ◆ This equipment has been shown to comply with EN60950. (Safety of Information Technology Equipment, including electrical business machines.
- ◆ This equipment is rated for 85 to 265V. Proper power cords should be used for the country where the equipment will be operated. Power consumption should not exceed 50W.
- ◆ The UC-250L should not be operated where the unit is exposed to extremes of temperature outside the ambient range., (+5°C to +45°C), precipitation, condensation or humid atmospheres above 80%.
- ◆ This equipment should not be operated around excessive dust, vibration, flammable gases, corrosive or explosive atmospheres.



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1 Before Getting Started

If you need help

UPCOM and its distributors stand by every product sold . If you need help please contact your local distributor or UPCOM directly at:

+1.408.329.4158

or

by e-mail:

support@upcomtechnologies.com

Manual Updates

From time to time, new versions of software may require slight changes to the material presented in this document. Check inside the back cover for supplementary pages that may have been added to keep the manual up to date

Unpacking and Inspection

Before installing the equipment. Please check the box for integrity. After unpacking look for any missing items or damage to the equipment. If there is damage, please contact customer support immediately. Do not proceed installing the equipment if there is visible or perceived physical damage.

Warranty and RMA

UPCOM guarantees this equipment against defects in material and workmanship for a period of 3 years from date of shipment. During this period UPCOM will repair or replace products that are under warranty.

For all equipment under warranty the owner is responsible for freight to UPCOM and all related customs, tariffs, insurance, etc. UPCOM is responsible for the freight of the equipment from the factory to the owner under the same method the equipment was returned to UPCOM.

Equipment shipped back to UPCOM without a previously accepted RMA will be returned to owner at owners expense.

The warranty does not cover: products with defaced serial number, damage during shipping, damage caused by lightning, power surge or installation services.

2 INTRODUCTION

UC-250L

The UC-250L Digital Video Broadcasting Modulator is a highly complex unit designed to simplify the operations of video or data over satellite. It operates up to 45Msps, (depending on model) in the L frequency band, (950MHZ to 1450MHZ).

It comes standard with a ASI, E3 and SPI input ports and RF L-band output. Keep in mind that only ASI input and the RF outputs may be enabled depending on the version purchased.



Front Panel View - UC250L



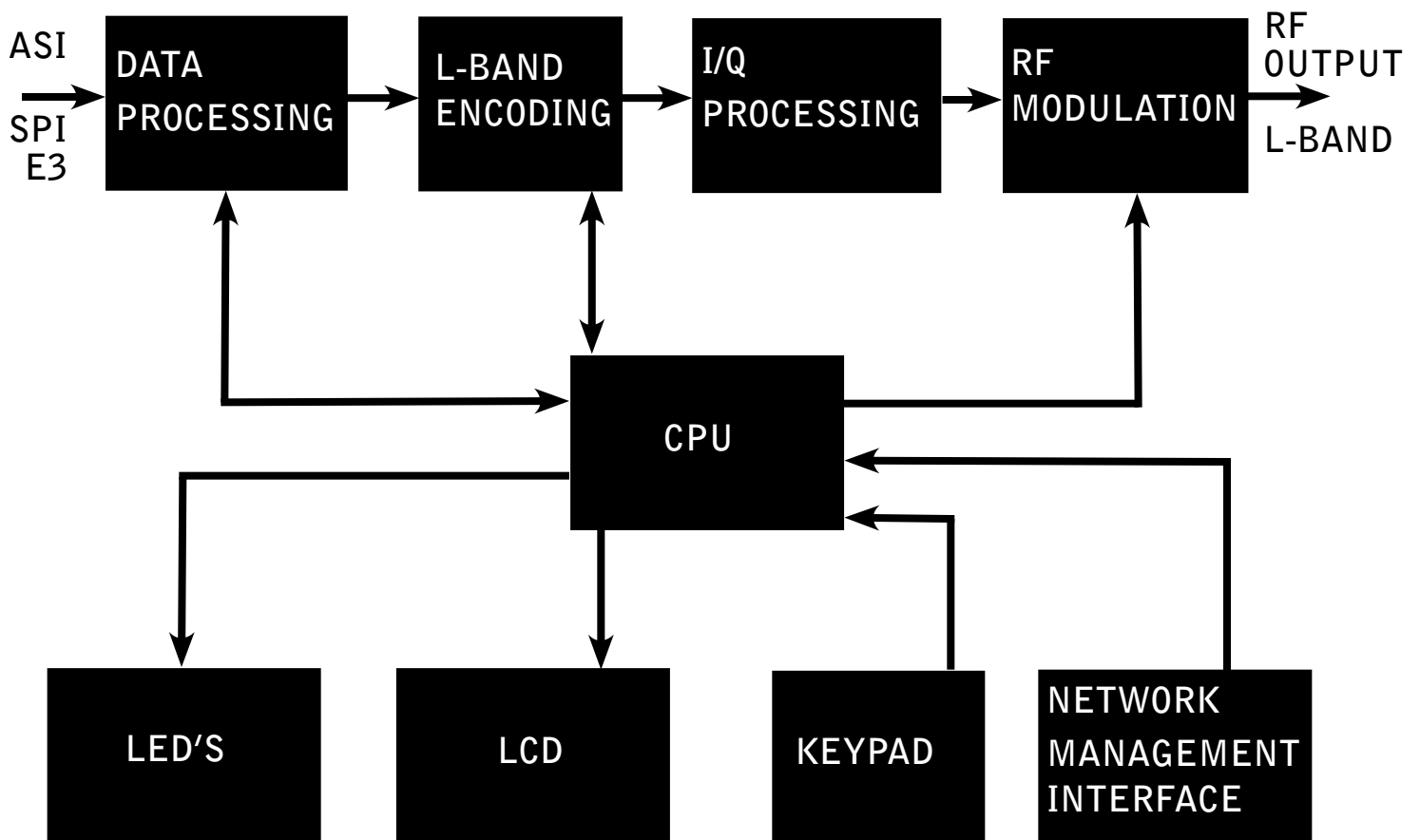
Rear View - UC250L

3 MAIN FEATURES

- ◆ DVB-S Standard for error correction encoding, (future versions and upgrades to S-2)
- ◆ Input bit rate: 1 to 60Mbps
- ◆ Output symbol rate: 1 to 45Mbaud(adjustable in 1Kbaud step) (depending on version)
- ◆ Output band width:1.25 to 56.25MHz (Roll-fall modulus 0.25)
- ◆ Output level: -20dBm to +2dBm
- ◆ 188 and 204 packet automatic identification
- ◆ Output frequency 950MHz to 1450MHz in 50KHz Steps
- ◆ NIT mapping and sending, support 44 NIT mapping
- ◆ PID filtering and re-mapping
- ◆ PSI/SI information pick-up, parse and modification
- ◆ SI information replacement and insert
- ◆ Data null packet input filtering and output data filling.
- ◆ PCR correction
- ◆ Real time monitoring of system input bit rate and valid bit rate real time
- ◆ Auto-switch power supply suitable to a wide range of voltages, (85V to 265V)
- ◆ No internal moving parts allowing for years of maintenance free operation
- ◆ Optional 10MHz reference for practical integration to BUC systems.
- ◆ Auto sync to ASI streams allowing for different data rates between Encoder/Encapsulator and Modulator

4 THEORY OF OPERATIONS

Operational Flowchart



System Composition

The UC-250L is composed of the following modules:

- ◆ Data Processing Unit
- ◆ L-Band Encoder
- ◆ CPU
- ◆ LED Status Lights
- ◆ LCD
- ◆ Front Panel Key Pad
- ◆ Network Management Interface

Data Processing Unit

This is the first step in signal conversion. It received and processes the ASI, (or SPI, E3) and converts it so it can be encoded into an L-band signal.

L-band Encoder/Upconverter

Converts the digital signal into a frequency agile L-band signal controlled by a high quality VCO, (voltage controlled oscillator)

CPU

The CPU, (central processing unit), is the brain of the unit. It controls all processes and allows for interaction between the modules. It also allows for configuration to be stored and managed.

LED

There are 3 LED status lights on the front panel of the UC-250L:

- ◆ Power: Indicates if the unit is powered on
- ◆ Status: Indicates the if the unit synchronised to the stream
- ◆ Alarm: Indicates if there are any problems or failures with the unit

LCD

The LCD located in the front panel is intended for ease of control and operations of the unit. All configuration options available to the modulator can be displayed through the front panel through the easy to read LCD.

Front Panel Keypad

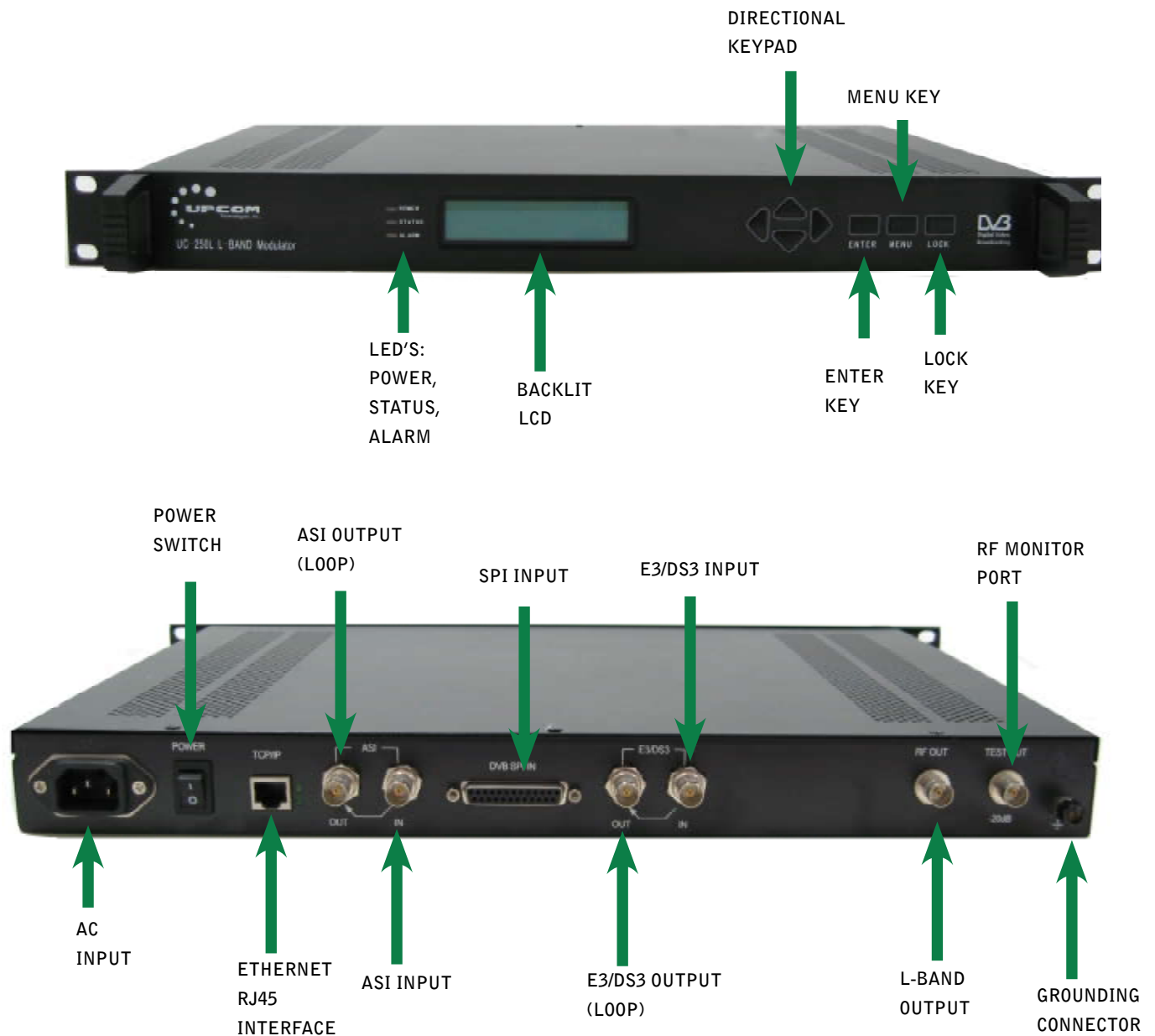
There are 7 buttons in the front panel of the UC-250L:

- ◆ Directional Arrows, (up, down, right, left): Allows for easy menu navigation
- ◆ Enter: Enters value on the menu or selects option on menus
- ◆ Menu: Selects menus or scrolls through menus
- ◆ Lock: Locks and unlocks keypad from accidental changes.

Network Management Interface

Software that allows monitoring and control through the RJ45/ethernet located in the rear of the unit.

5 Front and Rear Panel



Front Panel

LED

There are 3 LED status lights on the front panel of the UC-250L:

- ◆ Power: Indicates if the unit is powered on
- ◆ Status: Indicates the if the unit synchronised to the stream
- ◆ Alarm: Indicates if there are any problems or failures with the unit

LCD

The LCD located in the front panel is intended for ease of control and operations of the unit. All configuration options available to the modulator can be displayed through the front panel through the easy to read LCD.

Directional Keypad

Directional Arrows, (up, down, right, left): Allows for easy menu navigation

Enter Key

Enters value on the menu or selects option on menus

Menu Key

Selects menus or scrolls through menus

Lock Key

Locks and unlocks keypad from accidental changes.

Rear Panel

AC Input

Connection for AC input. Please make sure that the system is connected to a stable source of power running through an UPS system or something similar. Standard US or European power cables are supplied. Please specify upon ordering by requesting a specific type. Please make sure that the voltage input is somewhere between 85VAC and 265VAC and that the cord is connected to a receptacle capable of at least 50W.

Power Switch

Turns the unit on or off.

RJ-45/Ethernet

Allows for a connection to a TCP/IP network so that the management software can be used for monitoring and control of the modulator. This can be used for remote control or integration.

ASI Output (Loop)

This port allows for monitoring of the inputted ASI transport stream. This is useful for loop application, remuxing or monitoring of the signal being modulated. It is a standard BNC connector.

ASI Input

This port allows for the data to be inputted to the modulator. A standard ASI transport stream of 270Mbps with a maximum valid data rate of 60Mbps is expected at this port. It comprises of a BNC connector with 75 Ω impedance expecting a ASI transport stream autoswitchable between 188 and 204 bits.

Rear Panel (cont.)

SPI Input

This port allows for the data to be inputted to the modulator. A standard LVDS transport stream is expected at this port. It comprises of a DB-25 female connector expecting a LVDS transport stream autoswitchable between 188 and 204 bits.

Pin Number	Signal	Description	Pin Number	Signal	Description
1	CLK-A	Signal Clock	14	CLK-B	Signal Clock
2	GND	Ground	15	GND	Ground
3	D7-A	Data 7	16	D7-B	Data 7
4	D6-A	Data 6	17	D6-B	Data 6
5	D5-A	Data 5	18	D5-B	Data 5
6	D4-A	Data 4	19	D4-B	Data 4
7	D3-A	Data 3	20	D3-B	Data 3
8	D2-A	Data 2	21	D2-B	Data 2
9	D1-A	Data 1	22	D1-B	Data 1
10	D0-A	Data 0	23	D0-B	Data 0
11	DVALID-A	Data Available	24	DVALID-B	Data Available
12	PSYNC-A	Pack Synchronous	26	PSYNC-B	Pack Synchronous
13	CABLE	Cable Shield			

E3/DS3 Output (Loop)

This port allows for monitoring of the inputted a G.703 transport stream fed in the E3/DS3 port. This is useful for loop application, remuxing or monitoring of the signal being modulated. It is a standard BNC connector.

E3/DS3 Input

This port allows for the data to be inputted to the modulator. A standard E3/DS3 transport stream of 34.368Mbps/44.436Mbps in no frame format is expected at this port. It comprises of a BNC connector with 75Ω impedance expecting a G.703 transport stream autoswitchable between 188 and 204 bits.

Rear Panel (cont.)

L-Band Output

This standard BNC connector of 75Ω impedance outputs the modulated carrier in the 950MHz to 1450MHz range. It outputs signal in the -20 to +2dBm range.



Care should be exercised with connecting this unit to equipment that produces DC voltage. Equipment damage is can be expected if voltage is inserted in this port and is not covered under manufacturer's warranty.

If built in 10MHz is present on this unit it will be added to this port.

RF Monitor Port

This standard BNC connector of 75Ω impedance outputs the modulated carrier in the 950MHz to 1450MHz range. It outputs signal in the -40 to -18dBm range.



Care should be exercised with connecting this unit to equipment that produces DC voltage. Equipment damage is can be expected if voltage is inserted in this port and is not covered under manufacturer's warranty.

If built in 10MHz is present on this unit it will not be added to this port. If a 10MHz failure is suspected, please monitor the main output.

Grounding Connector

Please connect this to appropriate grounding.

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KEYPAD AND TOP LEVEL MENU

Keypad Functions:

The keypad present on this unit permits full configuration and management of the modulator. After a brief review of the keys present, the menu tree is described. All the functions and menus are described in detail in the following chapter.

Directional Keypad

Directional Arrows, (up, down, right, left): Allows for easy menu navigation

Enter Key

Enters value on the menu or selects option on menus

Menu Key

Selects menus or scrolls through menus

Lock Key

Locks and unlocks keypad from accidental changes.

Menu Structure:

The menu is described in different levels. The top level table is described on the next page and its subtrees on the subsequent pages.

Menu Structure (cont.)

Menu Number	Title/Description
1.0	VIEW ALARMS/SYSTEM CONFIGURATION
2.0	QPSK OUTPUT SYMBOL RATE
3.0	RF OUT FREQUENCY
4.0	SIGNAL IN PORT
5.0	BYPASS SWITCH
6.0	NIT TABLE MODE
7.0	INPUT TS
8.0	OUTPUT TS
9.0	QPSK OUTPUT MODE

Menu Top Level Description

◆ 1.0 VIEW ALARMS/SYSTEM CONFIGURATION

Allows the operator to verify what alarms are present on the unit, set its IP addresss and network information, serial number, as well as factory reset function.

◆ 2.0 QPSK OUTPUT SYMBOL RATE

Allows the operator to change the symbol rate, FEC mode and bandwidth measurement preferences, (bit or baud)

◆ 3.0 RF OUT FREQUENCY

Allow change in frequency, power level, turning on or off the modulation, (CW) and on or off the carrier.

◆ 4.0 SIGNAL IN PORT

Allows the user to change the source of transport stream as well as monitor the actual bit rate of the stream being inputted.

◆ 5.0 BYPASS SWITCH

Allows for PID translation.

◆ 6.0 NIT TABLE MODE

Allows for NIT changes.

◆ 7.0 INPUT TS

Allow for monitoring of the inputted TS

◆ 8.0 OUTPUT TS

Allows for monitoring of the outputted TS

◆ 9.0 QPSK OUTPUT MODE

Allows for reconfiguration of the TS

7 MENU STRUCTURE DESCRIPTION

Menu Description:

The 9 top level menus will be described in this chapter as well as its submenus on the following pages.

Menu 1.0 VIEW ALARM/SYSTEM CONFIGURATION

Option Number	Title/Description
1.0	VIEW ALARMS/SYSTEM CONFIGURATION
1.1	SET IP ADDRESS
1.2	SET NETMASK
1.3	SET GATEWAY
1.4	NETWORK STATUS
1.5	SERIAL NUMBER
1.6	VERSION
1.7	FACTORY RESET
1.8	RELOAD CHANNEL INFORMATION

◆ 1.0 VIEW ALARMS

This menu shows the stored and current alarms. The options are:

Alarm List Empty: No alarms present

No Input Signal: No signal is detected on the IN port.

RF Unlock: Error in the RF modulator portion of the system. Please contact UPCOM in order to repair the unit.

Buffer Full: Effective data rate of the transport stream is higher than the rate set for modulation. Set lower data rate on the encoder/encapsulator or increase data rate on modulator.

System Error: Please contact UPCOM in order to repair the unit

Alarms can be cleared by pressing the directional key down and enter to confirm "CLEAR ALL ALARMS"

◆ 1.2 SET IP ADDRESS

IP address configured for the system is displayed and can be changed using the directional keypad.

◆ 1.3 SET GATEWAY

Default Gateway configured for the system is displayed and can be changed by using the directional keypad.

◆ 1.4 NETWORK STATUS

Menu Description (cont.)

This option displays the current status of the monitoring and control IP network port as either CONNECTED or NOT CONNECTED

◆ 1.5 SERIAL NUMBER

This option displays the unit serial number.

◆ 1.6 VERSION

This option displays the unit version number. This can be useful when contacting UPCOM for technical support.

1.7 FACTORY RESET

Resets the unit to the original factory standard configurations.

◆ 1.8 RELOAD CHANNEL INFORMATION

Reloads channel information from the TS.

Menu 2.0 QPSK OUTPUT SYMBOL RATE

Option Number	Title/Description
2.0	QPSK OUTPUT SYMBOL RATE
2.1	FEC MODE
2.2	BW PREF. UNIT

◆ 2.0 QPSK OUTPUT SYMBOL RATE

Sets the carrier data rate in Mbaud or Mbps depending on setting in suboption 2.2 BW PREF. UNIT. Unit can be set as low as 1Mbaud and as high as 45Mbaud depending on options.

◆ 2.1 FEC MODE

Allows the operator to change the FEC MODE between 3/4, 5/6, 7/8, 1/2, or 2/3

2.2 BW PREF. UNIT

Allows for choosing unit in which the carrier data rate is defined. Choices are bits or bauds

Menu 3.0 RF OUT

Menu Number	Title/Description
3.0	RF OUT FREQUENCY
3.1	RF OUTPUT LEVEL
3.2	QPSK MODULATION ON/OFF
3.3	RF POWER SWITCH ON/OFF

Menu Description (cont.)

◆ 3.0 RF OUT FREQUENCY

Allows the operator to select the center frequency of the output L-Band carrier . It is selectable in increments of 50KHz and ranges from 950MHz to 1450MHz.

◆ 3.1 RF OUTPUT LEVEL

Allows the operator to select and adjust the carrier power level in .5dBuV increments. A dBuV to dBm conversion chart can be found in the appendix section of this manual.

◆ 3.2. QPSK MODULATION ON/OFF

Allow turning off the carrier modulation for CW tests. Clear carrier tests may be performed for satellite antenna pointing of other measurements. In order to modulate data, make sure that the QPSK MODULATION is set back to ON once all tests are performed.

◆ 3.3 RF POWER SWITCH ON/OFF

Turns off the carrier transmission. It must be set ON for normal operation.

Menu 4.0 SIGNAL IN PORT

Menu Number	Title/Description
4.0	SIGNAL IN PORT
4.1	IN PORT SIGNAL STATUS
4.2	IN TS STREAM RATE
4.3	IN TS STREAM EFFECTIVE RATE

◆ 4.0 SIGNAL IN PORT

This option allows selection among the available input options: ASI, SPI, E3, DS3.

◆ 4.1 IN PORT SIGNAL STATUS

This allows for monitoring of the type of stream being inputted: 188 BYTE, 204 BYTE, or NO SIGNAL

◆ 4.2 IN TS STREAM RATE

Shows total bit rate of the inputted stream.

◆ 4.3 IN TS STREAM EFFECTIVE RATE

Shows actual data rate of the stream that contains valid useful packets. This can be useful in monitoring if any packets are being wasted and if the carrier rate can be reduced.

Menu Description (cont.)

Menu 5.0 BYPASS SWITCH ON/OFF

Menu Number	Title/Description
5.0	BYPASS SWITCH ON/OFF
5.1	BYPASS PID 0
5.2	BYPASS PID 1
5.3	BYPASS PID 2
5.4	BYPASS PID 3
5.5	BYPASS PID 4
5.6	BYPASS PID 5
5.7	BYPASS PID 6
5.8	BYPASS PID 7

◆ 5.0 BYPASS SWITCH ON/OFF

Allows the operator to remap PID's if the BYPASS SWITCH is set to ON

◆ 5.1 BYPASS PID 0

Allows change of one PID number to be mapped into another.

◆ 5.2 BYPASS PID 1

Allows change of one PID number to be mapped into another.

◆ 5.3 BYPASS PID 2

Allows change of one PID number to be mapped into another.

◆ 5.4 BYPASS PID 3

Allows change of one PID number to be mapped into another.

◆ 5.5 BYPASS PID 4

Allows change of one PID number to be mapped into another.

◆ 5.6 BYPASS PID 5

Allows change of one PID number to be mapped into another.

◆ 5.7 BYPASS PID 6

Allows change of one PID number to be mapped into another.

◆ 5.8 BYPASS PID 7

Allows change of one PID number to be mapped into another.

Menu Description (cont.)

Menu 6.0 NIT TABLE MODE

Menu Number	Title/Description
6.0	NIT TABLE MODE
6.1	NETWORK ID
6.2	NETWORK NAME
6.3	CHANNELS IN NIT

◆ 6.0 NIT TABLE MODE

Allows the operator to change the NIT information in the present inputted stream. Options are KEEP ORIGINAL NIT and EXCHANGE ORIGINAL NIT.

◆ 6.1 NETWORK ID

Allows the operator to view the NETWORK ID changed. (control via M&C software only)

◆ 6.2 NETWORK NAME

Allows the operator to view the NETWORK NAME changed. (control via M&C software only)

◆ 6.3 CHANNELS IN NIT

Allows the operator to view the NETWORK CHANNELS changed. (control via M&C software only)

Menu Description (cont.)

Menu 7.0 INPUT TS

Menu Number	Title/Description
7.0	INPUT TS
7.1	INPUT SIGNAL
7.2	IN TS TS_ID
7.3	IN TS ON_ID
7.4	IN ALL RATE
7.5	IN TS EFFECT

By pressing the left/right directional pad the operator can navigate between the suboptions below. By pressing the up/down directional pad, the operator can navigate between the different channels in the stream.

◆ 7.0 INPUT TS

Shows the number of different programs that are present in the inputted TS.

◆ 7.1 INPUT SIGNAL

Shows the packet format in either 188 BYTE or 204 BYTE.

◆ 7.2 IN TS TS_ID

Shows the Transport Stream ID

◆ 7.3 IN TS ON_ID

Shows the original Transport Stream ID.

◆ 7.4 IN ALL RATE

Shows total rate for the transport stream.

◆ 7.5 IN TS EFFECT

Shows the effective data rate for the transport stream.

Menu Description (cont.)

Menu 8.0 OUTPUT TS

Menu Number	Title/Description
8.0	OUTPUT TS
8.1	OUTPUT TS_ID
8.2	OUTPUT TS ON_ID
8.3	CAT WORK MODE
8.4	SDT WORK MODE

By pressing the left/right directional pad the operator can navigate between the suboptions below. By pressing the up/down-direction pad, the operator can navigate between the different channels in the stream.

◆ 8.0 OUTPUT TS

Shows all the programs available on the transport stream.

◆ 8.1 OUTPUT TS_ID

Allows operator to change the transport stream ID

◆ 8.2 OUTPUT TS ON_ID

Allows operator to change the original transport stream ID.

◆ 8.3 CAT WORK MODE

Allows operator to make a new table.

◆ 8.4 SDT WORK MODE

Allows operator to make a new table.

Menu Description (cont.)

Menu 9.0 QPSK OUTPUT MODE

Menu Number	Title/Description
9.0	OUTPUT MODE
9.1	QPSK OUTPUT PARAMETERS

◆ 9.0 OUTPUT MODE

Allows the output TS to be changed by the configurations entered in OUTPUT TS. Options are WORK AS INPUT TS or WORK AS OUTPUT TS.

◆ 9.1 QPSK OUTPUT PARAMETERS

Allows operator to rebuilt parameters for output TS.

8

TECHNICAL SPECIFICATIONS

Data interface

ASI interface (Asynchronous Serial interface)

◆ Input:

Connector: BNC
Impedance: 75Ω
Packet format: 188/204 bits
Access data rate: 270Mbps
Max valid bit rate: 60Mbps
DVB standard

◆ Loop output:

Connector: BNC
Impedance: 75Ω

SPI input interface (Synchronous Parallel interface)

Connector: DB-25 female
Packet format: 188 or 204 bits
DVB Standard: LVDS

RF interface

◆ RF output:

Connector: BNC
Impedance: 75Ω
Output Frequency: 950MHz - 1450MHz
Reflection loss $\geq 15\text{dB}$
Output level: 100~110dBuV (adjustable)
Carrier rejection: $> 55\text{dB}$
SNR(out of band): $\geq 45\text{dB}$

Technical Specifications (cont.)

- ◆ RF output for test
 - Connector: BNC
 - Impedance: 75Ω
 - Output level: 85dBuV~100dBuV (adjustable)

Channel signal encoding

- ◆ Constellation: QPSK
- ◆ Channel encoding: RS encode, DVB-S standard
- ◆ MER: ≥40dB
- ◆ SNR(out of band): ≥45dB

Network management interface

- ◆ IEEE802.3 ETHERNET, RJ45 interface
- ◆ Software protocol: SNMP protocol

Power supply

- ◆ Voltage: 85V~265V AC
- ◆ Frequency: 50-60Hz
- ◆ Power consumption: 50W

Operational environment

- ◆ Operation temperature: +5 to 45°C;
- ◆ Storage temperature: -25 to +55°C.
- ◆ Relative humidity: 10~75%

Technical Specifications (cont.)

Radiation and safety

- ◆ Up to GB13837-92 and GB8898-88

Mechanic characteristics

- ◆ Dimension: 44.5mm(1U)*483mm*(19")*400mm
- ◆ Weight: 6kg

E3 /DS3 Interface (optional)

- ◆ Input (G.703 standard)
 - Connector: BNC
 - Impedance: 75Ω
 - Packet format 188/204 bits
 - Bit rate: E3/DS3 No-frame format (34.368Mbps/44.736Mbps)
- ◆ Output (loop)
 - Connector: BNC
 - Impedance: 75Ω

9

dBv to dBm CONVERSION TABLE

10 TROUBLESHOOTING

Front Panel Lights

The front panel lights can be a great tool for analyzing if the unit is working properly,

