BLONDER TONGUE
LABORATORIES, INC.

INSTRUCTION MANUAL

C UL US
LISTED

QT-Series

QAM Transcoder

Model	Stock No.	Description
QTM	6231	QAM Transcoder Module
QTM-HD	6241	QAM Transcoder Module, High Definition
QTM-HD PLUS	6242	QAM, Transcoder Module, High Definition Plus
QTPCM	6232/6232B	QT Power Supply & Control Module
QTRC	6233	QAM Transcoder Rack Chassis
QTRA-8	6230	QAM Transcoder Rack Assembly (Contains 8 QTM and a QTPCM in a QTRC)
QTRA-8 & RFCS	6229	QAM Transcoder Rack Assembly (Contains 8 QTM and a QTPCM in a QTRC with a QTRFCS)

Accessories

Model	Stock No.	Description
QTRFCS	6234	QT RF Combiner and Splitter (Contains QTRFC, 6234-1 and QTRFS, 6234-2)
QTRFCS-2	6225	QTRFC Combiner and Splitter with 2 Input Splitter (Contains QTRFC, 6234-1 and QTRFS, 6225-2)
BFP-19-IV	3988	1.75" Vented Blank Panel
QTSPS	6239/6239B	QT Standby Power Supply with Headend Fan
HDA-16-860-16	6240-16	Headend Distribution Amplifier (with 16 dB Gain, 16 Ports)
HDA-8-860-20	6240-08	Headend Distribution Amplifier (with 20 dB Gain, 8 Ports)
QC-HSK	2720	QCentral Remote Monitoring and Control Software
QTHF	6235	Headend Fan
HWS	2727	Headend Web Server

MADE IN USA

651210400E

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

Purchase Location Name:	
Purchase Location Telephone Number:	
Transcoder Digital Address:	

The lightning flash with arrowhead symbol within an equilateral triangle 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 persons.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

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.
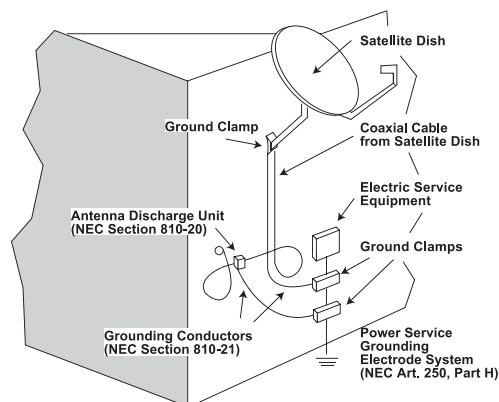
Safety Instructions

WARNING!

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 transcoder.

➥ Retain all safety and operating instructions for future reference.

➥ Heed all warnings on the transcoder and in the safety and operating instructions.

➥ Follow all installation, operating, and use instructions.

➥ Unplug the transcoder from the AC power outlet before cleaning. Use only a damp cloth for cleaning the exterior of the transcoder.

➥ 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 transcoder in high-humidity areas, or expose it to water or moisture.

➥ Do not place the transcoder on an unstable cart, stand, tripod, bracket, or table. The transcoder may fall, causing serious personal injury and damage to the transcoder. Install the transcoder only in a mounting rack designed for 19" rack-mounted equipment.

➥ Do not block or cover slots and openings in the transcoder. These are provided for ventilation and protection from overheating. Never place the transcoder near or over a radiator or heat register. Do not place the transcoder in an enclosure such as a cabinet without proper ventilation. Do not mount equipment in the rack space directly above or below the transcoder.

➥ Operate the transcoder using only the type of power source indicated on the marking label. Unplug the transcoder power cord by gripping the plug, not the cord.

➥ The transcoder 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:

Safety Instructions - continued

➡ We strongly recommend using an outlet that contains surge suppression or ground fault protection. For added protection during a lightning storm, or when the transcoder is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the lines between the transcoder 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 transcoder 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 transcoder 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 transcoder 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 transcoder;

❏ The transcoder has been exposed to rain or water;

❏ The transcoder has been dropped or the chassis has been damaged;

❏ The transcoder 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 transcoder or cause electrical shock or fire, and will void the warranty.

➡ Upon completion of any service or repair to the transcoder, ask the service technician to perform safety checks to ensure that the transcoder 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.

Introduction

The QT Series is a Modular QPSK to QAM Transcoder supporting up to eight QAM Transcoder Modules, interfaced with a Power & Control Module housed in a specially designed 3RU chassis.

The unit transcodes any 24-36 MHz wide QPSK modulated satellite signal to a 6 MHz wide QAM modulated IF signal and translates it to any CATV RF channel assignment in the 54-864 MHz frequency band.

The QT Series features a back-lit LCD display with front panel accessible push button controls providing access to all vital unit information, facilitating easy set-up and troubleshooting.

Interfacing the QT with Blonder Tongue's QCentral computer software or HWS provides off-site, remote operation and control including digital adjustment of the QAM RF output level.

Features

- Modular Design Allows One to Eight QAM Transcoder Modules in Three Rack Spaces
- Fully Agile Output Frequency Range of 54-864 MHz (CATV Ch. 2-135)
- Fully Agile Input Transponder Frequency Range of 950-2150 MHz
- Provides HDTV Quality Using QTM-HD Modules
- Flash Memory Integrated for Easy Firmware Upgrades
- Convenient Level Setting and Adjustment with CW Mode Capability
- Valuable QPSK SNR Data to Facilitate Easy Antenna Peaking
- Hot Swappable Transcoder Modules
- Back-Lit LCD Display Panel with Front Panel Accessible Push Button Controls Provides Access to All Vital Unit Information and Makes Set-Up and Troubleshooting a Breeze
- Off-Site Remote Operation and Control Including Digital Adjustment of the QAM RF Output Level with High Performance QCentral Computer Software Internet Connection
- QTM-HD Plus Provides QAM 1024 Capability
- HWS Provides Remote Operation and Control over an Internet Connection

The Unit

Front Panel - QT

1. **Unit Status Indicator -** Provides feedback to user based on the following LED conditions:
   - a) Solid Green ON - Indicates valid QPSK and QAM lock
   - b) Flash ON/OFF - QAM signal is in OFF or CW mode
   - c) Flash 1x, 2x or 3x and Pause OFF - Indicates possible upconverter problem, or possible problem with power cable
   - d) Flash 4x and Pause OFF - Indicates possible QAM modulator problem, check input transponder frequency and data rate to correct (check to make sure in "Auto Mode")

2. **Backlit LCD -** 8 character, 2 line Liquid Crystal Display screen used to interact with user to display unit information.

3. **Push Button Navigation Controls -** Buttons used to navigate between menus and enter unit information.

Rear Panel - QT
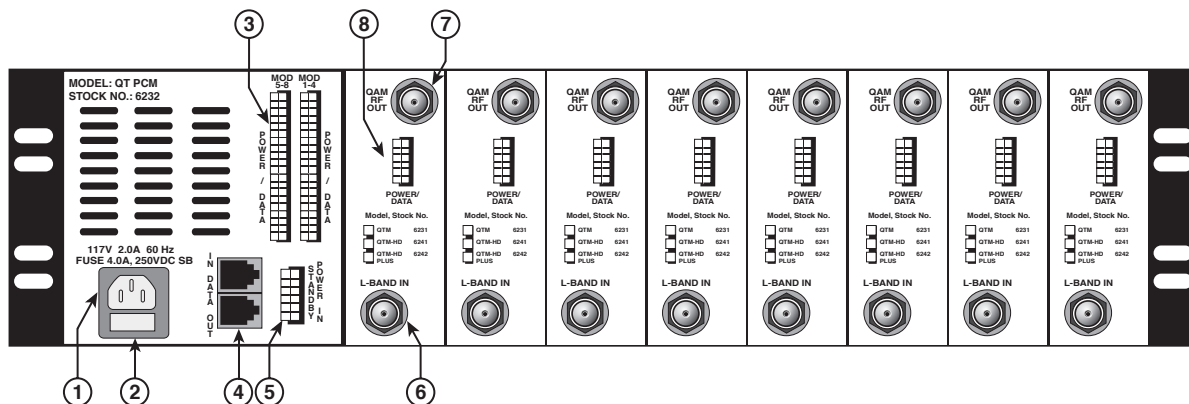
1. **Power Cord Socket -** The unit power cord plug socket.

2. **Fuse Holder -** 4.0 Amp., 250V DC, Slo Blo fuse.

3. **Module Power/Data Cables -** 2 cable sets with a 12-pin male connector used to deliver power and data to each QT unit.

4. **RS232 Serial Data Ports -** Used to plug into and daisy chain QT units for remote monitoring and configuration.

5. **Power IN -** 12-pin female connector used to plug-in the optional Standby Power unit for redundant support.

6. **QPSK L-Band Input -** Independent 75 Ohm RF connector for feeding appropriate QPSK L-Band satellite input signal.

7. **QAM RF Output -** Independent 75 Ohm QAM RF Output.

8. **Power/Data -** 12-pin female connector used to plug-in cable for respective module to deliver power and data.

Drawings are samples for illustration purposes only and are not to scale

Specifications

Technical Specifications For QTM and QTM-HD

Satellite QPSK Input

Input Frequency Range: Agile 950-2150 MHz

QPSK Bandwidth: Up to 36 MHz

Frequency Step: 1 MHz

Capture Range: ±5 MHz

Input Level Range: -65 to -20 dBm

RF Input Impedance: 75 Ohm

Return Loss: 8 dB min.

FEC Decoding: DVB, DigiCipher® Upgradable

Symbol Rate: 2 to 45 Msps

Code Rate: Viterbi Auto Recognition

I - Q Format: Normal / Inverted

8PSK & QPSK Turbo for QTM-HD

QAM Output

Output Frequency Range: Agile 54-864 MHz

Channel Range: CATV Ch. 2-135

QAM Bandwidth: 6 MHz

Output Level: +40 dBmV

Display Error: ±2 dB

Output Level Adjustable Range: 30-40 dBmV

Modulation Mode QTM:
   16, 32, 64, 128, 256 QAM
   (8PSK, QPSK Turbo & 256 QAM Capable with QTM-HD only)

Symbol Rate: 1 Msps to 6.9 Msps

Spectral Inversion: Auto Recognition

Carrier Suppression: 45 dB

Roll Off: 12, 15, 18 %

QAM SNR: >40 dB

MER

   QTM: 38 to 42 dB
   QTM-HD: 40 to 43 dB

RF Output Impedance: 75 Ohm

Spurious: -60 dBc

Broadband Noise:
   -75 dBc min. (4 MHz BW @40 dBmV Output)

Phase Noise
   QTM-HD @ 10 kHz: -97 dBc
   QTM @ 10 kHz: -90 dBc

Frequency Stability: ± 10 kHz

QAM I/Q Phase Error: <1 Degree

I/Q Amplitude Imbalance: <1 %

Controls and Indicators

PCM
   Computer Control:
      2 RJ11 Rear Panel RS232 Connectors
      Backlit Liquid Crystal Display (LCD)
      5 Navigation/Enter Push Buttons

QTM, QTM-HD
   Unit Status Indicator: 1 Green LED Per Module

Technical Specifications For QTM and QTRA-8

Mechanical

Chassis Dimensions: 5.25 x 19.0 x 12 inches

QTM Dimensions: 5.25 x 10.625 x 1.5 inches

Mounting: Standard EIA Unit Height 5.25" x 19" Wide Rack Mount

QTM Unit Weight: 1.7 lbs

QTRA-8 Weight: 28 lbs

QTM Power

Requirement: 100 to 265 VAC, 1A

Frequency: 50 to 60 Hz

Power Consumption (QTM + PCM)

QTM's:	1	2	3	4	5	6	7	8
Watts:	17	28	40	52	64	75	86	98

Fuse: 4 Amp, 250 VDC, SB

QTM-HD Power

Requirement: 100 to 265 VAC, 1A

Frequency: 50 to 60 Hz

Power Consumption (QTM-HD & PCM)

QTM-HD:	1	2	3	4	5	6	7	8
Watts:	20	31	42	55	68	82	94	107

QTM-HD PLUS Power

Requirement: 100 to 265 VAC, 1A

Frequency: 50 to 60 Hz

Power Consumption (QTM-HD PLUS & PCM PLUS)

QTM-HD PLUS:	1	2	3	4	5	6	7	8
Watts:	20	31	42	55	68	82	94	107

Environmental

Operating Temperature: 0 to 50 °C

Storage Temperature: -20 to 70 °C

Humidity: 0 to 90 % RH

Technical Specifications For QTRFCS

RF Combiner - (Stock No. 6234-1)

Inputs: 8
Outputs: 1

Insertion Loss
   54-500 MHz: 9.7 dB
   500-860 MHz: 10.7 dB

Isolation Between Ports 1-4: 30 dB
Isolation Between Ports 5-8: 45 dB
Isolation Between Group 1-4 to Group 5-8; 45 dB

Input Return Loss: 23 dB

Output Return Loss: 23 dB

RF L-Band Splitter - (Stock No. 6234-2)

Input: 1
Outputs: 8

Insertion Loss
   950-1750 MHz: 13.5 dB
   1750-2050 MHz: 14.5 dB

Isolation Between Any Combination of Input Ports
   (1-8): 20 dB

Input Return Loss: 16 dB

Output Return Loss: 16 dB

2 Input L-Band Splitter - (Stock No. 6225-2)

Inputs: 2
Output: 4 per Input

Insertion Loss:
   950-1750 MHz: 8.5 dB
   1750-2050 MHz: 9 dB

Isolation Between Ports (1-4) (5-8): 20 dB

Mechanical

QTRFC (WxHxD): 14.39 x 1.5 x 2.91 inches
QTRFS (WxHxD): 9.69 x 1.52 x 2.92 inches

Technical Specifications For QTPCM

Electrical Output Connectors to QTPCM

Output Voltage	6232 Current Max.	6232B Current Max.
+5 VDC	5.5 A	7.0 A
+10 VDC	3.0 A	3.0 A
+2.9 VDC	0.12 A	0.12 A
+3.3 VDC	8.5 A	10.0 A

Environmental

Operating Temperature: 0 to 50 °C

Storage Temperature: -20 to 70 °C

Humidity: 0 to 90 % RH

Mechanical

Dimensions (WxHxD): 19.0 x 1.75 x 14.5 inches

Weight: 6.5 lbs.

Technical Specifications for Headend Web Server

Programming Capabilities

IP Addressing Modes: Fixed or DHCP

Front Panel Settable User Name & Password

Front Panel Settable Headend Name

HTTP Web Browser Interface Requires No Additional Software

Mechanical

Dimensions: 10.0 x 19.0 x 1.75 inches

Weight: 4 lbs.

Mounting: Standard EIA Unit Height
               10.0" x 19" Wide Rack Mount

Controls & Connectors

Front Panel:
   Backlit Liquid Crystal Display (LCD)
   5 Navigation/Enter Push Buttons
   3 Green Ethernet Status LEDs

Rear Panel Serial Ports:
   RS 232, RJ-11 Port for Connection QT Headend
   RS 232, RJ-11 Port for Firmware Upgrade Only

Rear Panel Ethernet Port: RJ-45

Physical Layer: 10BaseT RJ-45 WAN/LAN Ethernet Port

Media Access and Link Layers: Per IEEE 802.3 (Ethernet)

AC Power

Voltage: 117 ± 10% VAC

Frequency: 60 Hz

Power Consumption: 2W

Fuse: 0.25A

Environmental

Operating Temperature Range: 0 to 50°C

Storage Temperature Range: -20 to 70°C

Humidity: 0 to 90 % RH

Installing the Transcoder

Installing the Transcoder in a Rack

Mounting

The transcoder chassis is 5.25 inches tall, 19 inches wide, and 12 inches deep.

You can mount the transcoder in a standard EIA, 24 inch (610 mm) deep, enclosed rack. Secure the transcoder chassis front panel to the rack by inserting four machine screws, with cup washers, through the four mounting holes in the front panel.

IMPORTANT!

DO NOT block the unit's ventilation holes.

When installing one or more QT units in a headend rack, it is recommended to leave a 1 rack unit space (1.75" high) between units to maximize air flow, but it is not required. This space helps to reduce heat build-up in a headend rack and will help to extend the product life span.

WARNING!

For safe and reliable operation, the transcoder requires a proper ground connection for the third prong of the transcoder power cord plug

Optional Remote Monitoring & Control

QCentral Remote Monitoring & Control Software

An optional Remote Monitoring & Control Software package (QCentral) is available from Blonder Tongue. This custom software application is designed to be used for the ability to monitor and configure a Transcoder headend. The software is a program that can be used locally in the direct connect mode via a null modem cable or remotely in the dial out mode using an external RS-232 serial modem at the headend and the remote site.

- The software features a user friendly graphical interface and is compatible with widely available Windows® based computers.

- The software allows the operator to create a unique file for each independent transcoder headend. The operator can then access the software to monitor, control and configure the units.

- The QAM output signal can be remotely turned off allowing the operator the ability to "remotely heal" a problem transcoder channel by shutting it down and activating a spare transcoder. The transponder signal from the problem transcoder can be activated on the spare and the output QAM signal placed on the previous output channel within the unit range.

- A QCentral Headend Starter Kit is available which includes all of the hardware interconnect components needed for a QT Headend to directly connect and control the headend. The external modem is purchased separately. The Starter Kit can be ordered from Blonder Tongue as Stock No. 2720.

- Single Unit Software Licenses are provided free of charge. They can be obtained by sending the complete unit address (found in the Advanced Interactive Sequence, see Operating Instructions, Level 4) via email to: qcentral@blondertongue.com

Headend Web Server (HWS)

The Headend Web Server (HWS) from Blonder Tongue allows an operator the means to remotely access a QAM Transcoder Series headend from anywhere in the world using a web browser over the Internet without requiring any additional software to be installed. The HWS is an add-on hardware based solution housed in a single height, rack mountable unit. It features a built-in web server that hosts software just like the QCentral software to communicate to the QT headend.

Just like the original QCentral software, the HWS is a valuable addition so that an operator can quickly and painlessly get real time information from a remote headend location to troubleshoot and even fix a field failure from the business office or anywhere any internet connection is available. The easy to use interface provides many functions, such as display and control of the input transponder frequency, the output channel, digital signal level, the signal to noise ratio as well as the ability to remotely turn off the QAM signal and turn on a hot spare unit. We have built in many advanced features such as DHCP or static IP support as well as 2 levels of password control including read/write and read only access modes.

The Headend Web Server is the perfect tool for the QAM Transcoder digital headend. It offer's the ultimate customer service solution for remote and unmanned headend locations with it's user activated capability to "remotely diagnose and heal a field problem" and eliminating the need for a costly truck roll or lengthy downtime. Contact Blonder Tongue today to get your Headend Web Server for the QT Series.

QAM Signal Level Testing

This section describes the preferred method for measuring and setting the QAM output level of the unit. It requires the ability to output a CW (carrier wave) QAM signal.

QAM Signal Level in CW Mode

The CW QAM signal is used to provide the true equivalent signal level for the QAM carrier. The QT Series is capable of supplying the output QAM signal in CW mode. This simplifies the level measurement process dramatically because the level does not need to be adjusted for the limitation in analyzer bandwidth settings. After setting the appropriate level in CW mode, the modular transcoder is changed back to normal mode.

Any meter that can measure CW Carrier Power Level can be used. The CW Carrier Level is equal to the QAM Power Level that will be presented in normal mode.
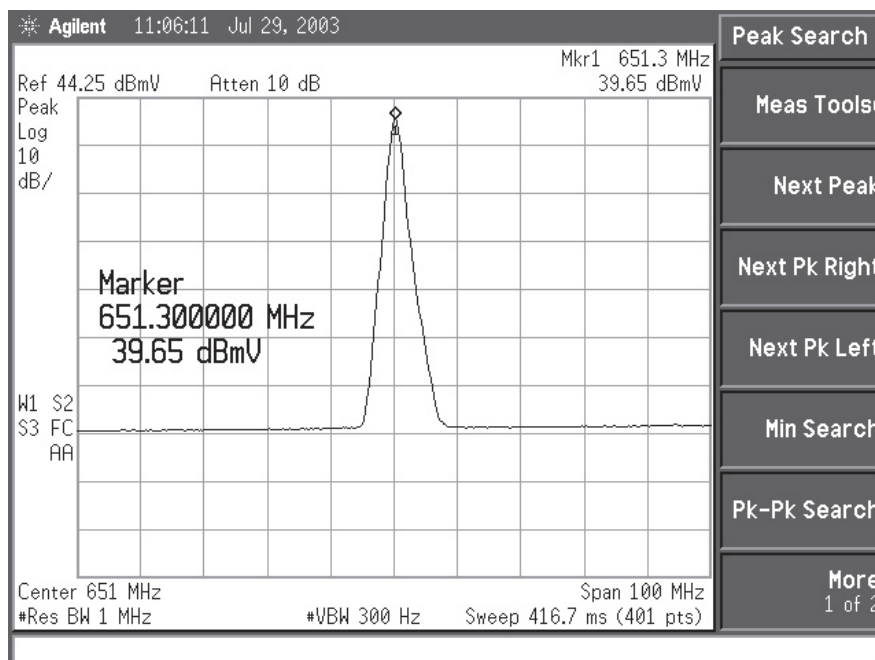
Mechanical Assembly

The Modules

The QT consists of 3 core modules.

QTPCM - QT Power & Control Module

QTM - QT QAM Transcoder Module

QTRC - QT Rack Chassis

QT Rack Chassis

Front

Rear

QT - Power Supply & Control Module (QTPCM)

Front

Front
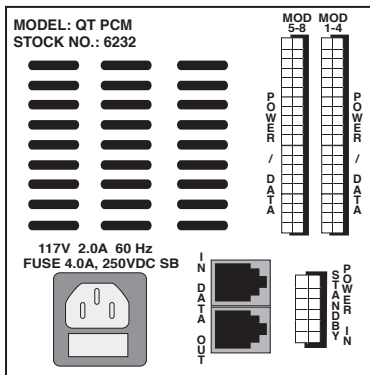
Rear
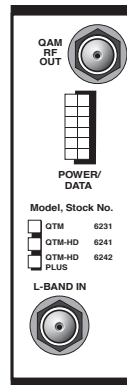
QTM/QTM-HD - QAM Transcoder Module

Drawings are samples for illustration purposes only and are not to scale

Installing the Modules in the Chassis

The following are the recommended instructions for installation of the modules in a chassis:

1. Mount the QTPCM module in the chassis by gently sliding it into position on the far right most position of the chassis (facing the front).

2. Tighten the front and rear retaining screw to secure the module in place.
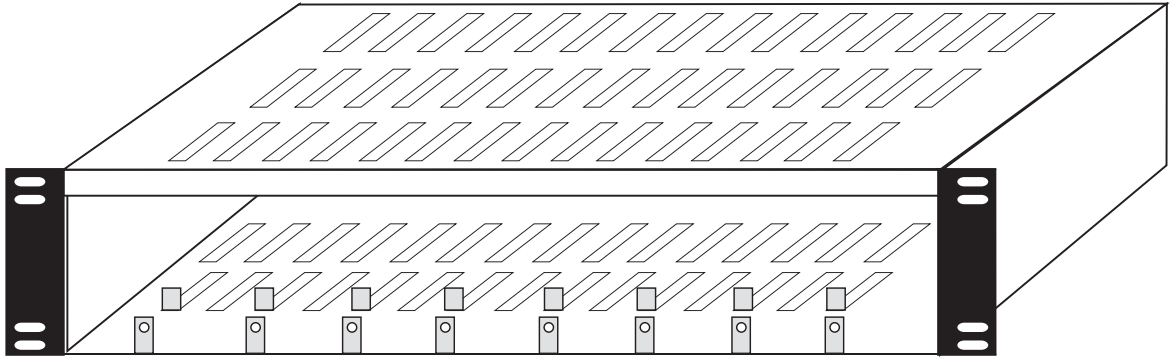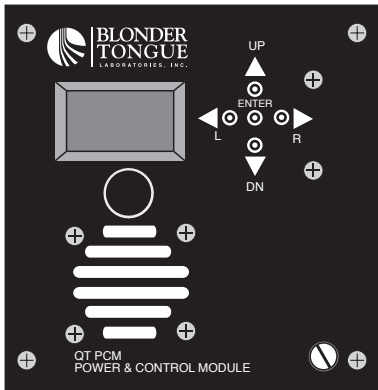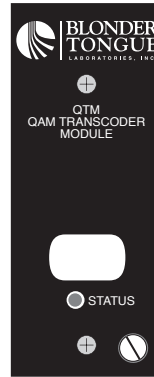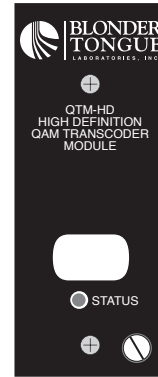
3. Mount all of the appropriate QT modules in the same manner.

4. Install the QTRFCS Combiner/Splitter. If the QTRFCS is not installed, you must install it.

5. Wire the appropriate L-Band input coaxial cables to the QT Modules "QPSK IN L-Band" F connector.

6. Wire the output of each module from the "QAM RF OUT" F connector to the appropriate combining device.

7. Insert the appropriate power/data cables into the QTPCM 50-pin female connectors labeled "MOD 1-4 and MOD 5-8 POWER/DATA".

   ➢ NOTE: Make sure the QTPCM connectors are secure

8. Slightly loosen rear retaining screw on QTPCM and Module #8 (nearest to QTPCM). Slide the cable wire bracket down over the power/data cables (see example below. The cable wire bracket is provided to secure the cable harness in place). Position the cover notches under the retaining screws and tighten screws.

9. Connect the 12-pin power/data cables labeled module 1 to 8 from the QTPCM to the particular transcoder module to the female 50-pin connector labeled "MOD 1-4 and MOD 5-8 POWER/DATA".

➢ NOTE: Make sure the appropriately labeled cable is connected to the corresponding module. This is done to ensure that the correct module is displayed by the LCD and is actually being communicated with correctly. Keep in mind that the modules are numbered 1 to 8 from left to right on the front and will then be housed 1 to 8 from right to left on the rear.

10. Connect the 12-pin power/cable from the standby power unit to the "Power In" connector of the QTPCM if applicable. The standby power unit can be mounted in the rack or in any easily accessible location.

   ➢ NOTE: You must connect A/C power to the QTPCM before you connect power from the standby power unit to prevent the unit from immediately going to standby power mode.

11. Connect the A/C power cord to the QTPCM.

QT - Module Loading Front View

Cable Wire Bracket
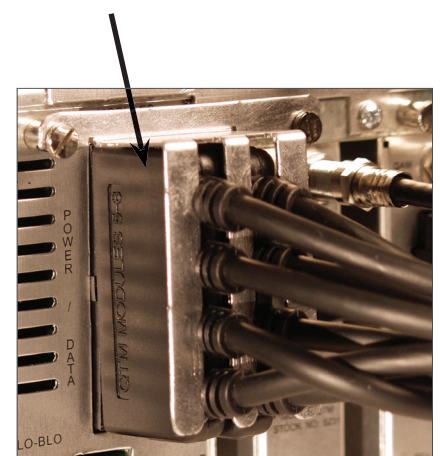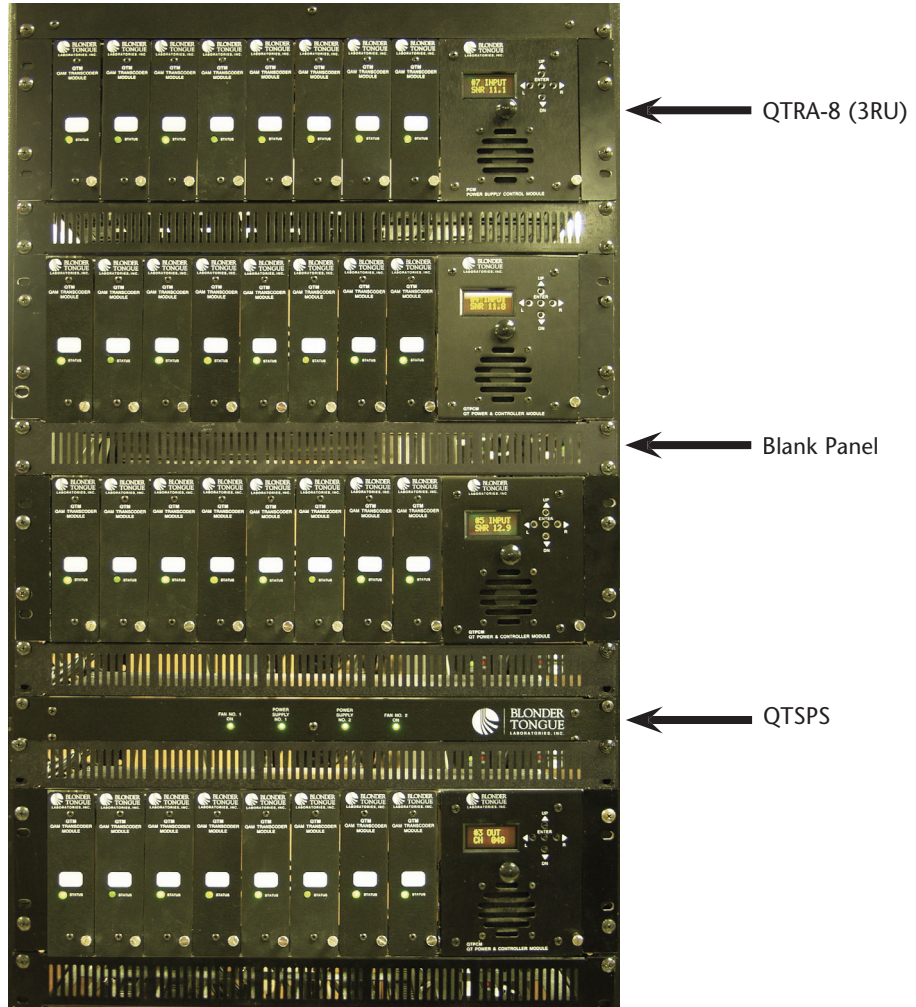
32 Transcoder Fully Populated QT Front View

QTRA-8 (3RU)

Blank Panel

QTSPS

8 QAM Channel Combined

Combiner

Modules 5-8

Modules 1-4

L-Band Splitter
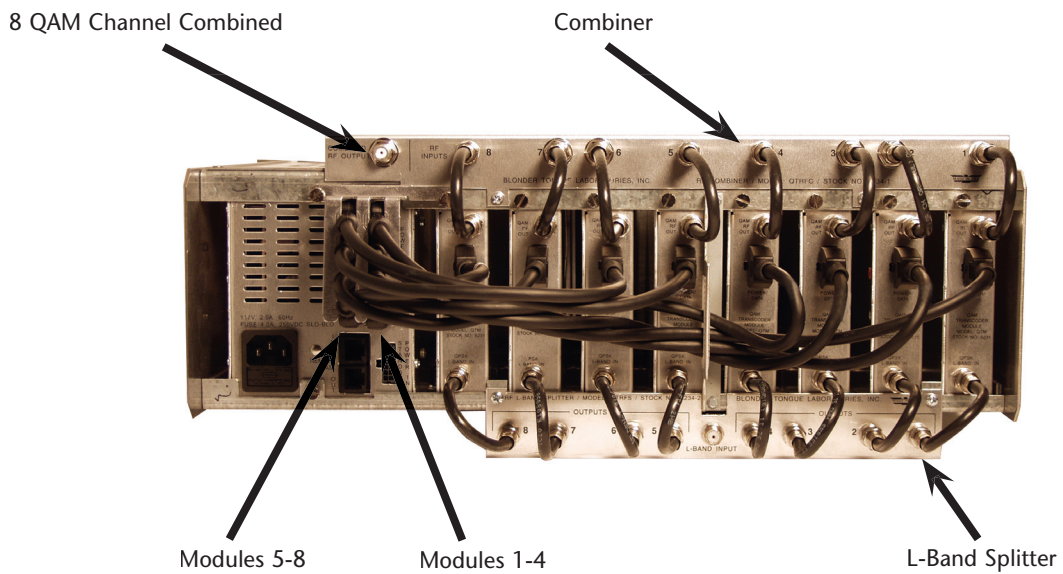
Fully Populated QT Rear View

QAM Transcoder Module Programming Recommendations

The following information is provided as a reference to permit optimum performance of the QAM transcoder headend.

- DVB 64 & 128 QAM Signals occupy a bandwidth of up to 5.75 MHz
- DVB 256 QAM Signals occupy a bandwidth of up to 6.43 MHz
- A Standard CATV channel bandwidth is 6.0 MHz
- It is recommended to not insert high definition signals that use 256 QAM adjacent to other 256 QAM high definition signals.
- It is recommended to alternate 64 QAM or 128 QAM signals with 256 QAM signals.

64 or 128 QAM
Up to 5.75 MHz BW

256 QAM
Up to 6.43 MHz BW

256 QAM   256 QAM

Signal Overlap Can Occur
with Adjacent 256 Signals

64/ 128
QAM

256
QAM

64/ 128
QAM

256
QAM

It is recommended to Alternate 256 QAM & 64 or 128 QAM Carriers
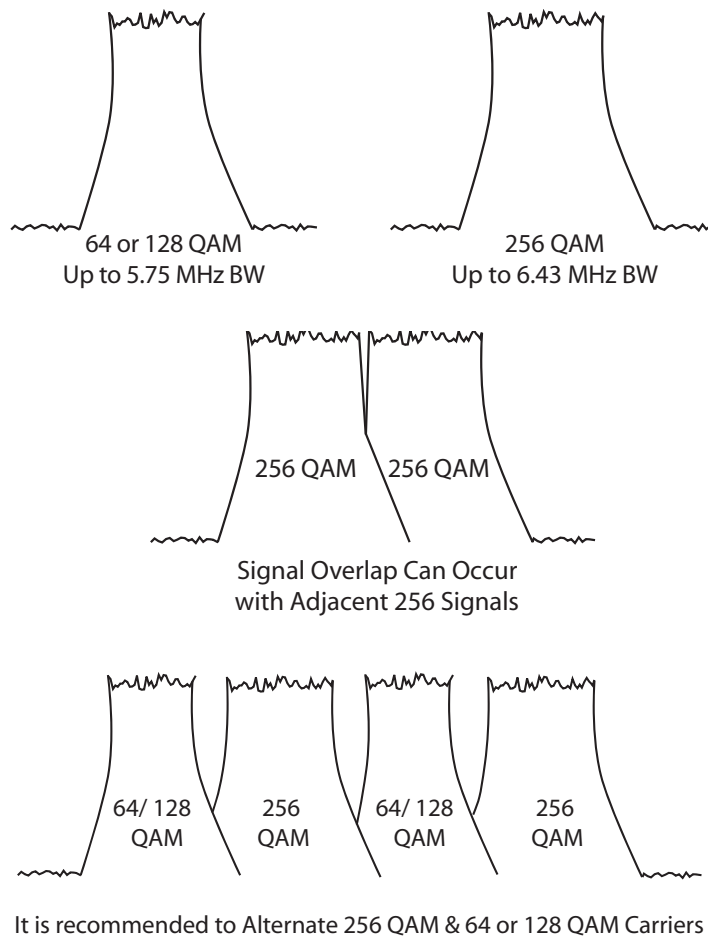
- Placing 256 QAM carriers adjacent to other 256 QAM signals will cause an approximate 3 dB MER degradation of the signal.

QAM Transcoder Power Supply Usage Recommendations

It is recommended to only use a maximum of 6 QTM-HD and/or QTM-HD Plus modules with a QTPCM # 6232 in a single rack unit.

A QTPCM Plus # 6232B is recommended when 6 to 8 QTM-HD and/or QTM-HD Plus modules are used in a single rack unit.

Replacing a QAM Transcoder Module

The following are the recommended instructions for replacing a QAM Transcoder Module (QTM, QTM-HD, or QTM-HD Plus) while the complete unit is operating:

1. Disconnect the 12-pin power/data cable from the QT Module.
2. Disconnect the RF coaxial cables.
3. Physically remove the QT module from the chassis by loosening the thumbscrew located on the front panel and the retaining screw on the rear.
4. Physically replace the new QT module in the chassis and tighten rear and front retaining screws.
5. Reconnect all RF coaxial cables. (Ensure the correct cable is wired to the input and output accordingly)
6. Reconnect the 12-pin power/data cable to the module from the QTPCM.

   ➣ NOTE: Make sure the appropriately labeled cable is connected to the corresponding module. This is done to ensure that the correct module is displayed by the LCD and is actually being communicated with correctly. Keep in mind that the modules are numbered 1 to 8 from left to right on the front and will then be housed 1 to 8 from right to left on the rear.

When a single QT Module is replaced, the QTPCM changes the setting on the new module to match the old settings. This is intended to make a swap out as simple as possible by minimizing the need to reprogram a QT Module in a swap out condition. This change is not immediate and it may take up to 1 minute before the settings are complete.

Replacing a QTPCM

The following are the recommended instructions for replacing a Power Supply & Control Module (QTPCM):

1. Remove the standby power cable from the Power In port, if applicable.
2. Remove the A/C power from the QTPCM.
3. Loosen the rear retaining screw and remove the cable wire bracket.
4. Remove the 50-pin power/data cables from the QTPCM.
5. Loosen the front panel retaining thumbscrews.
6. Remove the module from the chassis.
7. Physically replace the new QTPCM in the chassis.
8. Tighten the rear and front retaining screws to secure the module in place.
9. Reconnect the 50-pin power/data cables to the new QTPCM.

   ➣ NOTE: Make sure the appropriately labeled cable is connected to the corresponding module. This is done to ensure that the correct module is displayed by the LCD and is actually being communicated with correctly. Keep in mind that the modules are numbered 1 to 8 from left to right on the front and will then be housed 1 to 8 from right to left on the rear.

10. Connect the A/C power cord to the QTPCM.
    The unit will now reboot. The QTPCM will read the programming information from each QT Module and overwrite its own information from each respective QT Module and display the information accordingly on the LCD. This is designed to make a swap out as simple as possible by minimizing the need to reprogram a QTPCM in a swap out condition. After this installation, a user may reprogram any variable if desired.

11. Reconnect Standby Power after boot-up, if applicable.

QT - Operating Interface Instructions

Introduction

The Blonder Tongue QT Transcoder series uses an easy to read Back-lit LCD (liquid crystal display) and push button switches to control and monitor the QT Modules.

The following information describes the LCD methodology and approach. It is broken down into 4 levels of menu interaction described below.
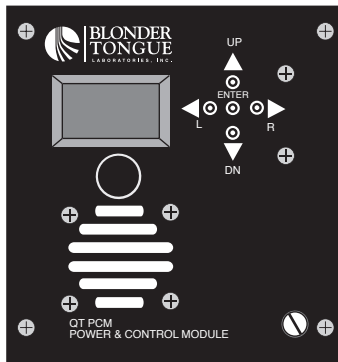
QT - LCD & Front Panel Navigation Controls

Level 1 - Boot-Up Display Sequence

When the unit is first plugged in for use, the QTPCM interrogates the potential transcoder connections and displays the appropriate module condition on the LCD readout as depicted below.
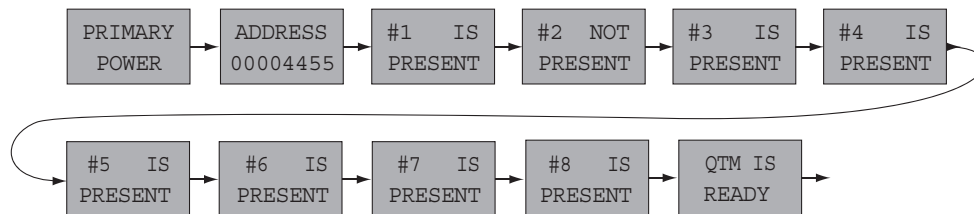
QT - Boot-Up Display Sequence

1. Each control module has a unique module address that is set at the factory which is displayed first after the power type. This address is used for remote software capability.

2. Each QAM transcoder module status is identified and reported on the LCD. If a module is identified it is listed as present or not present if not connected.

   It is during this cycle that the control module is determining the programming status of each module. Basically, the control module determines if the programming information of the module or it's own is to be used. This is designed to make module swaps as simple as possible.
   (See the previous section on replacing a module for details.)

3. Upon completion of the boot-up sequence the QT is ready for use and will proceed to the loop display sequence.

CAUTION	DO NOT push any switches on the control module during this sequence as it will NOT respond until it displays "QTM IS READY".

Level 2 - **Loop Display Sequence**

After the unit has displayed the boot-up sequence it proceeds to the loop sequence. In this mode the LCD displays the actual module status as depicted by the diagram below. This is referred to as the loop sequence because this information is constantly displayed in a scrolling fashion on the LCD readout. The loop sequence may be interrupted at any time by pressing the any of the arrow keys. The diagram is broken up into 8 rows to reflect the eight respective modules that can populate the rack chassis.

```
┌──────────┐   ┌──────────┐   ┌──────────┐
│ #1 INPUT │ → │ #1   OUT │ → │ #1 INPUT │
│ SNR 15.0 │   │ CH   111 │   │ 974  MHz │
└──────────┘   └──────────┘   └──────────┘

┌──────────┐
│ #2   NOT │
│ PRESENT  │
└──────────┘

┌──────────┐   ┌──────────┐   ┌──────────┐
│ #3 INPUT │ → │ #3   OUT │ → │ #3 INPUT │
│ NOT LOCK │   │ CH   112 │   │ 1563 MHz │
└──────────┘   └──────────┘   └──────────┘

┌──────────┐   ┌──────────┐   ┌──────────┐
│ #4 INPUT │ → │ #4   OUT │ → │ #4 INPUT │
│ SNR 13.6 │   │ CH   113 │   │ 1003 MHz │
└──────────┘   └──────────┘   └──────────┘

┌──────────┐   ┌──────────┐   ┌──────────┐
│ #5 INPUT │ → │ #5 OUT   │ → │ #5 INPUT │
│ SNR 14.2 │   │ CH   115 │   │ 1592 MHz │
└──────────┘   └──────────┘   └──────────┘

┌──────────┐   ┌──────────┐   ┌──────────┐
│ #6 INPUT │ → │ #6   OUT │ → │ #6 INPUT │
│ SNR 12.8 │   │ CH   119 │   │ 1032 MHz │
└──────────┘   └──────────┘   └──────────┘

┌──────────┐   ┌──────────┐   ┌──────────┐
│ #7 INPUT │ → │ #7   OUT │ → │ #7 INPUT │
│ SNR 14.0 │   │ CH   120 │   │ 1061 MHz │
└──────────┘   └──────────┘   └──────────┘

┌──────────┐   ┌──────────┐   ┌──────────┐
│ #8 INPUT │ → │ 8   OUT  │ → │ #8 INPUT │
│ SNR 12.2 │   │ CH   122 │   │ 1651 MHz │
└──────────┘   └──────────┘   └──────────┘
```
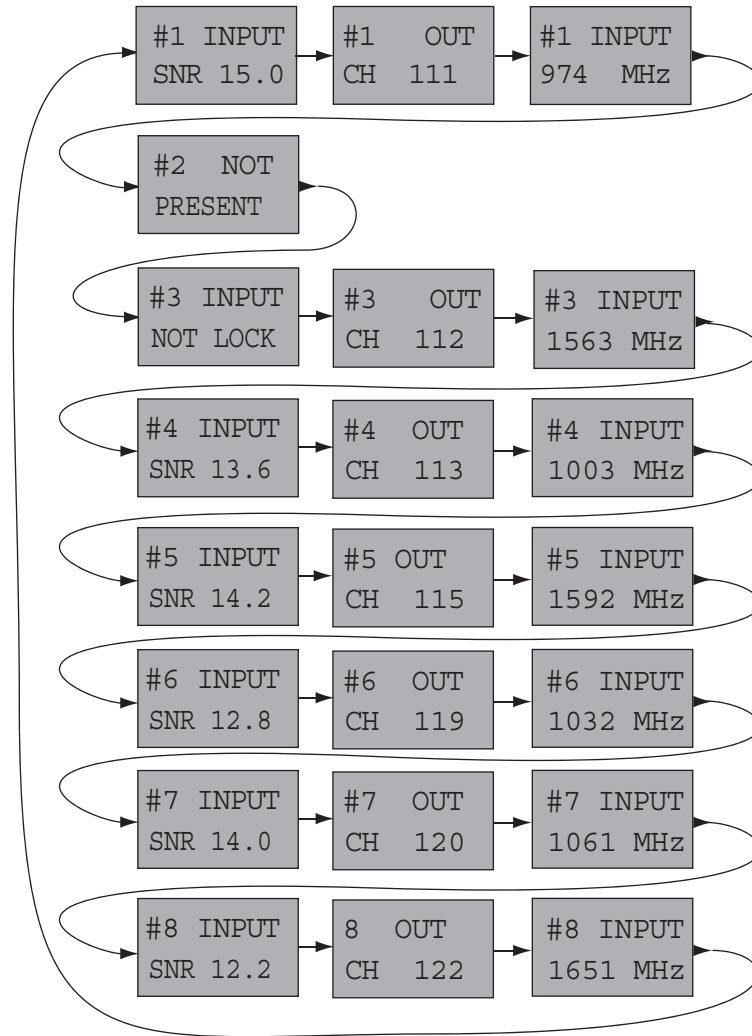
QT - Loop Display Sequence

1. The top row displays the status for module 1. The following rows display the status information for the remaining modules.

2. The first column displays the SNR Input status of the respective module.

   If a valid Input signal lock is achieved, the readout will display the estimated Input SNR in dB.
   If a module is not detected the readout will display the respective module as Not Present.
   If a Input Lock is not achieved, but the module is present, the readout will display Input Not Lock.

3. Column 2 indicates the output channel information for the respective module.

4. Column 3 indicates the input L-Band frequency information for the respective module.

Level 3 - Main Interactive Sequence

The main interactive sequence is where all the core module programming is performed. This sequence is accessed anytime a user depresses one of the ◄ (L) or ►(R) arrow navigation keys. The following diagram depicts the LCD screens available in the main interactive sequence. The diagram is broken up into rows and columns. The rows are intended to reflect the respective module information. The last 2 rows (below the dashed line) display the Input signal information for each module. Each of the variables in the first eight rows are user adjustable and the information in the last 2 rows is for display only. The Input signal status information is grouped together to allow the user to get a quick snapshot of all of the modules without requiring the need to scroll through all the module information.

#1 OUT CH 110	#1 INPUT 974 MHz	#1 LEVEL 40 dBmV	#1 QAM NORMAL
#2 OUT CH 111	#2 INPUT 1265 MHz	#2 LEVEL 40 dBmV	#2 QAM NORMAL
#3 OUT CH 112	#3 INPUT 1563 MHz	#3 LEVEL 40 dBmV	#3 QAM CW
#4 OUT CH 113	#4 INPUT 1003 MHz	#4 LEVEL 40 dBmV	#4 QAM OFF
#5 OUT CH 115	#5 INPUT 1592 MHz	#5 LEVEL 40 dBmV	#5 QAM NORMAL
#6 OUT CH 119	6 INPUT 1032 MHz	#6 LEVEL 40 dBmV	#6 QAM NORMAL
#7 OUT CH 120	#7 INPUT 1061 MHz	#7 LEVEL 40 dBmV	#7 QAM CW
#8 OUT CH 123	8 INPUT 1651 MHz	#8 LEVEL 40 dBmV	#8 QAM OFF
#1 INPUT SNR 12.2	#2 INPUT SNR 14.3	#3 INPUT NOT LOCK	#4 NOT PRESENT
#5 INPUT SNR 12.2	#6 INPUT SNR 14.3	#7 INPUT NOT LOCK	#8 NOT PRESENT

QT - Main Interactive Sequence

Interactive Sequence Logic

Accessing this sequence can be achieved at any time by depressing the ◄ (L) or ►(R) arrow navigation buttons. The user may scroll through the menu screens in either direction at any time to reach a desired variable.

1. Each time the unit is turned on and a user depresses the right arrow navigation button for the first time, the unit will default to # 1 OUT variable. Pushing the left arrow navigation button will present the # 8 Input module information.

2. If no interaction is made to the navigation buttons for approximately 10 seconds, the unit will return to the loop sequence. Depressing the left or right arrow navigation again will return the user to the next or previous location in the sequence.
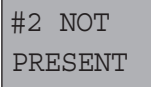
Programming a Variable

1. When a user arrives at a screen whose variable needs to be changed, the user depresses the ENTER button until the blinking cursor is displayed.

2. After the blinking cursor is displayed the user simply presses the ▲ (UP) or ▼ (DN) arrow buttons to increment or decrement to the appropriate desired value.

3. When the user reaches the desired setting the ENTER button is pressed again to save the change. The control module then programs the corresponding transcoder module to the new information.

4. The QT displays an affirmative response after information is entered correctly. The controller will display the "Entry Accepted" response as demonstrated below.

```
ENTRY
ACCEPTED
```

Entry Accepted
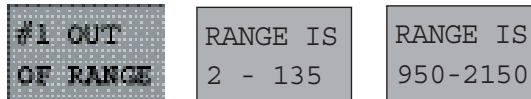
5. Entries can be made to the controller for all eight modules, even if not all modules are installed. The controller will display module "Not Present" response if the module is not installed.

```
#2 NOT
PRESENT
```

Module Not Present

6. The QT Series also displays a response to inform the user if an incorrect entry has been made, such as an entry out of the programmed range. The controller does not accept this information and forces the user to re-enter the correct information.

```
#1 OUT        RANGE IS      RANGE IS
OF RANGE      2 - 135       950-2150
```

Out of Range

QAM Modes

Column four depicted in the Main Interactive Sequence represents the QAM Mode. The unit has five QAM modes.

NORMAL: The normal QAM mode outputs a 6 MHz QAM modulated signal.

OFF: The off QAM mode outputs no signal from the module.
(When a module is placed in the QAM OFF Mode, the STATUS LED indicator will blink).

CW: The CW QAM mode outputs a CW signal that is very useful for measuring the output level of the transcoder. (See the QAM Signal Level Testing section for more detail). (When a module is placed in the QAM CW Mode, the STATUS LED indicator will blink).

CW ALL: Puts all QT modules installed in rack chassis into CW mode for ease of level adjustment.

NORMAL ALL: Puts all QT modules installed in rack chassis into normal QAM mode.

Output Level

The QT Transcoder Series features electronic output level control for each of the QAM transcoder modules.

The output level can be adjusted in any of the QAM modes listed above.

The output level is displayed and measured as an average value.
(See the QAM Signal Level Testing section for more detail).

The output level range is 30 dBmV to 40 dBmV.

The output level for a QAM CW is a true representation of a QAM signal level.

➢ NOTE: For optimum noise performance, output level for each module should be set nominally at +40 dBmV.

Level 4 - Advanced Interactive Sequence

The advanced interactive menu is easily accessible by depressing the ▲ (UP) or ▼ (DN) arrow keys on the front of the control module. The user may scroll through the menu screens depicted by continuing to press the up and down navigation keys.

CAUTION

Extreme caution should be used when modifying a variable in this sequence. These variables are generally not changed and may cause the unit to stop functioning properly.
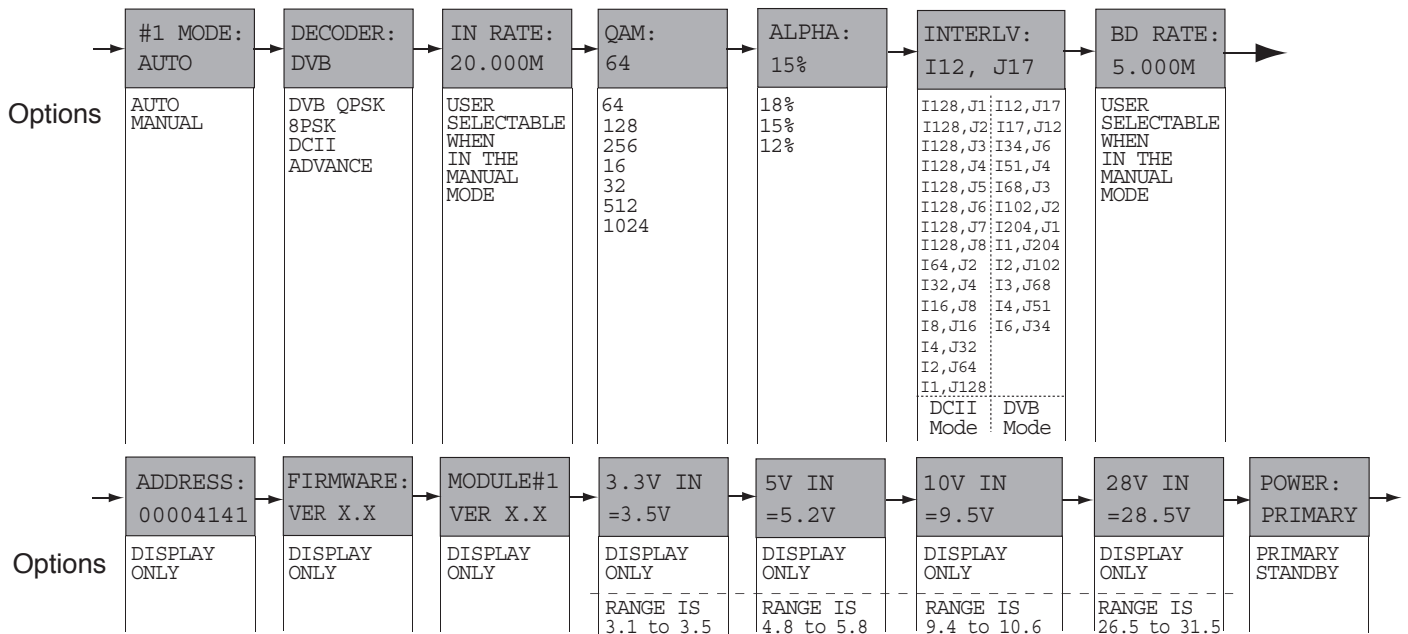
Changing an Advanced Interactive Variable

1. To protect the programming information, a user must first remove the unit from the 'AUTO MODE' and place it into the 'MANUAL MODE'. This ensures a small measure of protection from erroneous changes to the advanced lower level functions of the unit.

2. Once changed to the Manual Mode, any of the available advanced interactive variables can be changed. The available options are generally automatically displayed after the enter key is depressed by scrolling up and down with the cursor. Depressing enter again invokes the change and displays an affirmative response from the unit.

3. To change primary/standby power, the unit must be in the 'MANUAL MODE'.

Several variables are listed as display only variables, such as illustrated below.

Options

#1 MODE: AUTO	DECODER: DVB	IN RATE: 20.000M	QAM: 64	ALPHA: 15%	INTERLV: I12, J17	BD RATE: 5.000M
AUTO MANUAL	DVB QPSK 8PSK DCII ADVANCE	USER SELECTABLE WHEN IN THE MANUAL MODE	64 128 256 16 32 512 1024	18% 15% 12%	I128,J1 I12,J17 I128,J2 I17,J12 I128,J3 I34,J6 I128,J4 I51,J4 I128,J5 I68,J3 I128,J6 I102,J2 I128,J7 I204,J1 I128,J8 I1,J204 I64,J2 I2,J102 I32,J4 I3,J68 I16,J8 I4,J51 I8,J16 I6,J34 I4,J32 I2,J64 I1,J128 DCII Mode DVB Mode	USER SELECTABLE WHEN IN THE MANUAL MODE

Options

ADDRESS: 00004141	FIRMWARE: VER X.X	MODULE#1 VER X.X	3.3V IN =3.5V	5V IN =5.2V	10V IN =9.5V	28V IN =28.5V	POWER: PRIMARY
DISPLAY ONLY	DISPLAY ONLY	DISPLAY ONLY	DISPLAY ONLY RANGE IS 3.1 to 3.5	DISPLAY ONLY RANGE IS 4.8 to 5.8	DISPLAY ONLY RANGE IS 9.4 to 10.6	DISPLAY ONLY RANGE IS 26.5 to 31.5	PRIMARY STANDBY

➣ NOTE: A. When the QT module is set to the Auto Mode, the transcoder will automatically detect the input stream and the LCD will show the correct decoder mode and baud rate.

B. The Decoder Mode consists of four different modes, DVB QPSK, 8PSK, DCII, and Advance (QPSK Turbo). The QTM-HD and QTM-HD Plus can be set to all of the modes, however, the QTM can only be set to the DVB QPSK and DC II modes.

QT - LCD Advanced Interactive Variable Sequence

Factory Reset

The unit has a "Factory Reset" capability built in that allows a user to erase all the current programming information for the QTPCM and restore it to it's factory default setting.

To perform this function, press and hold the ▼ (UP) and ▼ (DN) arrow navigation keys simultaneously until the LCD displays "Factory Reset" and then release. This will cause the unit to reset the programmed information to the factory default setting show below.

FACTORY
RESET

Factory Reset

CAUTION

This will reset all programming information for all eight modules and is only recommended when an error condition is displayed by the LCD that can not be corrected by a normal power cycle!

The following are the default factory settings the unit will reset to:

# 1 OUT CH 101 # 1 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV	# 2 OUT CH 102 # 2 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV	# 3 OUT CH 103 # 3 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV	# 4 OUT CH 104 # 4 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV
# 5 OUT CH 105 # 5 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV	# 6 OUT CH 106 # 6 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV	# 7 OUT CH 107 # 7 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV	# 8 OUT CH 108 # 8 INPUT 974 MHz QAM: NORMAL LEVEL: 40 dBmV
MODE: AUTO DECODER: DVB IN RATE: 20.000 M QAM: 128 ALPHA: 15% INTERLV: I12, J17 BD RATE: 4.761M POWER: PRIMARY			

Troubleshooting Table

Failure Condition	Check
LCD Not On	Verify unit is plugged in Verify fuse
LCD Indicates Module Not Present, but Module Installed	Verify 12-pin power/data cable connected Verify correct power/data cable connected to module Verify voltages in advanced menu sequence
No Lock Indication	Verify input L-Band input signal level (-65 to -25 dBm) Verify correct satellite feed Verify L-Band feed wired to bottom connector of QT Module Verify correct input transponder programmed Verify correct decoding mode Verify auto mode
LED Conditions 1) Not On 2) Flash On/Off 3) Flash 4x On & Pause 4) Flash 1x, 2x or 3x & Pause	Verify 12-pin Power/Data cable connected QAM mode is OFF QAM mode in CW Indicates QAM Modulator Problem Check Transponder Frequency & Data Rate Indicates Upconverter Problem Indicates 29V Line Power Supply Problem Indicates Problem with power cable
Unit Locked w/QAM No Video on Set-top	Verify input transponder frequency Verify output channel Verify output cable wired from top connector of QT Module Verify output cable wired to appropriate combining device Perform scan on set-top, if available
If LCD Shows "Check Cable"	Check for loose wiring harness on the back Replace cable harness
If LCD Indicates "Standby Power" But, Standby Power Not Installed	Check for the DC voltage range from the LCD panel. If out of range, change QTPCM
If LCD Shows "No Data"	Not a failed condition. Either no module is present or harness is not connected.

➤ NOTE: For headend configuration and level adjustments, refer to Appendix C Block Diagrams.

Appendix A

CATV Channel Frequency Chart
54 MHz to 864 MHz

EIA Chan.	MHz Center Frequency	EIA Chan.	MHz Center Frequency	EIA Chan.	MHz Center Frequency
2	57	41	327	85	591
3	63	42	333	86	597
4	69	43	339	87	603
5	79	44	345	88	609
6	85	45	351	89	615
95	93	46	357	90	621
96	99	47	363	91	627
97	105	48	369	92	633
98	111	49	375	93	639
99	117	50	381	94	645
14	123	51	387	100	651
15	129	52	393	101	657
16	135	53	399	102	663
17	141	54	405	103	669
18	147	55	411	104	675
19	153	56	417	105	681
20	159	57	423	106	687
21	165	58	429	107	693
22	171	59	435	108	699
7	177	60	441	109	705
8	183	61	447	110	711
9	189	62	453	111	717
10	195	63	459	112	723
11	201	64	465	113	729
12	207	65	471	114	735
13	213	66	477	115	741
23	219	67	483	116	747
24	225	68	489	117	753
25	231	69	495	118	759
26	237	70	501	119	765
27	243	71	507	120	771
28	249	72	513	121	777
29	255	73	519	122	783
30	261	74	525	123	789
31	267	75	531	124	795
32	273	76	537	125	801
33	279	77	543	126	807
34	285	78	549	127	813
35	291	79	555	128	819
36	297	80	561	129	825
37	303	81	567	130	831
38	309	82	573	131	837
39	315	83	579	132	843
40	321	84	585	133	849
				134	855
				135	861

Appendix A

DishPro LNBF Transponder Frequencies
DBS Satellites – 61.5°, 110°, 119°, 148°, 157°

RHC Polarization LO = 11.25 GHz			LHC Polarization, Spectrally Inverted LO = 14.35 GHz		
Xponder#	L-Band Freq (MHz)	Ku-Band Freq (MHz)	Xponder#	L-Band Freq (MHz)	Ku-Band Freq (MHz)
1	974.00	12224.00	2	2111.42	12238.58
3	1003.16	12253.16	4	2082.26	12267.74
5	1032.32	12282.32	6	2053.10	12296.90
7	1061.48	12311.48	8	2023.94	12326.06
9	1090.64	12340.64	10	1994.78	12355.22
11	1119.80	12369.80	12	1965.62	12384.38
13	1148.96	12398.96	14	1936.46	12413.54
15	1178.12	12428.12	16	1907.30	12442.70
17	1207.28	12457.28	18	1878.14	12471.86
19	1236.44	12486.44	20	1848.98	12501.02
21	1265.60	12515.60	22	1819.82	12530.18
23	1294.76	12544.76	24	1790.66	12559.34
25	1323.92	12573.92	26	1761.50	12588.50
27	1353.08	12603.08	28	1732.34	12617.66
29	1382.24	12632.24	30	1703.18	12646.82
31	1411.40	12661.40	32	1674.02	12675.98

Band-Stacked 32 Transponder Frequency Chart – 121° Satellite
Band-Stacked FSS Dual Transponder Frequencies

VL Polarization LO = 10.75 GHz			HL Polarization, Spectrally Inverted LO = 13.85 GHz		
Xponder#	L-Band Freq (MHz)	Ku-Band Freq (MHz)	Xponder#	L-Band Freq (MHz)	Ku-Band Freq (MHz)
1	974.00	11724.00	2	2111.42	11738.58
3	1003.16	11753.16	4	2082.26	11767.74
5	1032.32	11782.32	6	2053.10	11796.90
7	1061.48	11811.48	8	2023.94	11826.06
9	1090.64	11840.64	10	1994.78	11855.22
11	1119.80	11869.80	12	1965.62	11884.38
13	1148.96	11898.96	14	1936.46	11913.54
15	1178.12	11928.12	16	1907.30	11942.70
17	1207.28	11957.28	18	1878.14	11971.86
19	1236.44	11986.44	20	1848.98	12001.02
21	1265.60	12015.60	22	1819.82	12030.18
23	1294.76	12044.76	24	1790.66	12059.34
25	1323.92	12073.92	26	1761.50	12088.50
27	1353.08	12103.08	28	1732.34	12117.66
29	1382.24	12132.24	30	1703.18	12146.82
31	1411.40	12161.40	32	1674.02	12175.98

Appendix A

Band-Stacked 24 Transponder Frequency Chart – 105° Satellite
Band-Stacked FSS Dual Transponder Frequencies

VL Polarization LO = 10.75 GHz			HL Polarization, Spectrally Inverted LO = 13.85 GHz		
Xponder#	L-Band Freq (MHz)	Ku-Band Freq (MHz)	Xponder#	L-Band Freq (MHz)	Ku-Band Freq (MHz)
1	970.00	11720.00	2	2110.00	11740.00
3	1010.00	11760.00	4	2070.00	11780.00
5	1050.00	11780.00	6	2030.00	11820.00
7	1090.00	11840.00	8	1990.00	11860.00
9	1130.00	11880.00	10	1950.00	11900.00
11	1170.00	11920.00	12	1910.00	11940.00
13	1210.00	11960.00	14	1870.00	11980.00
15	1250.00	12000.00	16	1830.00	12020.00
17	1290.00	12040.00	18	1790.00	12060.00
19	1330.00	12080.00	20	1750.00	12100.00
21	1370.00	12120.00	22	1710.00	12140.00
23	1410.00	12160.00	24	1670.00	12180.00

Appendix B

ECHOSTAR DishNetwork Application Example — 750 MHz System

Dish Pro Stacked & Legacy LNB Frequencies (MHz)

Transponders from 110° W, 119° W, 121° W & 148° W

	Satellite & Transponder	Legacy Frequency	Dish Pro Stacked Frequency	Output Channel	Center Frequency
QT Rack # 1	119 # 11	1120	1120	116	747
	119 # 13	1149	1149	115	741
	119 # 15	1178	1178	114	735
	119 # 17	1207	1207	113	729
	119 # 19	1236	1236	112	723
	119 # 21	1257	1257	111	717
	119 # 2	989	2111	110	711
	119 # 4	1018	2082	109	705
QT Rack # 2	119 # 6	1047	2053	108	699
	119 # 8	1076	2024	107	693
	119 # 10	1105	1995	106	687
	119 # 12	1134	1966	105	681
	119 # 14	1164	1936	104	675
	119 # 16	1193	1907	103	669
	119 # 18	1222	1878	102	663
	Spare Transcoder Slot				
	Spare Transcoder Slot				
QT Rack # 3	121 # 5	1032	1032	101	657
	121 # 15	1178	1178	100	651
	121 # 17	1207	1207	99	645
	121 # 21	1266	1266	98	639
	121 # 23	1295	1295	97	633
	121 # 27	1353	1353	96	627
	Spare Transcoder Slot				
QT Rack # 4	121 # 4	1018	2082	95	621
	121 # 6	1047	2053	94	615
	121 # 16	1193	1907	93	609
	121 # 20	1251	1849	92	603
	121 # 26	1339	1762	91	597
	Spare Transcoder Slot				
	Spare Transcoder Slot				
	Spare Transcoder Slot				

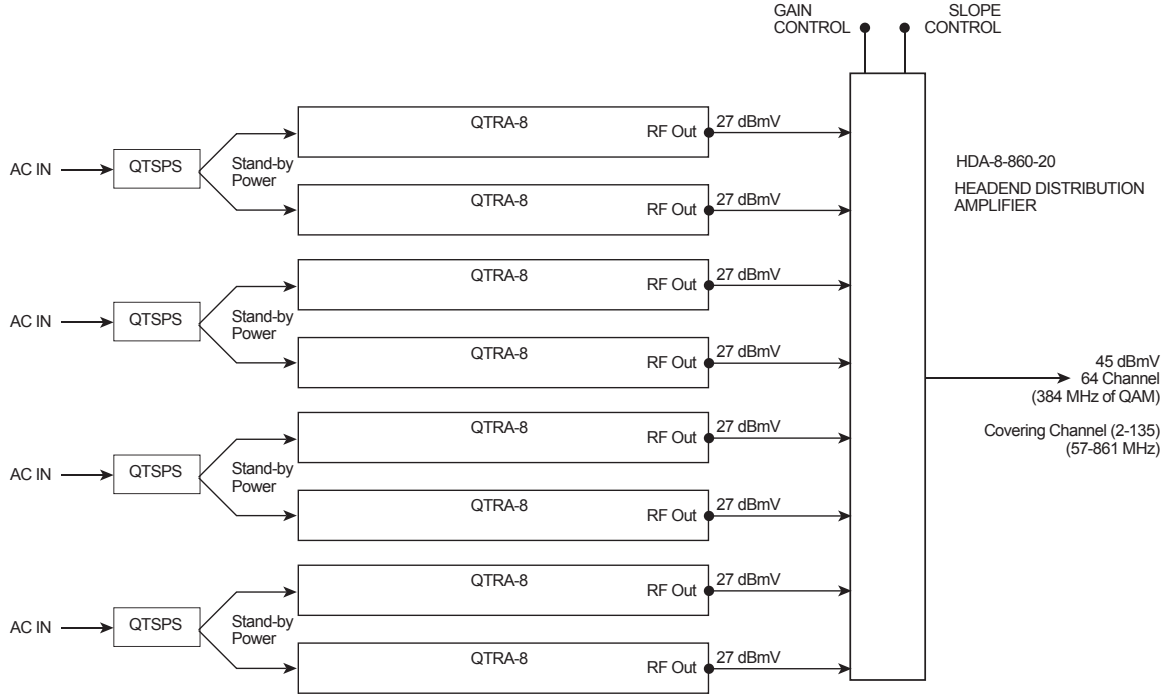|	Satellite & Transponder	Legacy Frequency	Dish Pro Stacked Frequency	Output Channel	Center Frequency
QT Rack # 5	110 # 1	974	974	90	591
	110 # 3	1003	1003	89	585
	110 # 5	1032	1032	88	579
	110 # 9	1091	1091	87	573
	110 # 11	1120	1120	86	567
	110 # 15	1178	1178	85	561
	110 # 21	1266	1266	84	555
	110 # 23	1295	1295	83	549
QT Rack # 6	110 # 25	1324	1324	82	543
	110 # 27	1353	1353	81	537
	110 # 29	1382	1382	80	531
	110 # 31	1411	1411	79	525
	110 # 10	1105	1995	78	519
	110 # 16	1193	1907	77	513
	110 # 18	1222	1878	76	507
	110 # 20	1251	1849	75	501
Rack # 7 HD	110 # 22	1280	1820	74	495
	110 # 24	1309	1791	73	489
	110 # 26	1339	1762	72	483
	110 # 7	1061	1061	71	477
	110 # 13	1149	1149	70	471
	110 # 17	1207	1207	69	465
	Spare Transcoder Slot				
	Spare Transcoder Slot				
Rack # 8 HD	148 # 1	974	974	68	459
	148 # 7	1061	1061	67	453
	148 # 9	1091	1091	66	447
	148 # 19	1236	1236	65	441
	148 # 13	1149	1149	64	435
	148 # 17	1207	1207	63	429
	148 # 31	1411	1411	62	423
	Spare Transcoder Slot				

119° Total: 15 DBS Transponders
121° Total: 11 FSS Transponders

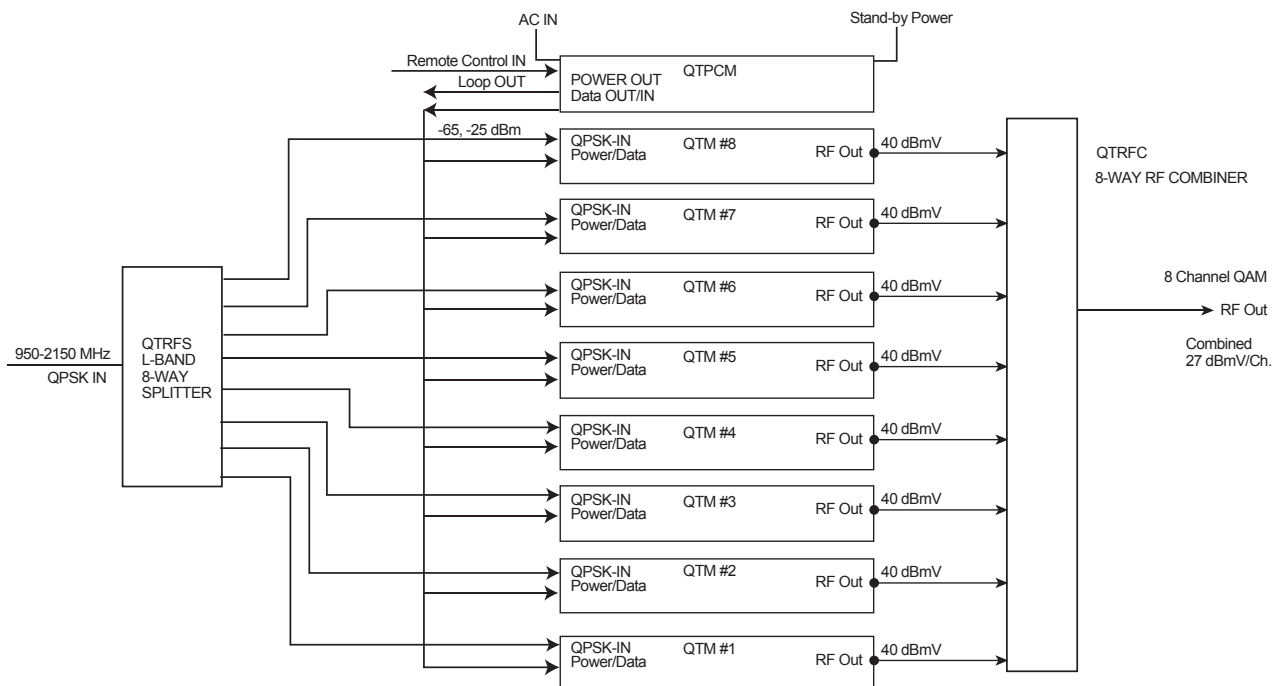110° Total: 22 DBS Transponders
148° Total: 7 DBS Transponders

55 Total Transponders
330 MHz total bandwidth

Appendix C

Block Diagram
64 QTM Transcoder Rack Assembly

GAIN CONTROL   SLOPE CONTROL

AC IN → QTSPS

Stand-by Power

QTRA-8   RF Out   27 dBmV
QTRA-8   RF Out   27 dBmV

AC IN → QTSPS

Stand-by Power

QTRA-8   RF Out   27 dBmV
QTRA-8   RF Out   27 dBmV

AC IN → QTSPS

Stand-by Power

QTRA-8   RF Out   27 dBmV
QTRA-8   RF Out   27 dBmV

AC IN → QTSPS

Stand-by Power

QTRA-8   RF Out   27 dBmV
QTRA-8   RF Out   27 dBmV

HDA-8-860-20
HEADEND DISTRIBUTION AMPLIFIER

45 dBmV
64 Channel
(384 MHz of QAM)

Covering Channel (2-135)
(57-861 MHz)

Block Diagram
QTRA-8 Detailed

AC IN   Stand-by Power

Remote Control IN

POWER OUT   QTPCM
Data OUT/IN
Loop OUT

-65, -25 dBm

QPSK-IN Power/Data   QTM #8   RF Out   40 dBmV
QPSK-IN Power/Data   QTM #7   RF Out   40 dBmV
QPSK-IN Power/Data   QTM #6   RF Out   40 dBmV
QPSK-IN Power/Data   QTM #5   RF Out   40 dBmV
QPSK-IN Power/Data   QTM #4   RF Out   40 dBmV
QPSK-IN Power/Data   QTM #3   RF Out   40 dBmV
QPSK-IN Power/Data   QTM #2   RF Out   40 dBmV
QPSK-IN Power/Data   QTM #1   RF Out   40 dBmV

950-2150 MHz
QPSK IN

QTRFS
L-BAND
8-WAY
SPLITTER

QTRFC
8-WAY RF COMBINER

8 Channel QAM
RF Out

Combined
27 dBmV/Ch.

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 products and fiber optics receivers, transmitters, couplers and integrated receivers/distribution amplifiers (including TRAILBLAZER™, RETRO-LINX™ and TWIN STAR™ products) as well as for VideoCipher® & 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 that product. The limited warranty set forth in this paragraph does apply to any product sold by BT, which at the time of sale constituted a Deal Den product, unless specified. Factory reconditioned or refurbished product warranty maybe of shorter duration as specified.

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 item ("Refurbished 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, unless specified. 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 Products. In such cases, BT's warranty for Refurbished 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 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 Products. All sales of Refurbished 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 Buyer 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 Buyer. Upon any such complaint, Buyer shall hold the goods complained of intact and duly protected, for a period of up to sixty (60) days. Upon the request of BT, Buyer shall ship such allegedly nonconforming 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 this contract must be commenced by Buyer 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 privatelabel products manufactured by third-parties are also available from BT on request. VideoCipher® & DigiCipher® are registered trademarks of Motorola Corp.