



INSTRUCTION MANUAL

MUX-2D-QAM

8VSB/QAM Multiplexer

| Model | Stock No. | Description |
|------------|-----------|----------------------|
| MUX-2D-QAM | 6504 | 8VSB/QAM Multiplexer |

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We recommend that you write the following information in the spaces provided below.

| | |
|-------------------------------------|--|
| Purchase Location Name: | |
| Purchase Location Telephone Number: | |
| MUX-2D-QAM Serial Number: | |

The information contained herein is subject to change without notice. Revisions may be issued to advise of such changes and/or additions.

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Section 1 — General & Safety Instructions



The STOP sign symbol is intended to alert you to the presence of REQUIRED operating and maintenance (servicing) instructions that if not followed, may result in product failure or destruction.



The YIELD sign symbol is intended to alert you to the presence of RECOMMENDED operating and maintenance (servicing) instructions.



The LIGHTNING flash symbol is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock.

**TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER FROM THIS UNIT.
NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.**

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE

NOTE TO CATV SYSTEM INSTALLER

This reminder is provided to call the CATV System Installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

Safety Instructions

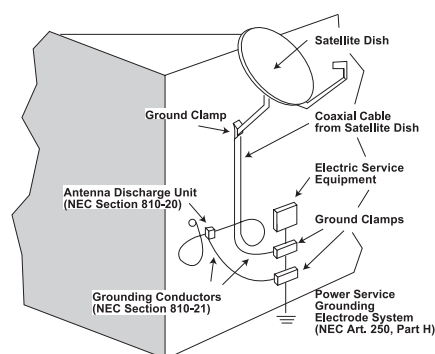


**YOU SHOULD ALWAYS FOLLOW THESE INSTRUCTIONS TO HELP ENSURE
AGAINST INJURY TO YOURSELF AND DAMAGE TO YOUR EQUIPMENT.**

- Read all safety and operating instructions before you operate the unit.
- Retain all safety and operating instructions for future reference.
- Heed all warnings on the unit and in the safety and operating instructions.
- Follow all installation, operating, and use instructions.
- Unplug the unit from the AC power outlet before cleaning. Use only a damp cloth for cleaning the exterior of the unit.
- Do not use accessories or attachments not recommended by Blonder Tongue, as they may cause hazards, and will void the warranty.
- Do not operate the unit in high-humidity areas, or expose it to water or moisture.
- Do not place the unit on an unstable cart, stand, tripod, bracket, or table. The unit may fall, causing serious personal injury and damage to the unit. Install the unit only in a mounting rack designed for 19" rack-mounted equipment.

Safety Instructions - continued

- Do not block or cover slots and openings in the unit. These are provided for ventilation and protection from overheating. Never place the unit near or over a radiator or heat register. Do not place the unit in an enclosure such as a cabinet without proper ventilation. Do not mount equipment in the rack space directly above or below the unit.
- Operate the unit using only the type of power source indicated on the marking label. Unplug the unit power cord by gripping the plug, not the cord.
- The unit is equipped with a three-wire ground-type plug. This plug will fit only into a ground-type power outlet. If you are unable to insert the plug into the outlet, contact an electrician to replace the outlet. Do not defeat the safety purpose of the ground-type plug.
- Route power supply cords so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where they exit from the unit.
- Be sure that the outdoor components of the antenna system are grounded in accordance with local, federal, and National Electrical Code (NEC) requirements. Pay special attention to NEC Sections 810 and 820. See the example shown in the following diagram:



- We strongly recommend using an outlet that contains surge suppression or ground fault protection. For added protection during a lightning storm, or when the unit is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the lines between the unit and the antenna. This will prevent damage caused by lightning or power line surges.
- Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing the antenna, take extreme care to avoid touching such power lines or circuits, as contact with them can be fatal.
- Do not overload wall outlets or extension cords, as this can result in a risk of fire or electrical shock.
- Never insert objects of any kind into the unit through openings, as the objects may touch dangerous voltage points or short out parts. This could cause fire or electrical shock.
- Do not attempt to service the unit yourself, as opening or removing covers may expose you to dangerous voltage and will void the warranty. Refer all servicing to authorized service personnel.
- Unplug the unit from the wall outlet and refer servicing to authorized service personnel whenever the following occurs:
 - The power supply cord or plug is damaged;
 - Liquid has been spilled, or objects have fallen into the unit;
 - The unit has been exposed to rain or water;
 - The unit has been dropped or the chassis has been damaged;
 - The unit exhibits a distinct change in performance.
- When replacement parts are required, ensure that the service technician uses replacement parts specified by Blonder Tongue. Unauthorized substitutions may damage the unit or cause electrical shock or fire, and will void the warranty.
- Upon completion of any service or repair to the unit, ask the service technician to perform safety checks to ensure that the unit is in proper operating condition.

Returning Product for Repair (or Credit)

A Return Material Authorization (RMA) Number is required on all products returned to Blonder Tongue, regardless if the product is being returned for repair or credit. Before returning product, please contact the Blonder Tongue Service Department at 1-800-523-6049, Ext. 4256 or visit our website: www.blondertongue.com for further information.

Section 2 — Product Summary

2.1 Revision History & Reason

This is the third issue of this Instruction Manual.

This issue adds reference in Section 5.4 regarding PID offsets changing program numbers. Previously only minor channel numbers were mentioned.

2.2 Product Application & Description

Application:

The MUX-2D-QAM multiplexer is equipped with two (2) 8VSB/QAM inputs. Users can select which programs within each input stream are either filtered or passed on. The resulting output stream is QAM modulated and upconverted to an RF channel with a set of automatically generated PSI (Program Specific Information) and PSIP (Program & System Information Protocol) tables. The data rate can be up to 38.8 Mbps for transmission in a single 6 MHz, QAM 256 channel or higher with QAM 512 and 1024.

The MUX-2D-QAM supports standard EIA CATV, IRC, HRC and Broadcast channel plans in the 54 – 864 frequency range. All channel frequency information, with appropriate FCC offsets, is pre-programmed and tuned electronically via microprocessor.

Description:

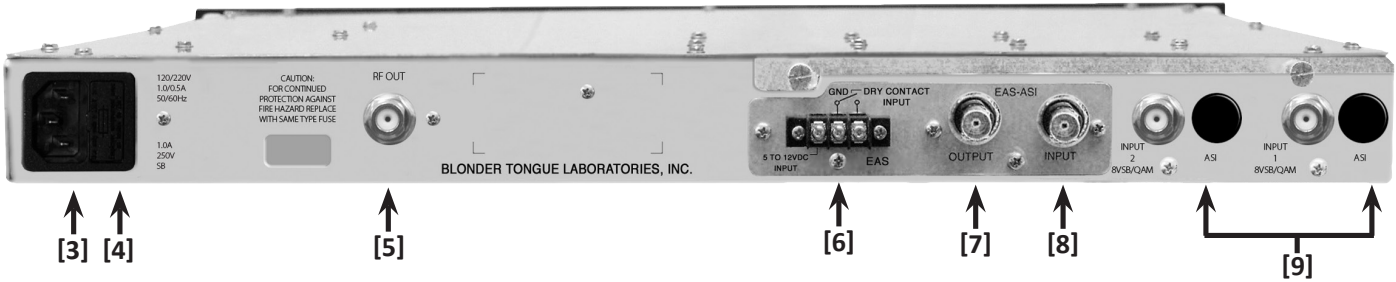
Below are the front and rear pictures of the unit:



[1] [2]

[1] & [2] LCD SCREEN & KEY-PAD:

The LCD has 2 lines, each capable of displaying 16 characters. The key-pad has 5 push-down buttons used to navigate between menus and to program unit information.



[3] [4] [5] [6] [7] [8] [9]

[3] POWER:

An IEC power cord socket



THE ACCEPTABLE INPUT VOLTAGES ARE 110 VAC/60 Hz & 220 VAC/ 50 Hz.

[4] FUSE HOLDER:

1.0 Amp., 250V DC, Slo Blo Fuse

[5] QAM RF OUTPUT:

75 Ω F CONNECTOR

[6] EAS CONTROL INPUT:

Terminal strip for either a dry contact closure or 5 to 12 VDC INPUT to activate the EAS mode.

[7] EAS-ASI OUTPUT:

75 Ω BNC connector - For looping EAS INPUT source to other units.

[8] EAS-ASI INPUT:

75 Ω BNC connector

[9] INPUTS:

(2) 8VSB/QAM - 75 Ω F connector

2.3 Product Specification

INPUT

| | |
|--------------------------------------|---|
| Connectors | |
| 8VSB/QAM module: | 2x "F" Female |
| Emergency Alert System (EAS): | 1x BNC Female |
| Standards | |
| 8VSB: | ATSC Digital Television A/53E |
| QAM: | ITU-T J.83 - Annex A & B (64 and 256 QAM) |
| ASI (EAS Input): | 1x DVB-ASI; EN 50083-9 SD single program broadcast MPEG2 or 4 video and AC-3 Dolby® Audio |
| 8VSB Mode | |
| Tuning Range: | UHF (NTSC Ch. 14-69), VHF (NTSC Ch. 2-13) |
| Data Rate: | 19.392 Mbps |
| Bandwidth: | 6 MHz |
| Power Level: | -20 to +20 dBmV |
| QAM Mode | |
| Tuning Range: | CATV (NTSC Ch. 2-135) |
| Data Rate: | 38.8 Mbps (QAM 256); 26.97 Mbps (QAM 64) – Auto Detect |
| Bandwidth: | 6 MHz |
| Power Level: | -15 to 20 dBmV (@ QAM 256) -20 to 20 dBmV (@ QAM 64) |
| Impedance: | 75 Ω |

OUTPUT

| | |
|-----------------------------------|--|
| Connector: | 1x "F" Female |
| QAM Modulation Modes: | 16, 32, 64, 128, 256, 512, and 1024 |
| DVB Symbol Rate: | Variable; 1 to 7 MSymbols/sec (MBaud) |
| Frequency Range: | 54 to 864 MHz |
| QAM Tuning | Per channel's number from 2 to 135 |
| RF Level: | +45 dBmV |
| RF Level LCD Screen Error: | ± 2 dB |
| RF Level Adjustment Range: | 33 to 47 dBmV |
| Frequency Stability: | ± 10 kHz over 32 to 122 °F (0 to 50 °C) |
| Frequency Tolerance: | ± 0.5 kHz @ 77 °F (25 °C) |
| Amplitude Flatness: | ± 0.25 dB (over 6 MHz channel) |
| Phase Noise: | -98 dBc (@ 10 kHz) |
| Spurious: | -60 dBc |
| Broadband Noise: | -75 dBc (@ +60 dBmV output level, 4 MHz bandwidth) |
| Impedance: | 75 Ω |
| Return Loss: | 12 dB |
| Spectral Inversion: | Auto Recognition |
| Carrier Suppression: | 55 dB |
| SNR: | Greater than 40 dB |
| MER: | Greater than 40 dB |
| I/Q Phase Error: | Less than 1 degree |
| I/Q Amplitude Imbalance: | Less than 1% |
| EAS Looped Output | |
| Connector: | 1x BNC Female |
| Standard: | ASI |
| Trigger Mechanism: | 5-12 VDC or Dry Contact Closure |

GENERAL

| | |
|--------------------------------|---|
| Dimensions (W x D x H): | 19.0 x 14.3 x 1.75 inches (483 x 363 x 44 mm) |
| Power: | 105 to 240 VAC/50 to 60 Hz |
| Power Dissipation: | 36 W |
| Weight: | 5.1 lbs (2.31 kg) |
| Operating Temperature: | 32 to 122 °F (0 to 50 °C) |
| Storage Temperature: | -13 to 158 °F (-25 to 70 °C) |
| Operating Humidity: | 0 to 95% RH @ 35 °C max, non-condensing |
| Storage Humidity: | 0 to 95% RH @ 35 °C max, non-condensing |

ALARMS/MONITORING/CONTROL

| | |
|-----------------------------------|---|
| Local Monitoring: | Front-panel 16-character, 2-line LCD screen |
| Local Control: | Front-panel Navigational Key-pad |
| Remote Monitoring/Control: | Not available |

Section 3 – Installation & Power-up

3.1 Unpacking

You will find the following items in the box:

- MUX-2D-QAM Multiplexer (QTY=1)
- Power Cord with IEC C13 line socket and 3-pin Type B NEMA 5 Plug (QTY=1)

3.2 Installation

The MUX-2D-QAM multiplexer is designed to be installed in a standard 19-inch (480 mm) rack (EIA 310-D, IEC 60297, and DIN 41494 SC48D). To install the encoder, secure its front panel to the rack by inserting four machine screws, with cup washers, through the four mounting holes in the front panel.



DO NOT BLOCK THE UNIT'S AIR INTAKE OR AIR DISCHARGE OPENINGS.

It is recommended to leave 1 rack unit space (1RU = 1.75 inch = 44.45 mm) between each encoder to reduce heat build-up in the rack which helps to extend the product's life span.

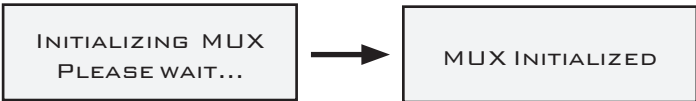


**FOR SAFE AND RELIABLE OPERATION,
THE GROUND PIN OF THE POWER CORD PLUG MUST BE GROUNDED PROPERLY.**

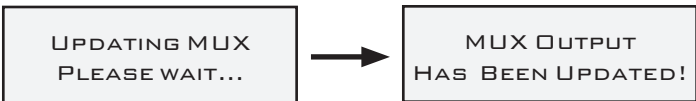
3.3 Power-up

There is no power On-OFF switch on this unit. To turn the unit on or off, simply connect/disconnect the power cord to/from the unit. The unit's power inlet plug is equipped with a fuse-holder and fuse.

The following sequence of events will take place when the unit is powered-up successfully:



The unit will then automatically check for the presence of input modules. The LCD displays the following when valid inputs are present:



The display defaults to the "MUX OUTPUT MENU" after 10 seconds of inactivity. More details on the "MUX OUTPUT MENU" can be found on Section 8.



The LCD has a backlit feature to illuminate the panel. It will light when any of the key-pad buttons are pressed. It will automatically turn off if no interaction is made after about 25 seconds.

Section 4 – Configuration

4.1 General

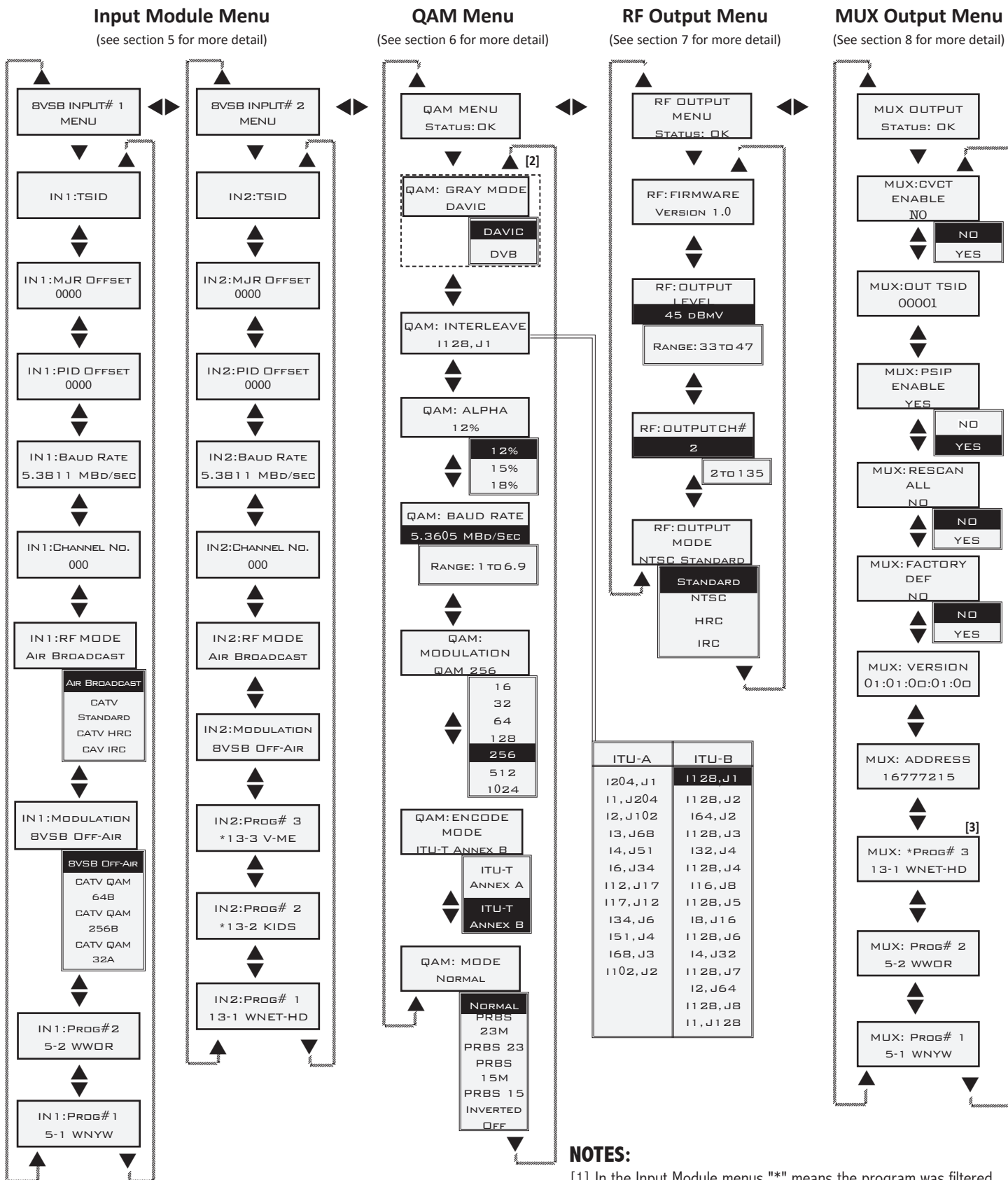
Configuration and monitoring of the unit is accomplished by utilizing the front-panel LCD and Key-pad. Configuration of the unit is accomplished from the five push-down buttons on the front-panel key-pad: ◀ (L), ▶ (R), ▲ (UP), ▼ (DN), and **Enter**. Diagram 1 depicts the LCD screens and parameters in the main interactive sequence.



**NO UNIT ADJUSTMENTS ARE PERMITTED IN THE ◀ (L) or ▶ (R).
ALL MODIFICATION MUST BE PERFORMED IN THE ▲ (UP)/ ▼ (DN) SEQUENCE.**

1. Press the ◀ (L) or ▶ (R) buttons to switch among different menus.
2. Press the ▲ (UP) or ▼ (DN) buttons to scroll to the desired interactive parameter.
3. When you arrive at the screen whose parameter needs to be changed, press and hold for about 2 seconds the **ENTER** button until the blinking cursor is displayed.
4. Press the ▲ (UP) or ▼ (DN) buttons to increment or decrement to the appropriate desired value.
5. Press the **ENTER** button again to apply the change to the unit's memory. The control board then programs the unit to the new setting.
6. You'll see the following confirmation message on the LCD screen:

ENTRY ACCEPTED



COMMENTS:

• Factory default values, when applicable, are highlighted in black in the diagram above.

NOTES:

- [1] In the Input Module menus "*" means the program was filtered.
- [2] The Gray Mode is available in ITU-A only.
- [3] In the MUX OUTPUT menu "*" means the program was remapped.

4.2 Quick Configuration

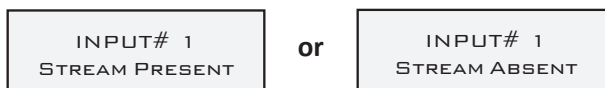
1. Refer to Section 5 to configure the 8VSB/QAM input modules. Please pay attention to the maximum input bandwidth that the unit and input modules can handle. A more detailed guide to maximum input bandwidth and output bandwidth limitations can be found in Section 10.
2. Connect the RF output F connector to the headend combiner or device of your choice.
3. Setting Output Level: The factory default is already set at the maximum output signal-to-noise ratio (SNR) of 45 dBmV. It is not recommended to change this setting. However, if you need to fine-tune the setting, follow these steps.
 - a. Using the ◀ (L) or ▶ (R) buttons, navigate to the "RF OUTPUT MENU".
 - b. Using the ▲ (UP) or ▼ (DN) buttons, navigate to the "RF: OUTPUT LEVEL" menu. Press and hold for about 2 seconds the **ENTER** button until you see a flashing cursor. You can now change the output level in 1 dB increments by using the ▲ (UP) or ▼ (DN) buttons.
 - c. Once you have arrived at the desired output level press the **ENTER** button. You will receive the following confirmation message on the front panel LCD screen: "Entry Accepted"
4. Setting Output QAM Channel:
 - a. Using the ◀ (L) or ▶ (R) buttons, navigate to the "RF OUTPUT MENU".
 - b. Using the ▲ (UP) or ▼ (DN) buttons, navigate to the "RF: OUTPUT CH#" menu. Press and hold for about 2 seconds the **ENTER** button until you see a flashing cursor. You can now change the output channel by using the ▲ (UP) or ▼ (DN) buttons.
 - c. Once you have arrived at the desired output channel press the **ENTER** button. You will receive the following confirmation message on the front panel LCD screen: "Entry Accepted"
 - d. Please see Section 7.5 if a channel plan other than standard NTSC is desired.
5. Eliminating Undesired Program Streams:
 - a. Using the ◀ (L) or ▶ (R) buttons, navigate to the input that you would like to eliminate program streams from.
 - i. The LCD will display "8VSB/QAM INPUT # 1 or 2".
 - ii. For a detailed map of the unit's interactive menu, please see Section 4.1.
 - b. When you have found the input that you would like to eliminate program streams from, use the ▲ (UP) or ▼ (DN) buttons to scroll through all of the available program streams.
 - i. The program streams are identified by the program number that is inserted into the stream by the content provider. If you were receiving programming from a broadcast source, you could expect to see:
 1. Program number (1, 2, 3...)
 2. The broadcaster's Major- and Minor-channel numbers, for example: 6-1, 6-2, 6-3,
 3. Station call letters (WBTL-HD, WBTL-SD, WBTL-WX,...)
 - c. When you have found the program number that you would like to eliminate, press and hold for about 2 seconds the **ENTER** button until you see a flashing cursor.
 - d. Using the ▲ (UP) or ▼ (DN) buttons you can eliminate the program by making an asterisk appear/disappear in the first position on the second line of the front-panel LCD. When you have the asterisk displayed on the program stream that you wish to eliminate, press the **ENTER** button.
 - e. You will receive several rapid confirmation messages on the front-panel LCD to confirm that the change has taken place and that all of the appropriate output tables are being updated. The final message will be: "MUX Output Has Been Updated!". The program stream that was marked with the asterisk will no longer be present in the multiplexed QAM output channel.

Section 5 – Input Menu

Each 8VSB/QAM input must be configured depending on whether the input is in 8VSB (Digital Off-Air) or in QAM (Digital Cable). The factory default values are selected to minimize the necessary configuration steps. However, you can change the factory default value of any of the menu options. In this section we provide an explanation of these options, and instructions on how to change them.

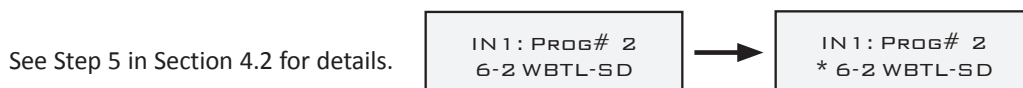
5.1 General

The unit will search for the presence of an input stream on both 8VSB/QAM inputs and one of the following two messages will appear on the LCD.



Programs, along with their program numbers will be displayed on the LCD. Major/Minor channel numbers and, when present, station call letters are also displayed. **Twelve (12) is the maximum number of input programs per stream.**

Filtering of input programs is accomplished by selecting a program and pressing the **ENTER** button when the asterisk "*" appears. For example, the following is the sequence to filter program #2 on Input Module #1:



5.2 Input Menu: "TSID" Parameter

This is a read only parameter indicating the Transport Stream Identification (TSID) of the input source. The FCC has assigned unique TSID's to all DTV stations and are used by receivers having advanced navigation features.

5.3 Input Menu: "MJR Offset" Parameter

In addition to remapping of the original Minor-channel numbers assigned by the broadcaster (see Section 5.2), you can also remap the original Major-channel numbers by assigning an "MJR Offset" value as follows:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the "8VSB INPUT#x MENU". See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to "INx: MJR Offset" parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ◀ (L) or ▶ (R) and ▲ (UP) or ▼ (DN) buttons to arrive at the desired offset value (range is integers from -999 to +999).
4. Press the **ENTER** button again to apply the change to the unit's memory.

Example:

- If channel numbers displayed on TV set now are 7-1, 7-2, 7-3, 13-1, 13-2, 13-3 by setting the MJR Offset = 10 (positive 10), then the channel numbers displayed on the TV will change to 17-1, 17-2, 17-3, 23-1, 23-2, 23-3.
- If channel numbers displayed on TV set now are 7-1, 7-2, 7-3, 13-1, 13-2, 13-3, by setting the MJR Offset = -10 (negative 10), then the channels displayed on the TV will be 7-1, 7-2, 7-3 (not remapped), 3-1, 3-2, 3-3 (remapped). Although negative Major Offset values are allowed, negative Major-channel numbers are not.
- If channel numbers displayed on TV set now are 7-1, 7-2, 7-3, 13-1, 13-2, 13-3, by setting the MJR Offset = 990, then the channel numbers displayed on the TV will be 997-1, 997-2, 997-3 (remapped), 13-1, 13-2, and 13-3 (not remapped). Although positive Major Offset values of up to 999 are allowed, Major-channel number cannot exceed 999.

5.4 Input Menu: “PID Offset” Parameter

PID (Packet Identifier) values are embedded by the broadcasters in the MPEG-2 stream to identify tables and programming packets. The PID Offset feature allows you to remap the Minor Channel numbers and the Program Channel numbers. Two modes are supported for remapping of PID values: Automatic and Manual.

The Factory default value is Automatic.

In the Automatic mode, when a duplicate PID values is detected, the duplicate PID value is incremented by one.

In the Manual mode, you can assign an offset value as follows:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “8VSB INPUT#x MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “INx: PID Offset” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ◀ (L) or ▶ (R) and ▲ (UP) or ▼ (DN) buttons to arrive at the desired offset value (range is integers from -1024 to +1023).
4. Press the **ENTER** button again to apply the change to the unit’s memory.

Example:

- If channel numbers displayed on TV are now 7-1, 7-2, and 7-3, by setting the PID Offset = 10 (positive 10), then the channel numbers displayed on the TV will change to 7-11, 7-12, and 7-13.
- If channel numbers displayed on TV are now 7-1, 7-2, and 7-3, by setting the PID Offset = -10 (negative 10), then the channels displayed on the TV will remain 7-1, 7-2, and 7-3. Although negative PID Offset values are allowed, negative Minor-channel numbers are not. When entering a minus offset, a non-zero number must be in the display before the unit allows the - sign to be toggled on.
- If channel numbers displayed on TV are now 7-20, 7-21, and 7-22, by setting the PID Offset = -10 (negative 10), then the channel numbers displayed on the TV will change to 7-10, 7-11, and 7-12. Before the PID Offset is applied, the unit will check for duplication across inputs and auto-corrects if necessary.
- If the Program numbers received on the input are 1, 2 and 3, by setting the PID offset =+10, the program numbers when viewed on the MUX Output Menu would then be “*Prog#11”, “*Prog#12”, and “*Prog#13”. The “*” indicates that the program was remapped. Note that the PID offset affects both the minor channel numbers and the program numbers.



SOME TV SETS WILL REQUIRE RE-SCANNING IN ORDER TO DISPLAY THE REVISED CHANNEL NUMBER ASSIGNMENTS.

NOTE: The CVCT Mode allows the MUX-2D-QAM to set each virtual channel assignment as a one-part three-digit integer channel number (major) only for CATV applications (ie:“570”) compared to the ATSC broadcast two-part format having major and minor channels (ie:“17-3”).

Directions for enabling the CVCT Mode (Cable Virtual Channel Table) are in Sections 8.2 and 8.9. First, there are important steps that must be performed in this section to ensure that all input streams will be maintained consistently after going “dark” and then returning or after AC power re-boots.

1. Confirm the CVCT Enable setting is “NO” (default setting). See section 8.2.
2. Connect all input streams and do any stream (program) filtering required to limit the output to a maximum of 12 programs.
3. Use the Manual Mode PID offset feature on inputs having the same program numbers as another input.



WHEN OPERATING THE MUX-2D-QAM IN CVCT MODE: DO NOT USE THE DEFAULT “AUTOMATIC” SETTING FOR PID OFFSETS BECAUSE AUTOMATIC PID REMAPPING AFTER POWER RE-BOOTS WILL RESULT IN DIFFERENT ASSIGNED PROGRAM NUMBERS. THIS APPEARS TO THE TV AS INCORRECT OR LOST CHANNEL NUMBERS AND MAY ADDITIONALLY REQUIRE TV’S TO BE RE-SCANNED IN ORDER TO VIEW THE PROGRAMS.

5.5 Input Menu: “Baud Rate” Parameter

Baud Rate (or modulation rate) is the number of distinct symbol (or signaling) changes made to the QAM transmission medium per second. The measurement unit is typically in Mega Bauds (MBd) which is synonymous to Mega symbols per seconds (MSPS).

It follows then, that the Baud Rate is dependent on the selection of the QAM modulation modes referenced in Section 5.5. The unit automatically assigns the appropriate Baud Rate for each QAM modulation type, for example:

The assigned Baud Rate is 5.0569 MBd, when CATV QAM 64B is selected.

The assigned Baud Rate is 5.3605 MBd, when CATV QAM 256B is selected.

It is not recommended to change the above assigned values, however, to change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “8VSB INPUT#x MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “INx: Baud Rate” parameter.
3. Press on the ENTER button until the blinking cursor is displayed. Press the ◀ (L) or ▶ (R) and ▲ (UP) or ▼ (DN) buttons to input the desired Baud Rate – the range is 1 to 6.9 MBd.
4. Press the ENTER button again to apply the change to the unit’s memory.

5.6 Input Menu: “Channel No” Parameter

To enter a channel number, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “8VSB INPUT#x MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “Channel No” parameter.
3. Press on the ENTER button until the blinking cursor is displayed. Press the ◀ (L) or ▶ (R) and ▲ (UP) or ▼ (DN) buttons to input the desired channel number (for example, you must enter 033 for channel 33).
4. Press the ENTER button again to apply the change to the unit’s memory.

5.7 Input Menu: “RF Mode” Parameter

Five (5) RF modes are supported by this module: Air Broadcast, CATV Standard, CATV HRC, CATV IRC, Frequency.

Factory default value is Air Broadcast – this is consistent with the factory default value for the “Modulation” parameter which is 8VSB Off-Air (See section 5.5 above).

To change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “8VSB INPUT#x MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “INx: RF Mode” parameter.
3. Press on the ENTER button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired RF mode.
4. Press the ENTER button again to apply the change to the unit’s memory.

5.8 Input Menu: “Modulation” Parameter

Seven (7) input standards are supported by this module: 8VSB Off-Air, CATV QAM 64B, CATV QAM 256B, CATV QAM 32A, CATV QAM 64A, CATV QAM 128A, and CATV QAM 256A.

Factory default value is 8VSB Off-Air.

To change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “8VSB INPUT#x MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “INx: Modulation” parameter.
3. Press on the ENTER button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired modulation type.
4. Press the ENTER button again to apply the change to the unit’s memory.

5.9 Input Menu: “Program #” Parameter

This is a read-only parameter indicating for each input program its program number, the Major/Minor channel number, and the station call letters. **The maximum number of input programs per stream is twelve (12).** Please see Section 5.5 for procedures on how to filter out undesired input programs.



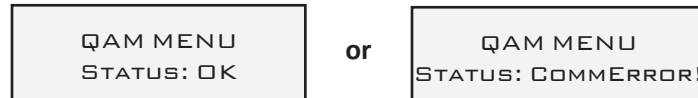
REGARDLESS OF WHETHER THE INPUT STREAM TO THE 8VSB/QAM MODULE IS IN 8VSB (DIGITAL OFF-AIR) OR IN QAM (DIGITAL CABLE), THE WORD “8VSB” IS DISPLAYED ON THE LCD.

Section 6 - QAM Menu

6.1 General

The “QAM MENU” allows you to configure the QAM output of the unit. The seven (7) possible configurable parameters shown in Section 4.1 are explained in detail in this section. However, the following two status messages are applicable when you are in the “QAM MENU”:

- "Status: OK" – Input program streams are present and all output parameters are set and operating correctly.
- "Status: MUTE" – Indicates that there are NO streams present on any input modules while the QAM Mode is set to "Normal" or "Inverted". To reduce broadband noise in the system, the unit disables the QAM output when there are no input streams present.



6.2 QAM Menu: “Gray Mode” Parameter

Gray codes are used to improve error correction. For example, in QAM modulation, the signal's constellation diagram is arranged so that the bit patterns conveyed by adjacent constellation points differ by only one bit. By combining this with FEC capable of correcting single-bit errors, it is possible for a receiver to correct any transmission errors that cause a constellation point to deviate into the area of an adjacent point. This makes the transmission system less susceptible to noise. Two (2) options, only when “Encode Mode” is ITU-T Annex A, are available: DAVIC and DVB. The factory default is DAVIC. It is not recommended to change the above assigned value, however, to change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “QAM MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “QAM: GRAY Mode” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired value.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

6.3 QAM Menu: “Interleave” Parameter

Interleaving is a technique used in conjunction with FEC (Forward Error Correction) to correct for the QAM errors that are induced by burst noise. The unit employs a convolutional interleaver. Most television sets equipped with a QAM tuner use the factory default interleaving scheme. However, some QAM set-top boxes may use an interleaving scheme different from our factory default value. To change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “QAM MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “QAM: Interleave” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired value.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

6.4 QAM Menu: “Alpha” Parameter

The QAM passband spectrum is shaped by root raised cosine filtering with a roll-off factor Alpha. Three (3) options are available: 12%, 15%, and 18%. The factory default is 12%.

When Encode Mode = ITU-T Annex B, and the Modulation = CATV QAM 256B, the recommended ALPHA value is 12%.

When Encode Mode = ITU-T Annex B, and the Modulation = CATV QAM 64B, the recommended ALPHA value is 12%.

When Encode Mode = ITU-T Annex A the recommended ALPHA value 15%.

It is not recommended to change the above assigned values, however, to change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “QAM MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “QAM: ALPHA” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired value.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

6.5 QAM Menu: “Baud Rate” Parameter

Baud Rate (or modulation rate) is the number of distinct symbol (or signaling) changes made to the QAM output transmission medium per second. The measurement unit is typically in Mega Bauds (MBd) which is synonymous to Mega symbols per seconds (MSPS).

It follows then, that the Baud Rate is dependent on the selection of the QAM modulation modes referenced in Section 6.4. The unit automatically assigns the appropriate Baud Rate for each QAM modulation type, for example:

The assigned Baud Rate is 5.0569 MBd, when CATV QAM 64B is selected.

The assigned Baud Rate is 5.3605 MBd, when CATV QAM 256B is selected.

It is not recommended to change the above assigned values, however, to change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “QAM MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “QAM: Baud Rate” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ◀▶ and ▲▼ buttons to arrive at the desired mode – the range is 1 to 6.9 MBd.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

6.6 QAM Menu: “Modulation” Parameter

Seven (7) options are available: 16, 32, 64, 128, 256, 512, and 1024. The factory default is 256.

To change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “QAM MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “QAM: Modulation” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired mode.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

6.7 QAM Menu: “Encode Mode” Parameter

Two (2) options are available: ITU-T Annex A, and ITU-T Annex B.

The factory default is ITU-T Annex B.

ITU-T Annex A is used mostly with the PAL television standard, and ITU-T Annex B is used mostly with the NTSC television standard.

To change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “QAM MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “QAM: Encode Mode” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired mode.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

6.8 QAM Menu: “Mode” Parameter

Eight (8) options are available: Normal, PRBS15, PRBS15M, PRBS23, PRBS23M, Inverted, Off, and CW.

The factory default is Normal.

The four (4) self test modes, denoted PRBS (Pseudo Random Binary Sequence), are only applicable for testing purposes, and must not be selected when operating the encoder for its intended use.

The Inverted option inverts the QAM output spectrum.

The Off option turns off the QAM output of the encoder – no output will be available.

The CW (Carrier Wave) option is only applicable for testing purposes, and must not be selected when operating the encoder for its intended use. See Appendix A for details.

For normal operation, the mode must be “Normal”, however, to change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “QAM MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “QAM: Mode” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired QAM mode.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

Section 7 - RF Output Menu

7.1 General

The “RF OUTPUT MENU” allows you to configure the RF output of the unit. The three (3) possible configurable parameters shown in Section 4.1 are explained in detail in this section. However, the following status messages are applicable when you are in the "RF OUTPUT MENU":

Status: OK – the RF Output is functioning correctly.

Status: CommError! – there is probably a hardware or firmware malfunction. Please call Tech Support @ 1-800-523-6049 or +1-732-679-4000 ext 4217.

Status: Error #1 – same as above.

Status: Error #2 – same as above.

Status: Error #3 – same as above.

7.2 RF Menu: “Firmware” Parameter

This is a read-only parameter and displays the firmware version of the unit’s QAM upconverter module.

7.3 RF Menu: “Output Level” Parameter

Allows you to select the output power level, measured in dBmV, in 1 dB increments.

The range is 33 to 47 dBmV.

Factory default value is 45 dBmV.

THE OUTPUT LEVEL ADJUSTMENTS ARE RECOMMENDED ONLY FOR FINE-TUNING, however, to change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “OUTPUT MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “RF: OUTPUT LEVEL” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired value.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

7.4 RF Menu: “Output Channel #” Parameter

Allows you to select the output power level, measured in dBmV, in 1 dB increments.

The range is 2 to 135.

Factory default value is 2.

To change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “OUTPUT MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “RF: OUTPUT CHANNEL #” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ◀ (L) or ▶ (R) and ▲ (UP) or ▼ (DN) buttons to arrive at the desired value.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

7.5 RF Menu: “Output Mode” Parameter

Four (4) options are available: Standard NTSC, HRC, IRC, Frequency.

The factory default is Standard NTSC.

The HRC (Harmonically Related Carrier) and IRC (Incrementally Related Carrier) options are for signals with “off-center” carrier center-frequency.

The Frequency option allows to select any desired frequency in 12.5 kHz increments.

To change the factory default value, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “RF OUTPUT MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “RF: OUTPUT MODE” parameter.
3. Press on the **ENTER** button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the desired value.
4. Press the **ENTER** button again to apply the change to the unit’s memory.

Section 8 - MUX Output Menu

8.1 General

The “MUX OUTPUT MENU” allows you to obtain information about the multiplexed output stream, and displays the hardware and firmware versions of the unit. The following status messages are applicable when you are in the “MUX OUTPUT MENU”:

Status: OK – input program streams are present, and all output parameters are configured correctly.

Status: No Input – Indicates that there are NO streams present on any input modules while the QAM Mode is set to “Normal” or “Inverted”. To reduce broadband noise in the system, the unit disables the QAM output when there are no input streams present.

Status: Overflow Error! – Indicates that total output bandwidth exceeds the maximum data rate for the “QAM Mode” and “Modulation” parameters that have been selected. The maximum data rate that can be transported in 256 QAM output is approximately 38.8 Mbps. See Section 9 for more details.

8.2 MUX Output: “CVCT Enable” Parameter

The MUX-2D-QAM default setting is “No”. When this mode is enabled (yes selected), major and minor channel numbers and names can be added or edited under the MUX Output / Program # (Section 8.9) menu. The MUX-2D-QAM creates and maintains the CVCT (cable virtual channel table) and MGT (master guide table) in this mode.



BEFORE ENABLING CVCT VERIFY THAT:

- ALL INPUT STREAMS ARE CONNECTED AND REQUIRED PROGRAM FILTERING TO ENSURE A MAXIMUM OF 12 PROGRAMS HAS BEEN DONE. SEE SECTIONS 4.2 .5, AND 5.1 FOR PROGRAM FILTERING INSTRUCTIONS.
- PID OFFSETS HAVE BEEN MANUALLY ASSIGNED TO PREVENT DUPLICATE PROGRAM NUMBERS. THE DEFAULT “AUTO” PID SETTING SHOULD NOT BE USED WITH THE CVCT FEATURE BECAUSE DATA ERRORS WILL OCCUR FROM DIFFERENT PROGRAM NUMBERS BEING AUTOMATICALLY ASSIGNED AFTER AC POWER CYCLING.
- ERRORS MAY APPEAR AS DIFFERENT DISPLAYED CHANNEL NUMBERS OR COMPLETELY LOST PROGRAMS REQUIRING USERS TO RE-SCAN THEIR TV’S.

SEE SECTION 5.4 FOR DETAILS.

8.3 MUX Output: “Out TSID” Parameter

User can set a Transport Stream Identification number by pressing the ENTER button until a blinking cursor is displayed. Using the navigation buttons, set the desired TSID and then press ENTER to save the change. The default TSID number is “1”.

8.4 MUX Output Menu: “PSIP Enable” Parameter

Allows the user to turn on/off extended PSIP tables on the output stream. Depending on the source of input streams, some may have PSIP and others will not. The merged output will only contain info on the channels that had PSIP and could result in a set of tables not containing programming details for every channel. This can be a problem for some MPEG decoders and therefore need the option of turning off these tables. When “CVCT” is enabled “PSIP” enabled is forced to “No”. Likewise when CVCT is set to “No”, PSIP is enabled “Yes”.

8.5 MUX Output Menu: “Rescan All” Parameter

Allows you to rescan all input streams. All current configuration values will remain the same. To rescan all input stream, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “MUX OUTPUT MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “Rescan All” parameter.

3. Press on the ENTER button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the “YES” value.
4. Press the ENTER button again to apply the change to the unit’s memory.

8.6 MUX Output Menu: “Factory Default” Parameter

Allows you to erase all current configuration values and restore to factory default values shown in Section 4.1. To restore all configurations values to the factory default, follow these steps:

1. Using the ◀ (L) or ▶ (R) buttons scroll to the “MUX OUTPUT MENU”. See Section 4.1 for details.
2. Using the ▲ (UP) or ▼ (DN) buttons scroll to “Factory Default” parameter.
3. Press on the ENTER button until the blinking cursor is displayed. Press the ▲ (UP) or ▼ (DN) buttons to arrive at the “YES” value.
4. Press the ENTER button again to apply the change to the unit’s memory.

8.7 MUX Output Menu: “Version” Parameter

This is a read-only parameter and displays the unit’s firmware version, for example: 01:01:00:01:00.

8.8 MUX Output Menu: “Address” Parameter

This is a read-only parameter and displays the unit’s unique factory-assigned address.

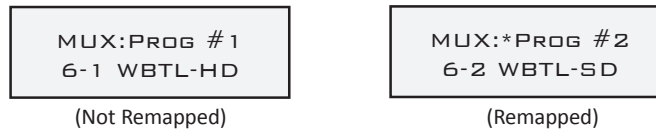
8.9 MUX Output Menu: “Program #X” Parameter

CVCT Enabled = “No”

When CVCT (8.2) is not enabled, this is a read-only parameter. The program #, the Major/Minor channel #, and channel's call letters are displayed when available.

See Sections 5.1 and 5.6 for information on filtered programs should any desired programs not appear on the output.

Twelve (12) is the maximum number of output programs. Merged PSI/PSIP tables are automatically generated when a stream is added to the input modules. Tables are also updated automatically when a new stream or table revision is detected. An asterisk "*" indicates that the program was remapped as shown in the example below.



CVCT Enabled = “Yes”

When CVCT is enabled, major/minor channel #'s and the channel's call letters or name can be changed by navigating to the desired program number, pressing enter until the cursor blinks and making changes with the up, down, left and right arrow keys. Once the desired changes have been made, press enter again to save them.

Allowable entries are as follows:

Major Channel: 1 thru 999

Minor Channel: 0 thru 999 Note that setting the minor channel to 0 (zero) will make the television receiver display only the major channel number. CATV digital channel designations use a three-part integer channel number as this (29, 570, etc) in comparison to the ATSC broadcast standard with major and minor channels (2-1, 2-2 etc.).

See NOTE in sections 5.4 concerning PID offsets when CVCT is enabled.



IMPORTANT – SEE NOTES IN SECTIONS 5.4 AND 5.9 CONCERNING THE NEED TO USE THE MANUAL PID OFFSET SETTING WHEN USING THE CVCT MODE TO AVOID POTENTIAL UNIT OPERATIONAL PROBLEMS AFTER POWER CYCLING.

Section 9 - Emergency Alert System (EAS)

The MUX-2D-QAM EAS feature allows all program streams to be replaced by an EAS broadcast when activated. An ASI input is required for EAS. The ASI format must be a single stream standard definition program (typically <=5.5 Mbps data rate) with MPEG 2 or 4 audio/video encoding. A 5.5 Mbps data rate allows for up to 7 program streams without exceeding 38.8 Mbps on a QAM 256 channel. Use an appropriate lower data rate if more streams are present.



DO NOT USE A HIGH DEFINITION (HD) EAS INPUT SOURCE AS THIS WILL EXCEED THE MAXIMUM ALLOWABLE BIT RATE WHEN MULTIPLE PROGRAMS ARE PRESENT.

The EAS mode is activated by applying a dry contact closure or a 5 to 12 VDC input to the EAS terminal strip on the back panel.

The front panel LCD will display the following when EAS is activated:



Upon removing the contact closure or voltage input the MUX-2D-QAM will return to its normal operation.

A buffered ASI output is provided on the rear panel to permit “daisy-chaining” or looping multiple MUX-2D-QAM’s from a single EAS-ASI source.

Section 10 – Frequently Asked Questions

1.

Question: What is the maximum number of input programs per input?

Answer: The maximum number of input programs per input is 12.

2.

Question: What is the maximum input and output data rate?

Answer: The input data rate is dependent on program content. 38.8 Mbps is the maximum output data rate for QAM 256.

3.

Question: What happens when more than 12 input programs are presented to an input?

Answer: The additional programs are not recognized by the MUX-2D-QAM and cannot be multiplexed to the QAM output.

4.

Question: What is the maximum number of multiplexed programs and the maximum output data rate?

Answer: The maximum number of multiplexed programs is 12, and the total data rate of these 12 programs cannot exceed approximately 19.4 Mbps for a QAM 64 modulation, or 38.8 Mbps for a QAM 256 modulation.

5.

Question: What happens when the maximum number of multiplexed programs or the maximum output data rates are exceeded?

Answer: Any programs in excess of 12 that have been selected for the output will not be multiplexed. If the aggregate data rate of all the multiplexed programs exceeds 38.8 Mbps, tiling will occur on all multiplexed programs. It is common for all data rates to fluctuate or ‘burst’ in conjunction with the complexity of the program’s video content. Factors that contribute to bandwidth ‘bursting’ are:

- a. High contrast levels
- b. Motion
- c. Complexity of visual textures

Frequently Asked Questions (continued)

6.

Question: Are there any data rate standards that can be used in order to properly plan the multiplexed output?

Answer: The table below can be used as a rough guideline.

| Format | Definition | Typical | Bursting |
|--------|------------|----------------|-----------|
| MPEG-2 | Standard | ≈ 3 – 4 Mbps | ≈ 6 Mbps |
| MPEG-2 | High | ≈ 12 Mbps | ≈ 17 Mbps |
| MPEG-4 | Standard | ≈ 1.5 – 2 Mbps | ≈ 3 Mbps |
| MPEG-4 | High | ≈ 6 Mbps | ≈ 10 Mbps |

7.

Question: What happens if a programmed, operational MUX-2D-QAM loses power?

Answer: The unit has a non-volatile memory that stores all of unit settings so that it can resume normal operation after going through its reboot sequence. Currently, PIDs are not stored in non-volatile memory. *Use the PID offset feature on inputs having the same program numbers as another input. Do not use the "Auto" setting on PID Offset as any automatic remapping upon a power reboot may result in different program numbers being assigned.*

8.

Question: What if the program data changes locations? (program 1 on input #1 now becomes program 3 on input #1 and program 1 is black screen).

Answer: The programs are remapped upon detection of a new PAT or PMT. Changes in the stream content are conveyed with new versions of the PAT/PMT tables. The unit automatically remaps upon detection of a table version update.

9.

Question: What if error messages occur?

Answer: "MUX Output Error": During the boot-up sequence, if the following message should appear on the LCD screen and not go away, there is an internal hardware error.

"Status: CommError!": There is an internal hardware error.

"Status: CfgError": This error may appear if the Baud Rate has been manually changed from the standard default settings shown in Section 4.1. If the Baud Rate is correct for the QAM Mode and Modulation scheme selected in the unit, then you need to return the unit for repairs.

"Status: NotLocked": There is an internal hardware error.

You can reach our Tech-support @ 1-800-523-6049 or 732-679-4000 ex. 4217.

Appendix A: Measuring the QAM Output Signal Level

To ensure that the QAM output power level indicated on the LCD screen is indeed accurate, you can also measure the true equivalent signal level for the QAM carrier using the CW (Carrier Wave) signal. The unit is capable of supplying the CW signal which simplifies the measurement process because the output level does not need to be adjusted for the bandwidth setting limitations of the spectrum analyzer.

Once the QAM mode is set at CW (please see Section 6.8 for instructions), then any meter that can measure CW power level can be used to compare the output level entered via the key-pad and the CW power level which is equal to the true QAM power level that will be presented in the NORMAL mode.

Limited Warranty

Blonder Tongue Laboratories, Inc. (BT) will at its sole option, either repair or replace (with a new or factory reconditioned product, as BT may determine) any product manufactured by BT which proves to be defective in materials or workmanship or fails to meet the specifications which are in effect on the date of shipment or such other specifications as may have been expressly agreed upon in writing (i) for a period of one (1) year from the date of original purchase (or such shorter period of time as may be set forth in the license agreement specific to the particular software being licensed), with respect to iCentral™ (hardware and software) and all other software products (including embedded software) licensed from BT, (ii) for a period of one (1) year from the date of original purchase, with respect to all MegaPort™, IPTV products, and fiber optics receivers, transmitters, couplers and integrated receiver/distribution amplifiers (including TRAILBLAZER™, RETRO-LINX™ and TWIN STAR™ products) as well as for DigiCipher ® satellite receivers, and (iii) for a period of three (3) years from the date of original purchase, with respect to all other BT products. Notwithstanding the foregoing, in some cases, the warranty on certain proprietary sub-assembly modules manufactured by third-party vendors and contained in BT products and on certain private-label products manufactured by third-parties for resale by BT are of shorter duration or otherwise more limited than the standard BT limited warranty. In such cases, BT's warranty with respect to such third-party proprietary sub-assembly modules and private-label products will be limited to the duration and other terms of such third-party vendor's warranty. In addition, certain products, that are not manufactured but are resold by BT, carry the original OEM warranty for such products. The limited warranty set forth in this paragraph does not apply to any product sold by BT, which at the time of sale constituted a Refurbished/Closeout Product.

(b) BT will at its sole option, either repair or replace (with a new or factory-reconditioned product, as BT may determine) any product sold by BT which at the time of sale constituted a refurbished or closeout item ("Refurbished/Closeout Product"), which proves to be defective in materials or workmanship or fails to meet the specifications which are in effect on the date of shipment or such other specifications as may have been expressly agreed upon in writing, for a period of ninety (90) days from the date of original purchase. Notwithstanding the foregoing, in some cases the warranty on third party software and on certain proprietary sub-assembly modules manufactured by third-party vendors and contained in BT products and on certain private-label products manufactured by third-parties for resale by BT are of shorter duration or otherwise more limited than the BT limited warranty for Refurbished/Closeout Products. In such cases, BT's warranty for Refurbished/Closeout Products constituting such third party software, third-party proprietary sub-assembly modules and private-label products will be limited to the duration and other terms of such third-party vendor's warranty. In addition, notwithstanding the foregoing, (i) certain Refurbished/Closeout Products that are not manufactured (but are resold) by BT, carry the original OEM warranty for such products, which may be longer or shorter than the BT limited warranty for Refurbished/Closeout Products. All sales of Refurbished/Closeout Products are final.

To obtain service under this warranty, the defective product, together with a copy of the sales receipt or other satisfactory proof of purchase and a brief description of the defect, must be shipped freight prepaid to: Blonder Tongue Laboratories, Inc., One Jake Brown Road, Old Bridge, New Jersey 08857.

This warranty does not cover damage resulting from (i) use or installation other than in strict accordance with manufacturer's written instructions, (ii) disassembly or repair by someone other than the manufacturer or a manufacturer-authorized repair center, (iii) misuse, misapplication or abuse, (iv) alteration, (v) lack of reasonable care or (vi) wind, ice, snow, rain, lightning, or any other weather conditions or acts of God.

OTHER THAN THE WARRANTIES SET FORTH ABOVE, BT MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND, EXPRESS OR IMPLIED, AS TO THE CONDITION, DESCRIPTION, FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR AS TO ANY OTHER MATTER, AND SUCH WARRANTIES SUPERSEDE ANY ORAL OR WRITTEN WARRANTIES OR REPRESENTATIONS MADE OR IMPLIED BY BT OR BY ANY OF BT'S EMPLOYEES OR REPRESENTATIVES, OR IN ANY OF BT'S BROCHURES MANUALS, CATALOGS, LITERATURE OR OTHER MATERIALS. IN ALL CASES, BUYER'S SOLE AND EXCLUSIVE REMEDY AND BT'S SOLE OBLIGATION FOR ANY BREACH OF THE WARRANTIES CONTAINED HEREIN SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT F.O.B. SHIPPING POINT, AS BT IN ITS SOLE DISCRETION SHALL DETERMINE. BT SHALL IN NO EVENT AND UNDER NO CIRCUMSTANCES BE LIABLE OR RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, PUNITIVE, DIRECT OR SPECIAL DAMAGES BASED UPON BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT LIABILITY OR OTHERWISE OR ANY OTHER LEGAL THEORY, ARISING DIRECTLY OR INDIRECTLY FROM THE SALE, USE, INSTALLATION OR FAILURE OF ANY PRODUCT ACQUIRED BY BUYER FROM BT.

All claims for shortages, defects, and non-conforming goods must be made by the customer in writing within five (5) days of receipt of merchandise, which writing shall state with particularity all material facts concerning the claim then known to the customer. Upon any such claim, the customer shall hold the goods complained of intact and duly protected, for a period of up to sixty (60) days. Upon the request of BT, the customer shall ship such allegedly non-conforming or defective goods, freight prepaid to BT for examination by BT's inspection department and verification of the defect. BT, at its option, will either repair, replace or issue a credit for products determined to be defective. BT's liability and responsibility for defective products is specifically limited to the defective item or to credit towards the original billing. All such replacements by BT shall be made free of charge f.o.b. the delivery point called for in the original order. Products for which replacement has been made under the provisions of this clause shall become the property of BT. Under no circumstances are products to be returned to BT without BT's prior written authorization. BT reserves the right to scrap any unauthorized returns on a no-credit basis. Any actions for breach of a contract of sale between BT and a customer must be commenced by the customer within thirteen (13) months after the cause of action has accrued. A copy of BT's standard terms and conditions of sale, including the limited warranty, is available from BT upon request. Copies of the limited warranties covering third-party proprietary sub-assembly modules and private-label products manufactured by third-parties are also available from BT on request. DigiCipher ® is a registered trademark of Motorola Corp. (Rev 0509)



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