INSTRUCTION MANUAL

AQD Series

ATSC/QAM Demodulator

Model	Stock No.	Description
AQD	6245	ATSC/QAM Demodulator Module
AQD PLUS	6244	ATSC/QAM Demodulator PLUS Module (with AFD package)
AQD PLUS ASI	6244-10	ATSC/QAM Demodulator PLUS Module with Dual ASI outputs
AQD-PCM	6246	ATSC/QAM Demodulator - Power and Control Module
QTRC	6233	AQD/QAM Transcoder Rack Chassis

Accessories

AQD-RCS	2730	AQD Remote Configuration Server
AQD-SPS	6253	AQD Standby Power Supply Unit
QT-RFC	6234-1	8 Way RF Combiner / Splitter
QTHF	6235	QT/AQD Headend Fan

Assemblies

QRA-AB-X1 to X9	6251-AB-X1 to X9

Where:
A = "1" for QT-PCM; "2" for AQD-PCM; and "3" for AQT-PCM
B = "A" for Combiner only; "B" for Splitter only; and "C" for optional Combiner/Splitter assembly
X1 = Quantity of QTM-II modules
X2 = Quantity of QTM-HD modules
X3 = Quantity of QTM-HD PLUS modules
X4 = Quantity of AQD modules
X5 = Quantity of QTM-HD-NPU modules
X6 = Quantity of AQT modules
X7 = Quantity of AQD PLUS modules
X8 = Quantity of AQD PLUS ASI modules
X9 = "0" for no remote module, "1" for QT-HWS-II module, "2" for AQD-RCS module; and "3" for AQT-RCS module

Status	Date	Document No.	Issue No.	Author
Active	August 27, 2009	651217100G	7	AB
Obsolete	July 12, 2009	651217100F	6	AB
Obsolete	May 7, 2009	651217100E	5	AB
Obsolete	October 7, 2008	651217100D	4	CF

MADE IN USA

651217100G

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

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

Table of Contents

Section 1 — General & Safety Instructions

STOP	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.**

➡ Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature per Section 2.3.

➡ Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

➡ Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

➡ Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

➡ Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

➡ 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.

Safety Instructions - continued

➥ 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.

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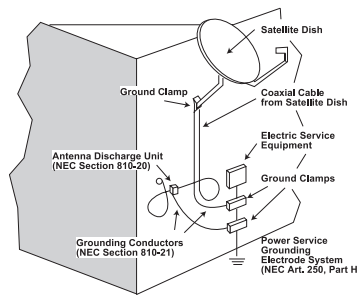
➥ We strongly recommend using an outlet that contains surge suppression or ground fault protection. For added protection during a lightning storm, or when the unit is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the lines between the unit and the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

The reason for this issue was to add the UL logo indicating that the product is now UL approved.

The reason for the previous issue was (a) to include description and features of AQD PLUS and AQD PLUS ASI modules, and (b) to reformat the document for added clarity on some of the procedures.

2.2 Product Series, Application & Description

AQD Series:

AQD module – ATSC/QAM Demodulator (AQD) receives one (1) ATSC digital input (in 8VSB, 64 QAM, or 256 QAM) and

delivers one (1) analog RF channel in the 54-856 MHz range.

AQD PLUS module: is the same as AQD, but can process the AFD codes (Active Format Description). AFD is a standard set of codes that can be included in the MPEG video stream to carry information about the picture's aspect ratio and active characteristics. It has been used by television broadcasters to enable both 4:3 & 16:9 television sets to optimally present pictures transmitted in either format. It has also been used by broadcasters to dynamically control how down-conversion equipment formats widescreen 16:9 pictures for 4:3 displays.

AQD PLUS ASI – is the same as AQD PLUS but equipped with two (2) additional ASI output streams, each stream containing the same content.

AQD PCM module – is the required power supply and control module required to power up, monitor, and control for the AQD, AQD PLUS, and AQD PLUS ASI modules.

QTRC – is the required rack chassis. It accommodates one (1) AQD PCM modules and up to eight (8) AQD/AQD PLUS/AQD PLUS ASI modules.

AQD RCS – is the optional Remote Configuration Server module. AQD RCS is not included in this instruction manual. For details, see Instruction Manual No. 651217900 series.

AQD SPS – is the optional Stand-by Power Supply. AQD SPS is not included in this instruction manual. For details, see

Instruction Manual No. 651218100 series.

AQD RFS – is the optional 8-way RF combiner and splitter. AQD SPS is not included in this instruction manual. For details, see Instruction Manual No. 651218100 series.

QTHF – is the optional Headend Fan. QTHF is not included in this instruction manual. For details, see Instruction Manual No. 651214100 series.
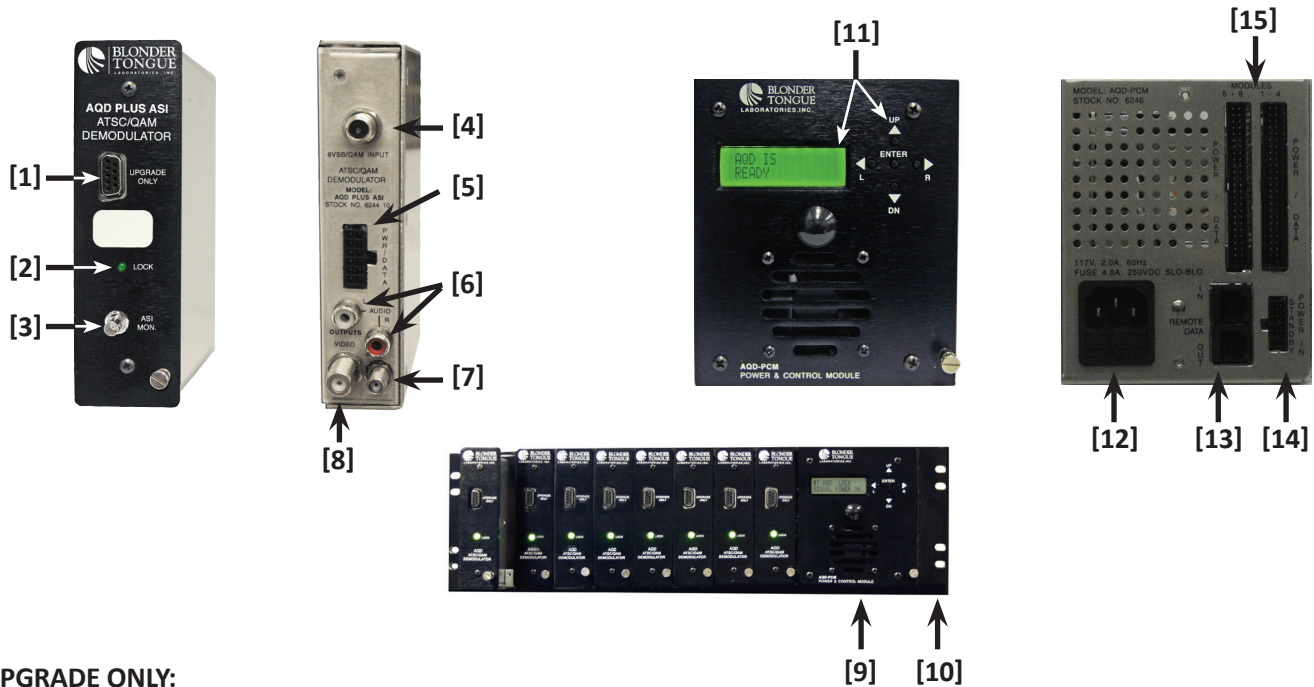
[1] UPGRADE ONLY:
a 9-pin RS-232 connector used for firmware upgrades when applicable

[2] LOCK:
provides visual information about the status of the AQD module as follows:

      i. Solid Green: Unit is locked to the RF input signal

      ii. Flashing Green: Unit cannot lock to the RF input signal, or unit is in the Scan mode

[3] ASI MONITOR (ONLY AVAILABLE ON THE AQD PLUS ASI MODEL):
provides an ASI output identical to the rear-panel ASI output (see 7 below)

[4] 8VSB/QAM INPUT:
"F" female connector for 8VSB or QAM input

[5] PWR/DATA:
10-pin connector that allows the AQD module to receive power from and to communicate with the PCM module

[6] AUDIO OUT LEFT/RIGHT:
RCA connectors providing the Left and Right audio outputs

[7] ASI (ONLY AVAILABLE ON THE AQD PLUS ASI MODEL)**:**
the primary ASI output

[8] VIDEO OUT:
"F" female connector for NTSC composite video output

[9] AQD-PCM:
the power supply and control module that can support up to eight AQD modules

[10] QTRC:
the 19"-wide, 3RU-high rack chassis

[11] 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.

[12] POWER SOCKET & FUSE:
the IEC power socket and fuse holder (4 amp, 250 VDC, Slo Blo)

[13] DATA IN/OUT:
RS232 serial data interfaces to daisy chain AQD units for remote monitoring and control when applicable

[14] STANDBY POWER IN:
12-pin female connector to receive power from the optional Standby Power unit when applicable

[15] POWER/DATA:
2 connectors, each to provide power to and to communicate with 4 AQD modules

2.3 Product Specification

Input

Connector:	"F" Female
Standards **8VSB:** **QAM:**	 ATSC Digital Television Standard A/53E ITU-T J.83 (64 and 256 QAM)
8VSB Mode **Tuning Range:** **Symbol Rate:** **Bandwidth:**	 UHF (NTSC Ch. 14-78), VHF (NTSC Ch. 2-13) 10.762 Msymbols/sec 6 MHz
QAM Mode **Tuning Range:** **Symbol Rate:** **Bandwidth:**	 CATV (NTSC Ch. 2-135) 5.3606 Msymbols/sec (QAM 256); 5.057 Msymbols/sec (QAM 64) — Auto Detect 6 MHz
8VSB Power Level: **QAM Power Level:** **Impedance:**	-20 to +20 dBmV -20 to +20 dBmV 75 Ω

Output

Connector **Video:** **Audio:**	 "F" Female RCA; Left & Right
NTSC Composite Video **Level:** **Flatness:** **Video to Noise Ratio:** **Differential Gain:** **Differential Phase:** **Format:** **Aspect Ratio:** **Closed Captioning:**	 1 Volt Peak-to-Peak 1.0 dB p/v (30 Hz to 4.2 MHz) 70 dB ± 1.0% ± 1.0 degree 480i Center Cut, Letterbox, Full, Zoom 1, Zoom 2 EIA-608
L/R Analog Audio **Level:** **Frequency Response:** **Modes:**	 1.0 to 1.2 Volt Peak-to-Peak (at -20 dBFs input) 2.0 dB p/v (30 Hz to 20 KHz) Stereo, Mono, SAP
ASI Output **(AQD PLUS ASI ONLY)** **Standard:** **No. of Streams:** **Data Bit Rate:** **Transport Stream Rate:** **Output Impedance:**	 DVB-ASI; 50083-9 Two identical streams 270 Mbps 160 Mbps (Max) 75 Ω

General

Dimensions (W x D x H) **AQD/AQD-RCS Module:** **AQD-PCM Module:** **QTRC Chassis:**	 1.5 x 11.31 x 5.25 inches (38 x 287 x 133 mm) 4.5 x 10.625 x 5.25 inches (114 x 270 x 133 mm) 19 x 12.0 x 5.25 inches (483 x 305 x 133 mm)
Power:	110 VAC/60 Hz (Fuse:1 A, 250 VDC, SloBlo)
Power Dissipation:	10 W (per AQD module)
Weight **AQD/AQD-RCS Module:** **Fully Loaded Chassis:**	 1.5 lbs (0.68 kg) 24 lbs (10.9 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-condensation
Storage Humidity:	0 to 95% RH @ 35 °C max, non-condensation

Alarms/Monitoring/Control

Indicators **AQD Module:** **AQD-RCS Module:**	 Lock (Green LED) Link/Transmit/Receive (3 x Green LEDs)
Local Monitoring: **Local Control:**	Front-panel 16-character, 2-line LCD screen Front-panel Navigational Key-pad
Remote Monitoring/Control:	GUI-based menu via Web browser (Available if the optional AQD-RCS module is installed)

Section 3 – Installation & Power-up

3.1 Unpacking

AQD & AQD PLUS modules are shipped with one (1) video/audio cable assembly.

AQD PLUS ASI modules are shipped with (i) one (1) video/audio cable assembly, and (ii) one (1) SMA connector-to-BNC connector adapter cable.

AQD PCM module is shipped with (i) one (1) power cord with IEC C13 line socket and 3-pin Type B NEMA 5 plug, (ii) one (1) cable wire bracket, and (iii) two (2) 50 pin-to-12-pin power/data cable assemblies.

3.2 Installation

The AQD/AQD PLUS/AQD PLUS ASI module is designed to be installed in QTRC (QT Rack Chassis) in a standard 19-inch (483 mm) rack (EIA 310-D, IEC 60297, and DIN 41494 SC48D).

To install the QTRC, secure its front panel to the rack by inserting four machine screws, with cup washers, through the four mounting holes in the front panel. It is recommended to leave 1 rack unit space (1RU = 1.75 inch = 44.45 mm) between each QTRC to reduce heat build-up in the rack which helps to extend the product's life span.

> ⚠ **DO NOT BLOCK THE UNIT'S AIR INTAKE OR AIR DISCHARGE OPENINGS. FOR SAFE AND RELIABLE OPERATION, THE GROUND PIN OF THE POWER CORD PLUG MUST BE GROUNDED PROPERLY.**

To install the required AQD-PCM and the AQD/AQD PLUS/AQD PLUS ASI modules in the QTRC chassis, follow the steps below:

1. Slide the AQD-PCM module in the QTRC chassis in the three slots on the right of the chassis (when facing the chassis).

2. Tighten the front and rear retaining screw to secure the module in place.

3. Install any AQD/AQD PLUS/AQD PLUS ASI modules in the QTRC chassis in the same manner.

4. Connect the desired 8VSB/QAM input to the AQD module's rear-panel F connector labeled "8VSB/QAM INPUT".

5. Connect the video output of the AQD module's rear-panel F connector marked "VIDEO OUT", and the audio output of the module's rear-panel two RCA connectors marked "AUDIO OUT LEFT/RIGHT" to an appropriate analog RF modulator.

6. Connect the power/data cables to the AQD-PCM module's rear-panel 50-pin female connectors labeled "MOD 1-4 and MOD 5-8 POWER/DATA". AQD-PCM may not be able to communicate with the AQD modules if the power/data connectors are not secured properly.

7. Slightly loosen the rear-panel retaining screw on AQD-PCM module and AQD module #8 (nearest to AQD-PCM). Slide the cable wire bracket down over the power/data cables (The cable wire bracket is provided to secure the cable harness in place – see picture below). Position the cover notches under the retaining screws and tighten screws.

Cable Wire Bracket
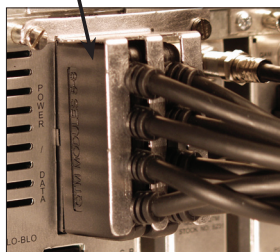
8. Connect the 12-pin end of the power/data cables, each labeled "1" to "8", to each ADQ module's rear-panel connector labeled "PWR/DATA".

> ⚠ **FOR CORRECT COMMUNICATION BETWEEN AQD-PCM AND EACH OF THE EIGHT AQD MODULES, MAKE SURE TO MATCH THE CABLE'S NUMBER TO THE AQD MODULE'S NUMBER: CABLE LABELED "1" TO AQD MODULE INSTALLED IN SLOT #1 (FARTHEST FROM THE AQD-PCM), AND CABLE LABELED "8" TO AQD MODULE INSTALLED IN SLOT #8 (NEAREST TO THE AQD-PCM).**

3.3 Power-up

STOP THE POWERING REQUIREMENT OF AQD-PCM IS 110 VAC/50 HZ ONLY.
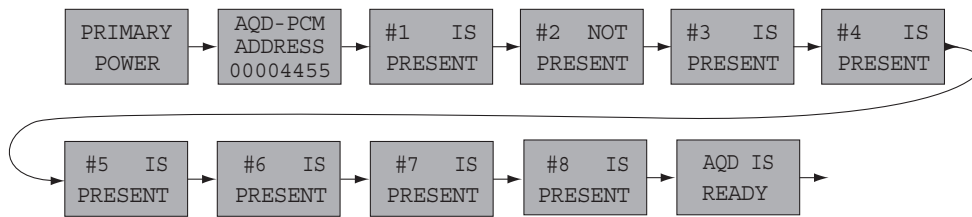
There is no power on-off switch on this unit. To turn the unit on or off, simply connect/disconnect the power cord to/from AQD-PCM. The unit is also equipped with a fuse-holder and fuse (SLO-BLO, 4.0 Amps, 250V).

If applicable, connect the 12-pin power cable from the standby power unit to AQD-PCM module's rear-panel 12-pin connector labeled "STANDBY POWER IN". The standby power unit can be mounted in the rack or in any easily accessible location.

! YOU MUST CONNECT THE PRIMARY POWER TO THE AQD-PCM BEFORE YOU CONNECT POWER FROM THE STANDBY POWER UNIT TO PREVENT AQD-PCM FROM IMMEDIATELY GOING TO STANDBY POWER MODE.

The following messages will be displayed on the LCD screen when AQD-PCM is first powered-up:

```
PRIMARY    AQD-PCM     #1   IS   #2  NOT   #3   IS   #4   IS
POWER      ADDRESS     PRESENT   PRESENT   PRESENT  PRESENT
           00004455

#5   IS    #6   IS    #7   IS   #8   IS   AQD IS
PRESENT    PRESENT    PRESENT   PRESENT   READY
```

! THE KEY-PAD REMAINS UNOPERATIONAL DURING THE POWER-UP SEQUENCE. DO NOT ADJUST ANY CONTROLS UNTIL THE SEQUENCE IS COMPLETED AND THE "AQD IS READY" MESSAGE IS DISPLAYED.

During the power-up process, AQD-PCM will communicate with each AQD module to identify and confirm its status. A "#x IS PRESENT" message is displayed if the communication is successful. A "#x AQD NOT PRESENT" message is displayed if the communication is unsuccessful or if no AQD module is installed.

3.4 Hot-swapping the AQD Module

The AQD/AQD PLUS/AQD PLUS ASI module is hot-swappable. To replace a module without powering down any other modules, follow these steps:

1. Disconnect the 12-pin power/data cable from the module.
2. Disconnect the input and output cables.
3. Loosen the thumbscrew located on the front-panel and the retaining screw on the rear-panel and remove the module from the chassis.
4. Slide the new module in the QTRC chassis and tighten the front- and rear-panel retaining screws.
5. Reconnect all input and output cables.
6. Reconnect the 12-pin power/data cable to the module from the AQD-PCM.
7. Reprogram all module interactive variables as desired.

Section 4 – Quick Configuration

4.1 General

The Quick Configuration instructions are provided as the minimum steps required to configure the unit. Please see Section 5 for Advanced Configuration.

The front-panel key-pad has five push-down buttons as follows:

The LEFT button   denoted as ◀ (L) in this document

The RIGHT button   denoted as ▶ (R) in this document

The UP button   denoted as ▲ (UP) in this document

The DOWN button   denoted as ▼ (DN) in this document

The ENTER button   denoted as **ENTER** in this document

The ◀ (L), ▶ (R) buttons are primarily used to toggle between AQD modules.

The ▲ (UP), ▼ (DN) buttons are primarily used to toggle between the parameter fields within each AQD module.

The **ENTER** button is used to initiate a parameter value change and to lock the new value after changes are made.

Using the ▲ (UP), ▼ (DN) buttons, you can toggle among the following available "parameter fields" which will be displayed on the LDC screen for each AQD module.

Section 5.1

#1 DEMOD MODE
8VSDB

For details see
section 5.1

8VSB
QAM B

▲▼

Section 5.2

#1 CHANNEL PLAN
BROADCAST

See section 5.2

BROADCAST
STANDARD CATV
HRC
IRC

▲▼

Section 5.3

#1 SCAN MENU
EXIT

See section 5.3

EXIT
YES
ALL MODULES
STATUS
STOP SCAN

▲▼

Section 5.4

#1 TUNE CHANNEL
02-1 WCBS-HD

See section 5.4

DISPLAYS
AVAILABLE
CHANNELS
FROM
SCAN

Press UP to access all
Major & Minor Channels
Press DN to Skip to
Major Channels only

Section 5.5

#1 AQD LOCK 16:9
UHF:44=653 MHz

See section 5.5

DISPLAY ONLY

▲▼

Section 5.6

#1 PICTURE SHAPE
ZOOM1   16:9

See section 5.6

LETTER BOX
FULL
ZOOM1
SMART ZOOM1
DELOT

▲▼

Section 5.7

#1 OUTPUT AUDIO
99% STEREO

See section 5.7

RANGE IS 0 to 100%

0% Mutes Audio

▲▼

Section 5.8

#1 AUDIO MODE
STEREO

See section 5.8

STEREO
MONO

▲▼

Section 5.9

#1 CC:EIA-608
ENABLE

See section 5.9

ENABLE
DISABLE

Section 5.10

#1 AQD PWR RESET
EXIT

See section 5.10

EXIT
YES
ALL MODULES

▲▼

Section 5.11

#1 MODULE
VER X PROD 4 6.3 ms

See section 5.11

DISPLAY ONLY

▲▼

Section 5.12

AQD-PCM ADDRESS
00004159

See section 5.12

DISPLAY ONLY

▲▼

Section 5.13

AQD-PCM
FIRMWARE XV:X 2.12

See section 5.13

DISPLAY ONLY

▲▼

Section 5.14

3.3VIN
3.5V

See section 5.14

DISPLAY ONLY

RANGE IS 3.1 TO 3.6

Section 5.15

6VIN
6.2V

See section 5.15

DISPLAY ONLY

RANGE IS 5.5 TO 6.5

▲▼

Section 5.16

10VIN
9.5V

See section 5.16

DISPLAY ONLY

RANGE IS 9.4 TO 10.8

▲▼

Section 5.17

29VIN
=28.5V

See section 5.17

DISPLAY ONLY

RANGE IS 26.0 TO 31.5

▲▼

Section 5.18

POWER STATUS
PRIMARY

See section 5.18

PRIMARY
STANDBY

▲▼

Section 5.19

AFD MENU

See section 5.19

NEED AQD PLUS

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

⚠ **ALL CONFIGURABLE PARAMETERS CAN BE RESET TO THE FACTORY DEFAULT VALUE BY PRESSING SIMULTANEOUSLY AND HOLDING THE UP AND DN BUTTONS FOR APPROXIMATELY 10 SECONDS.**

⚠ **AFTER A POWER CYCLE, I.E. UTILITY POWER LOSS AND RECOVERY, ALL CONFIGURABLE VALUES WILL REVERT BACK TO THE LAST PROGRAMMED VALUE AND THE UNIT WILL POWER-UP WITH THE SAME VALUES AS BEFORE THE POWER CYCLE.**

4.2 Quick Configuration

The following steps provide the minimum requirements necessary to configure each AQD module. Please see Section 5 for Advanced Configuration.

(1) Measure the RF input level to make sure the input signal is within the -20 to +20 dBmV acquisition range of the unit. The recommended input signal level is -10 to +10 dBmV.

(2) Select the appropriate "DEMOD MODE" (8VSB or QAM) – see Section 5.1 for procedures.

(3) Select the appropriate "CHANNEL PLAN" (Broadcast, Standard CATV, HRC, or IRC) – see Section 5.2 for procedures.

(4) Perform a SCAN – see Section 5.3 for procedures.

> ⚠ **A SCAN MUST BE PERFORMED EACH TIME THE "DEMOD MODE" IS CHANGED.**
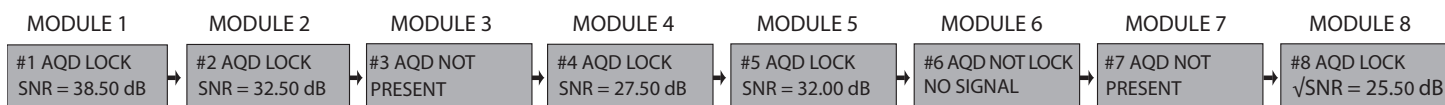
(5) Select the desired program via the "TUNE CH" menu - see Section 5.4 for procedures.

> ⚠ **THE OPTIMUM OUTPUT SIGNAL-TO-NOISE RATIO (SNR) IS ACHIEVED BY SETTING THE OUTPUT LEVEL TO 60 DBMV. IF SYSTEM REQUIRES A LOWER LEVEL, THEN ATTENUATE THE LEVEL EXTERNALLY.**

4.3 Loop Sequence

After the initial sequence is completed, the unit AQD-PCM proceeds to the loop sequence. In this mode, the LCD displays the status of the AQD modules present as shown below. This is referred to as the loop sequence because the information displayed on the LCD scrolls from one AQD module to the other, in a loop. The loop sequence may be interrupted at any time by pressing any of UP/DOWN buttons.

MODULE 1	MODULE 2	MODULE 3	MODULE 4	MODULE 5	MODULE 6	MODULE 7	MODULE 8
#1 AQD LOCK SNR = 38.50 dB	#2 AQD LOCK SNR = 32.50 dB	#3 AQD NOT PRESENT	#4 AQD LOCK SNR = 27.50 dB	#5 AQD LOCK SNR = 32.00 dB	#6 AQD NOT LOCK NO SIGNAL	#7 AQD NOT PRESENT	#8 AQD LOCK √SNR = 25.50 dB

The SNR (Signal-to-Noise Ratio) value displayed on the is expressed in dB. The following are the recommended input SNR values for the appropriate signal modulation type:

Quality of Video	8VSB modulation	QAM 64 modulation	QAM 256 modulation
Excellent	Greater than 30 dB	Greater than 38 dB	Greater than 38 dB
Good	25 to 30 dB	30 to 38 dB	35 to 38 dB
Marginal	18 to 25 dB	23 to 30 dB	30 to 35 dB
Non-functional	Below 18 dB	Below 23 dB	Below 30 dB

The following error messages may appear during the loop sequence:

- NO PROGRAM - will be displayed if a valid lock is acquired but no program signal is detected.
- NO SIGNAL - indicates that the input signal was not detected (no RF input).
- PLEASE SCAN - indicates a scan was not performed or is required again.
- AUDIO ONLY - indicates no video signal is detected.
- NO AUDIO - indicates no audio signal is detected.
- SCRAMBLED PRG - indicates the input signal is encrypted.

Section 5 – Advanced Configuration

In this Section we provide an explanation of the "parameter values" described in Section 4.1, and instructions on how to change them.

5.1 "DEMOD MODE" parameter

Two (2) options are available : 8VSB and QAM B.

The factory default is 8VSB.

AQD can lock to a terrestrial (broadcast or off-air) 8VSB or CATV QAM Annex B modulated RF input signal. You must select an appropriate signal type to ensure signals are properly identified during a scan.

If INPUT DEMOD MODE = 8VSB, then the unit automatically sets the CHANNEL PLAN = Broadcast.

If INPUT DEMOD MODE = QAM B, then the unit automatically sets the CHANNEL PLAN = STANDARD CATV.

See Section 5.2 for details on CHANNEL PLAN.

To change the factory default value, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "DEMOD MODE" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲ (UP) or ▼ (DN) buttons to select the desired parameter.

(3) Press the **ENTER** button to enter and lock the new parameter. The following message will then appear on the LCD screen, prompting you to re-scan:

> MODE CHANGED
> PLEASE RE-SCAN

⚠ **A SCAN MUST BE PERFORMED EACH TIME THE "INPUT DEMOD MODE" IS CHANGED.**

See section 5.3 on how to perform a scan.

5.2 "CHANNEL PLAN" parameter

Four (4) options are available: Broadcast, Standard CATV, HRC, and IRC.

The factory default is Broadcast.

BROADCAST option must be selected for terrestrial (broadcast or off-air) 8VSB reception - this option is automatically

selected when you set the DEMOD MODE to 8VSB (See Section 5.1). Reception is limited to VHF & UHF frequencies.

STANDARD CATV option is capable of locking to 8VSB and QAM Annex B signals with "standard" carrier center-frequency - this option is automatically selected when you set the DEMOD MODE to QAM B (See Section 5.1). Reception is limited to CATV frequencies.

HRC (Harmonically Related Carrier) and IRC (Incrementally Related Carrier) options are capable of locking to QAM Annex B signals with "off-center " carrier center-frequency. See Appendix A for the Standard, HRC, and IRC frequency allocations.

To change the factory default value, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "INPUT CH PLAN" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲ (UP) or ▼ (DN) buttons to select the desired parameter.

(3) Press the **ENTER** button to enter and lock the new parameter. The following message will then appear on the LCD screen to confirm your selection:

> ENTRY
> ACCEPTED

5.3 "SCAN MENU"

Five (5) options are available: Exit, Yes, All Modules, Status, Stop Scan.

You must perform a scan so that the AQD can search and find all available channels present on the input signal.

EXIT allows you to exit the scan menu without making any modifications.

YES performs a scan of the incoming available signals only on the AQD module presently configured.

> ⚠ **ONCE A NEW SCAN IS IN PROCESS ALL PREVIOUSLY SCANNED AND STORED CHANNELS ARE ERASED. USE OF KEY-PAD IS NOT ALLOWED, BUT IF ATTEMPTED A "SCAN IN PROCESS" MESSAGE WILL BE DISPLAYED ON THE LCD SCREEN.**

ALL MODULES performs a scan of the incoming available signals on all the AQD modules.

STATUS displays the channels found during the scan process.

STOP SCAN allows you to stop an on-going scan.

> ⚠ **ONCE A NEW SCAN IS IN PROCESS ALL PREVIOUSLY SCANNED AND STORED CHANNELS ARE ERASED. IF THE SCAN IS STOPPED, ONLY A PARTIAL LIST OF CHANNELS WILL BE AVAILABLE FOR SELECTION.**

To change the factory default value, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "SCAN MODE" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲ (UP) or ▼ (DN) buttons to select the desired parameter.

(3) Press the **ENTER** button to enter and lock the new parameter.

5.4 "TUNE CHANNEL" parameter

The TUNE CHANNEL allows you to select a desired channel from the list of "clear and un-encrypted" channels after AQD has scanned and stored the data for all such available channels.

To select a desired program, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "TUNE CHANNEL" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter.

(3) Use the ▲ (UP) button to toggle between all available channels – both the Major-channels and their corresponding Sub-channels are displayed.

(4) Press the **ENTER** button to enter and lock the new channel. The following message will then appear on the LCD screen to confirm your selection:

> ENTRY
> ACCEPTED

(5) Additionally, a "banner" will appear for approximately 10 seconds on all TV sets indicating the Major-channel number, its Sub-channel number and designation, and the time of day as received from the input stream.

5.5 "AQD LOCK" parameter

This is a read-only screen and displays the following information as received form the input stream:

Picture Aspect Ratio: typically 16:9 or 4:3

Input Signal Mode: typically 8VSB, or Q64 (QAM 64), or Q256

Channel Number: for example 101, or UHF 44

Center Frequency of the channel above: for example 657 MHz in the case of Ch. 101, or 653 MHz in case of UHF 44.

5.6 "PICTURE SHAPE" parameter

Six (6) options are available: Full, Letter Box, Center Cut, Zoom1, Zoom2, and SmartZoom1.

The factory default value is Zoom2.

You can adjust the picture's aspect ratio to the desired setting for converting 16:9 images to 4:3 images as required for traditional television ratio viewing.

> **IF THE INCOMING IMAGE HAS AN ASPECT RATIO OF 4:3, THEN THE FOLLOWING MESSAGE IS DISPLAYED ON THE LCD SCREEN TO INDICATE THAT NO PICTURE IMPROVEMENT IS MADE BY CHANGING THE ASPECT RATIO.**

```
PICTURE SHAPE
WARNING → 4:3
```

FULL displays the entire picture while stretching it vertically to fit the TV screen and may result in black bars on the sides of the TV screen.
LETTER BOX displays the entire picture image and may result in black bars on top/bottom and left/right of the TV screen.
CENTER CUT expands the image to fit the TV screen while cropping some images on the left/right and typically results in no black bars on the screen.
ZOOM1 results in vertical/horizontal cut with black bars.
ZOOM2 results in vertical/horizontal cut without black bars.
SMARTZOOM1 is a modified version of Zoom1 to adjust for differences in the picture shape data sent by a broadcaster.
See Appendix B for pictorial samples. To choose any of the available options, follow these steps:

> (1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "PICTURE SHAPE" field on the LCD screen.
> (2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲(UP) or ▼(DN) buttons to select the desired parameter.
> (3) Press the **ENTER** button to enter and lock the new parameter. The following message will then appear on the LCD screen to confirm your selection:

```
ENTRY
ACCEPTED
```

> **THIS "PICTURE SHAPE" PARAMETER IS DISABLED IF THE AFD OPTION IS ENABLED.**
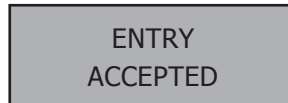> **SEE "AFD MENU" IN SECTION 5.19.**

5.7 "OUTPUT AUDIO" parameter

The range is from 0 to 100%.

The factory default value is 100%.

To change the factory default value, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "OUTPUT AUDIO" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The 3-digit percentage field will flash, indicating that you can enter a percentage. Use the ▲ (UP) or ▼ (DN) buttons to enter the first digit of the desired audio percentage. For example, if you want to enter 98% (098%), then you must enter digit (0).

(3) Use the ▶ (R) button to change the position of the cursor and move it to the second position of the percentage. Then use the ▲ (UP) or ▼ (DN) buttons to enter the second digit of the audio percentage – digit (9) in the case of 98%.

(4) Repeat step 3 above until all desired digits are entered.

(5) Once all the digits of the desired percentage are entered, press the **ENTER** button to enter and lock the value. The following message will then appear on the LCD screen to confirm your selection:

> ENTRY
> ACCEPTED

5.8 "AUDIO MODE" parameter

Two (2) options are available: Stereo, and Mono.

The factory default value is Stereo.

> ⚠️ **YOU MUST CHANGE THE AUDIO MODE TO "MONO" IF AQD'S OUTPUT IS TO BE FED TO A MONO (NON-STEREO) ANALOG MODULATOR.**

To change the factory default value, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "AUDIO MODE" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲ (UP) or ▼ (DN) buttons to select the desired parameter

(3) Press the **ENTER** button to enter and lock the new parameter.
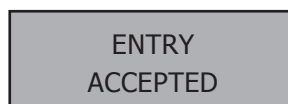
5.9 "CC: EIA-608" parameter

Two (2) options are available: Enabled, and Disabled.

The factory default value is Enabled.

This is the Closed Captioning option. The Closed Captioning, also known as line 21 captions per EIA-608, is the standard for Closed Captioning for NTSC broadcasts in the United States. You can globally enable or disable Closed Captioning, eliminating the need to adjust individual TV sets.

To choose any of the available options, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "CC: EIA-608" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲ (UP) or ▼ (DN) buttons to select the desired parameter.

(3) Press the **ENTER** button to enter and lock the new parameter. The following message will then appear on the LCD screen to confirm your selection:

> ENTRY
> ACCEPTED

5.10 "AQD POWER RESET" parameter

Three (3) options are available: Exit, Yes, and All Modules.

This is to power-cycle one or all the AQD modules.

To choose any of the available options, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "AQD POWER RESET" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲ (UP) or ▼ (DN) buttons to select the desired parameter.

(3) Press the **ENTER** button to enter and lock the new parameter. The following message will then appear on the LCD screen to confirm your selection:

```
ENTRY
ACCEPTED
```
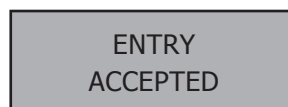
5.11 "MODULE" parameter

This is a read-only screen and displays the firmware version of the AQD module, for example:

VER PROD 6.3ms

5.12 "AQD-PCM ADDRESS" parameter

This is a read-only screen and displays the factory-set and unique 8-digit address of the AQD-PCM module, for example 00012345. You need to know what this address is if you intend to add the optional AQD-RCS module that allows remote monitoring and control of the AQD modules. See Instruction Manual No. 651217900 series for more detail.

5.13 "AQD-PCM Firmware" parameter

This is a read-only screen and displays the firmware version of the AQD-PCM module.

5.14 "3.3V IN" parameter

This is a read-only screen and displays the actual DC voltage sent from the AQD-PCM to the "digital circuit-board" of the AQD module. The normal operating range is from 3.1 to 3.6 VDC.

5.15 "6V IN" parameter

This is a read-only screen and displays the actual DC voltage sent from the AQD-PCM to the "digital circuit-board" of the AQD module. The normal operating range is from 5.5 to 6.5 VDC.

5.16 "10V IN" parameter

This is a read-only screen and displays the actual DC voltage sent from the AQD-PCM to the "analog circuit-board" of the AQD module. The normal operating range is from 9.4 to 10.8 VDC.

5.17 "29V IN" parameter

This is a read-only screen and displays the actual DC voltage sent from the AQD-PCM to the "analog circuit-board" of the AQD module. The normal operating range is from 26.0 to 31.5 VDC.

5.18 "POWER STATUS" parameter

Two (2) options are available: Primary, and Standby.

The PRIMARY selects the power source to be from the AQD-PCM module.

The Standby selects the power source to be, if applicable, from the AQD SPS module.

The factory default value is PRIMARY.

To choose any of the available options, follow these steps:

(1) Use the ▲ (UP) or ▼ (DN) buttons to toggle between the "parameter fields" until you see the "POWER STATUS" field on the LCD screen.

(2) Press and hold for three seconds the **ENTER** button. The default value will flash, indicating that you can enter a new parameter. Use the ▲ (UP) or ▼ (DN) buttons to select the desired parameter.

(3) Press the **ENTER** button to enter and lock the new parameter. The following message will then appear on the LCD screen to confirm your selection:

```
ENTRY
ACCEPTED
```
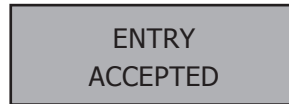
5.19 "AFD MENU"

Five (5) options are available: AFD Disable, AFD Center Cut, AFD Letter Box, Force Center Cut, Force Letter Box.

The factory default value is AFD Center Cut.

> **THE AFD MENU IS AVAILABLE ONLY WITH "AQD PLUS" OR "AQD PLUS ASI" MODULES.**
>
> **YOU WILL NOT SEE THIS FIELD IF YOU HAVE PURCHASED AN "AQD" MODULE.**
>
> **WHEN ENABLED, THE AFD MENU WILL OVER-RIDE THE PICTURE SHAPE SETTING. SEE SECTION 5.6 FOR DETAILS.**

AFD (Active Format Description) is a standard set of codes that can be included in the MPEG video stream to carry information about video's aspect ratio and active picture characteristics. It has been used by television broadcasters to enable both 4:3 & 16:9 television sets to optimally present pictures transmitted in either format. It has also been used by broadcasters to dynamically control how down-conversion equipment formats widescreen 16:9 pictures for 4:3 displays.

AFD DISABLE means the AFD codes will be ignored and not processed by the unit.

AFD CENTER CUT is an auto mode. In this mode, the unit will automatically detect any AFD code present in the broadcast stream and will adjust the TV screen accordingly. If there is no AFD code present, it will default to Center Cut format.

AFD LETTER BOX is an auto mode. In this mode, the unit will automatically detect any AFD code present in the broadcast stream and will adjust the TV screen accordingly. If there is no AFD code present, it will default to Letter Box format.

FORCE CENTER CUT forces the unit to adjust the TV screen to Center Cut format, regardless of the AFD code being present or not present in the broadcast stream.

FORCE LETTER BOX forces the unit to adjust the TV screen to Letter Box format, regardless of the AFD code being present or not present in the broadcast stream.

> **IF THE VIDEO STREAM CONTAINS AN AFD CODE NOT SUPPORTED BY MODULE,**
>
> **THE MODULE WILL TREAT THE STREAM AS IF THERE WAS NO AFD CODE, AND WILL ADJUST**
>
> **THE TV SCREEN ACCORDING TO THE CURRENT OPTION.**

Section 6 – AQD SPS

AQD SPS (Standby Power Supply) consists of two independent standby power supply units, capable of providing the power conditioning functions that are normally provided by the AQD-PCM module . The unit features two independent rear-panel connectors, one connector for each of the power supply units. Only one AQD SPS unit is required for up to 16 AQD modules (2 fully-loaded chassis). This AQD SPS is optional and may be added to a system at any time.

6.1 Product Description

Front Panel
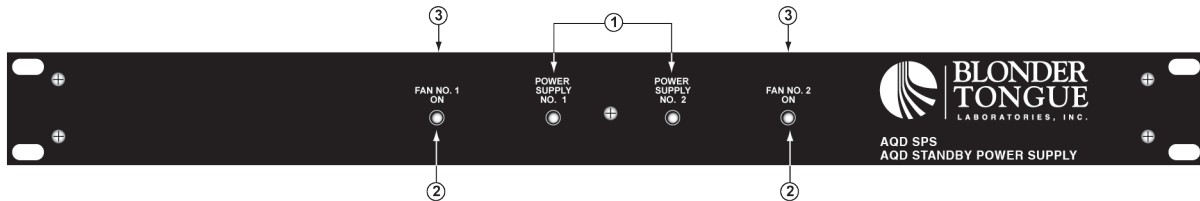
1. **2 LED Lights -** The lights are powered by the respective power supply built into the unit and will illuminate when power is present.
2. **2 Fan LED Lights -** A green LED illuminates when the fan is in operation. The LED will blink if the fan stops operating for any reason, such as being clogged or a malfunction.
3. **Air Circulation Fan -** Fan powering (top of unit) is determined by the number of power supply units.

Rear Panel
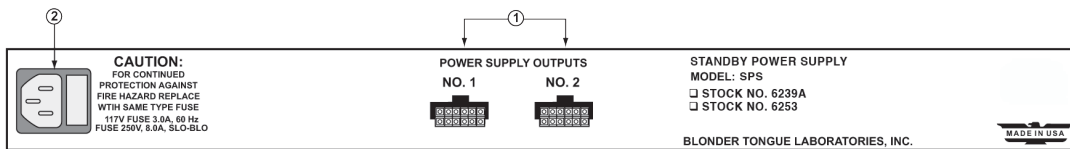
1. **2, 12-Pin Power Supply Connector Ports -** When a particular LED is illuminated, the corresponding 12-pin connector port on the rear of the unit is ready for standby power use.
2. **Power Cord Socket & Fuse Holder Mechanical**
   Dimensions (WxHxD): 19.0 x 1.75 x 14.5 inches

   Weight: 6.5 lbs.

6.2 Installation

It is recommended to mount one (1) Standby Power unit between two (2)AQD Series rack chassis units. The fans draw airflow up for circulation. Optimum performance is achieved when a full rack space is used between the chassis and the SPS. This needs to occur when used in conjunction with the optional RF splitter system.

6.3 Operation

The Standby Power unit is intended to automatically provide power in the event of a loss of power, temporary or permanent, to the primary power supply. During this condition, when power is lost to the primary supply but not lost by the standby unit, the unit will automatically switch to standby power. The unit is programmed to verify that primary power is lost by checking the status to ensure it is not a temporary condition. The unit firmware was designed with a built-in small delay, approximately 6-8 seconds, to eliminate the potential for uncertainty or chatter regarding power loss. After this delay, the unit will automatically switch to the standby power unit. If power is restored to the primary power supply, the unit will verify the condition and automatically return to primary power.

LCD Functional Interface

Blonder Tongue digital products use an LCD display panel to provide the operator with as much information as needed regarding the condition and status of the particular modules. This includes status information pertaining to standby power.
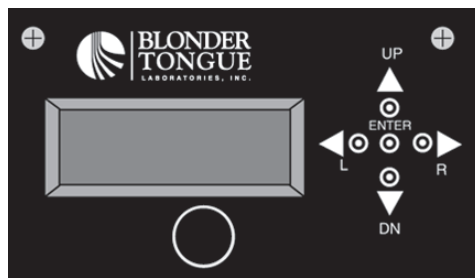
AQD PCM - LCD & Front Panel Controls

The front panel of the PCM will display Standby Power when it is being used.

THE FRONT PANEL OF THE PCM WILL DISPLAY STANDBY POWER WHEN IT IS BEING USED.

IF A PRIMARY FAILURE IS NOT DUE TO AC POWERING LOSS, IT IS RECOMMENDED TO HAVE THE PCM SERVICED.

POWER STATUS
STANDBY

Manual Standby Power Interaction

The unit menu system provides the ability to manually move to standby or back to primary power. This is extremely valuable in a testing condition but not encouraged during normal operation.

- The power status can be displayed by depressing the ▼ (DN) arrow key on the front of the control module.

  Scroll up ▲ (UP) or ▼ (DN) through the variables to reach "Power Status."

Appendix A: CATV Channel Frequency Chart

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

Broadcast Chart

VHF Broadcast Channels Channel	Center Frequency
2	57
3	63
4	69
5	79
6	85
7	177
8	183
9	189
10	195
11	201
12	207
13	213

UHF Broadcast Channels Channel	Center Frequency
14	473
15	479
16	485
17	491
18	497
19	503
20	509
21	515
22	521
23	527
24	533
25	539
26	545
27	551
28	557
29	563
30	569
31	575
32	581
33	587
34	593
35	599
36	605
37	611
38	617
39	623
40	629
41	635
42	641
43	647
44	653
45	659
46	665
47	671
48	677
49	683
50	689
51	695
52	701
53	707
54	713
55	719
56	725
57	731
58	737
59	743
60	749
61	755
62	761
63	767
64	773
65	779
66	785
67	791
68	797
69	803

Appendix B: Screen Aspect Ratio

4:3

16:9

LETTERBOX

Displays the entire picture image while fitting the picture to the screen by applying bars to the top and bottom of the screen.

FULL

Displays the entire picture image while fitting the picture to the screen by stretching the image vertically, so that it fits the screen. Black bars are present on the sides and there may be a slight distortion of the picture.

ZOOM 1 (Smart Zoom 1)

Expands the picture image to fit the screen while cropping some images on the left and right. This mode will still show very thin black bands at the left and right of the screen.

Center Cut

Expands the picture image to fit the screen while cropping some images on the left and right w/o displaying any bars on the screen.

NOTE:

• *It is recommended to use the Center Cut setting for maximum screen usage when converting 16:9 aspect ratio signals for viewing on 4:3 televisions, the primary use of the DAP.*

Appendix C: AFD

Active Format Description (AFD) is industry standard data that can be used to describe active picture information about a video signal. This data enables video processing devices to make automatic adjustments according to aspect ratio and other picture information included in the AFD and bar data.

The AFD code and bar data values are carried in the VANC space of the baseband digital video signal in accordance with SMPTE 2016-3 (2007). The AFD code and bar data values are also carried in the video user data of the MPEG-2 Elementary Stream in accordance with ATSC Digital Television Standard A/53 Part 4.

While the AFD Specification provides for a wide variety of output aspect ratios and scenarios, the following table provides capabilities that down-converters should support for specific AFD codes.

The codes shown below are arguably the codes most relevant for down-conversion. For a full set of codes that may be present in video signals, and a full discussion of bar data, see ATSC A/53 Part 4, SMPTE 2016-1 and CEA-CEB-16.

AFD Code	Aspect Ratio	Description	Original HD Frame	Down-converted SD Frame
'0100'	16x9	Image with aspect ratio greater than 16:9 as a vertically centered letterbox in a 16:9 coded frame, should be accompanied by bar data.		
'1000'	16x9	Full frame 16:9 image, the same as the 16:9 coded frame		
'1001'	16x9	Pillarbox 4:3 image, horizontally centered in the 16:9 coded frame		
'1010'	16x9	Full frame 16:9 image, with all image areas protected		
'1111'	16x9	Image with a 16:9 aspect ratio and with an alternative 4:3 center in a 16:9 coded frame.		

Appendix D: Glossary of Useful Terms & Acronyms

Glossary of Useful Terms and Acronyms

AFD — Active Format Description (AFD) is a standard set of codes that can be sent in the MPEG video stream or in the baseband SDI video signal that carries information about the video's aspect ratio and active picture characteristics. It has been used by television broadcasters to enable both 4:4 and 16:9 television sets to optimally present pictures transmitted in either format. It has also been used by broadcasters to dynamically control how down-conversion equipment formats widescreen 16:9 pictures for 4:4 displays.

Standard AFD codes provide information to video devices about where in the coded picture the active video is and also the "protected area" which is the area that needs to be shown. Outside of the protected area, edges at the sides or the top can be removed without the viewer missing anything significant. Video decoders and display devices can then use this information, together with knowledge of the display shape and user preferences, to choose a presentation mode. AFD codes are not part of the core MPEG standard; they are a DVB extension, which has subsequently also been adopted, with some changes, by ATSC.

Anamorphic Stretching — Anamorphic widescreen is a cinematography and photography technique for capturing a widescreen picture on standard 35mm film, or other visual recording media with a non-widescreen native aspect ratio. It can also refer to a related technique for maximizing picture quality in DVD video recordings.

ASI — Asynchronous Serial Interface (ASI) is a streaming data format which often carries an MPEG Transport Stream (MPEG-TS). It is electrically identical to an (SDI) Serial Digital Interface signal and is always 270Mbit/s. There are two transmission formats commonly used by the ASI interface, the 188 byte format and the 204 byte format. The 188 byte format is the more common ASI transport stream. When optional data is included, the packet can stretch an extra 16 bytes to 204 bytes total.

Aspect Ratio — The aspect ratio of an image is its displayed width divided by its height (usually expressed as "x:y"). For instance, the aspect ratio of a traditional television screen is 4:3 (a ratio of four units wide to three units tall). High-definition television and European digital television use an aspect of 16:9.

ATSC — Advanced Television Systems Committee (ATSC) is the group, established in 1982, that developed the eponymous ATSC Standards for digital television in the United States, also adopted by Canada, Mexico, South Korea and Honduras, and is being considered by other countries.

ATSC Standards — Document a digital television format (Developed by ATSC) that will have replaced the analog NTSC television system by February 17, 2009 in the United States, and August 31, 2011 in Canada.

The high definition television standards defined by the ATSC produce wide screen 16:9 images with up to 1920×1080 pixels in size — more than six times the display resolution of the earlier standard. However, a host of different image sizes is also supported, so that up to six standard-definition channels can be broadcast on a single 6 MHz TV Channel.

ATSC also boasts "theater quality" audio because it uses the Dolby Digital AC-3 format to provide 5.1-channel surround sound. Numerous auxiliary data-casting services can also be provided.

Closed Captions — Closed captions are text versions of the audio content or may provide other information while you are watching a program. Actual content is decided by the broadcaster.

DVB -— Digital Video Broadcasting (DVB) is a suite of internationally accepted open standards for digital television. These standards define the physical layer and data link layer of the distribution system. Devices interact with the physical layer via a synchronous parallel interface (SPI), synchronous serial interface (SSI), or asynchronous serial interface (ASI). All data is transmitted in MPEG-2 transport streams with some additional constraints (DVB-MPEG).

HDTV — High Definition Television. HDTV is a broadcasting format with significantly higher resolution (at least twice that) than that of traditional formats such as NTSC, SECAM & PAL. Signal formats are 1080i (interlaced scan) and 720p (progressive scan) with a widescreen (16:9) aspect ratio as standard. The technical standards for broadcasting HDTV are also able to handle 16:9 aspect ratio pictures without using letterboxing or anamorphic stretching, thus further increasing the effective resolution for such content.

Letterbox — Letterboxing is the practice of transferring widescreen films to video formats while preserving the original aspect ratio. Since the video display is most often a more square aspect ratio than the original film, the resulting video must include masked-off areas above and below the picture area (often referred to as "black bars," or, more accurately, as mattes). Letterboxing takes its name from the similarity of the resulting image to a horizontal opening in a postal letter box. LTBX is an acronym used for programming using this format.

MPEG — The Moving Pictures Experts Group (MPEG) is a working group of the ISO/IEC standard body charged with the development of video and audio encoding standards. Its first meeting was in May 1988 in Ottawa, Canada and has since grown to include approximately 350 from various industries, universities, and research institutions. MPEG's official designation is ISO/IEC JTC1/SC29 WG11.

MPEG 2 — MPEG-2 was the second of several standards developed by the MPEG and is an international standard (ISO/IEC 13818). MPEG-2 is widely used as the format of digital television signals that are broadcast by terrestrial (over-the-air), CATV, and direct broadcast satellite TV systems. It also specifies the format of movies and other programs that are distributed on DVD and similar disks. As such, TV stations, TV receivers, DVD players, and other equipment are often designed to this standard.

QAM — Quadrature Amplitude Modulation is a modulation scheme which conveys data by changing (modulating) the amplitude of two carrier waves. These two waves, usually sinusoids, are out of phase with each other by 90° and are thus called quadrature carriers, hence the name of the scheme. In QAM, the constellation points are usually arranged in a square grid with equal vertical and horizontal spacing, although other configurations are possible. The most common forms are 16-QAM, 64-QAM, 128-QAM and 256-QAM. By moving to a higher-order constellation, it is possible to transmit more bits per symbol.

SDTV — Standard Definition Television. SDTV signal formats are 480p and 480i, they provide lower resolutions than high definition, yet provide a very sharp, clear picture. Lower resolution allows broadcasters to transmit multiple programs per channel. The term SDTV is usually used in reference to digital television, in particular when broadcasting at the same (or similar) resolution as analog systems. Digital SDTV in 4:3 aspect ratio has the same appearance as traditional analog TV.

Sub-Channel — The compression of audio and video signal enables each digital channel to carry different programs on sub-channels. Typically, the main program is on channel 8-1, in the example for channel 8. In this case, 8 is the "major channel", and 1, 2, or 3 is the sub-channel.

Vestigial Sideband — Vestigial sideband (VSB) is a type of amplitude modulation (AM) technique that encodes data by varying the amplitude of a single carrier frequency. Portions of one of the redundant sidebands are removed to form a vestigial sideband signal - so-called because a vestige of the sideband remains.

8VSB — Developed by Zenith, it is the 8-level vestigial sideband modulation method adopted for terrestrial broadcast of the ATSC digital television standard in the United States and Canada.

Widescreen — A widescreen image is a film, computer, or television image with a wider aspect ratio than the standard Academy frame developed during the classical Hollywood cinema era, often expressed as 4:3.

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