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## INSTRUCTION MANUAL

# DAP Series

| Model | Stock No. | Description |
|---|---|---|
| DAP | 6290 | Digital-to-Analog Processor |
| DAP PLUS | 6295 | Digital-to-Analog Processor PLUS (with AFD package) |

### Options

| | | |
|---|---|---|
| DAP RNC | 6290-RNC | DAP equipped with Remote Network Card (RNC) Module |
| DAP PLUS ASI | 6295-10 | DAP PLUS equipped with ASI Module |
| DAP PLUS RNC | 6295-12 | DAP PLUS equipped with Remote Network Card (RNC) Module |
| DAP PLUS A/R | 6295-22 | DAP PLUS equipped with ASI and RNC Modules |

| Status | Date | Document No. | Issue No. | Author |
|---|---|---|---|---|
| Active | Oct. 14, 2011 | 651221300B | 3 | AB |
| Obsolete | Sept. 25, 2008 | 651221300A | 2 | AB |
| Obsolete | Apr. 11, 2008 | 651218700A | 1 | CF |

MADE IN USA

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

| | |
|---|---|
| Purchase Location Name: | |
| Purchase Location Telephone Number: | |
| DAP Serial Number: | |

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

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Document Number: USA 651221300B

Printed in the United States of America.

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## Section 1 — General & Safety Instructions

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

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

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

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

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

### NOTE TO CATV SYSTEM INSTALLER

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

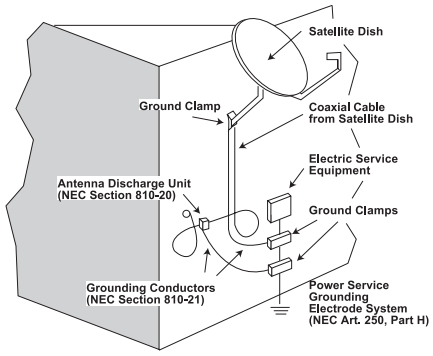
## Safety Instructions

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

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

## Safety Instructions - continued

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




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

### Returning Product for Repair (or Credit)

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

# Section 2 — Product Summary

## 2.1 Revision History & Reason

This is the third issue of the Instruction Manual.

The first issue covered the DAP (stock 6290) product only.

The second issue was released to cover th DAP PLUS (stock 6295) product, along with its optional ASI module, namely, the DAP PLUS ASI (stock 6295-10). The RNC (Remote Network Card) option which is available for both DAP and DAP PLUS were also briefly discussed in the second issue. However, a separate user manual is available for these options.

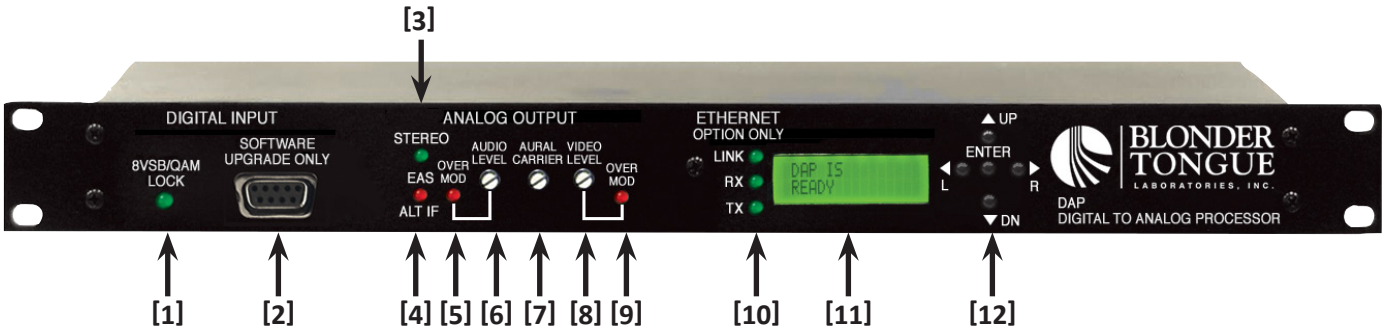
In this third issue, some editorial changes are made to add clarity to some of the procedures. No substantial operation or maintenance procedures are revised.

## 2.2 Product Series, Application & Description

**DAP Series:**

DAP – A Digital-to-Analog Processor (DAP) 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.

DAP RNC – same as DAP but equipped with an optional RNC (Remote Network Card) module which allows for remote monitoring and control of DAP via Internet and a GUI-based menu using any standard web browser such as Internet Explorer or Netscape Navigator. Only one RNC is needed to monitor and control all the DAP units in a headend. Please see Blonder Tongue Labs Document No. 651220500 series for details on the RNC option.




**[1]** UNIT STATUS INDICATOR:
Solid Green LED indicates valid lock to the RF input signal
Flashing Green LED indicates Not Locked or Scanning in process

**[2]** 9-PIN RS-232 CONNECTOR:
Used for future software upgrade

**[3]** STEREO LED:
Solid Green indicates Stereo

**[4]** EAS/ALT INDICATOR:
Solid Red indicates EAS/ALT IF is activated

**[5]** AUDIO OVER MODULATION LED:
RED LED lights when peak deviation of aural carrier is over 25 kHz

**[6]** AUDIO MODULATION CONTROL:
Adjusts aural carrier modulation

**[7]** AURAL CARRIER CONTROL:
Controls amplitude of aural RF carrier relative to visual RF carrier

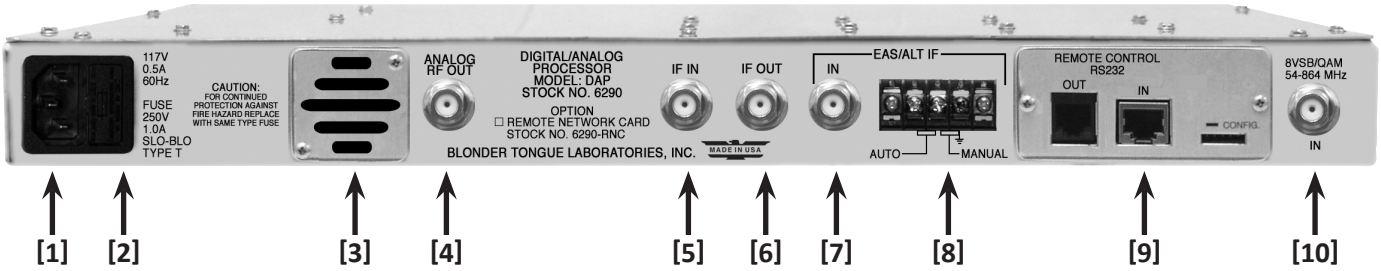
**[8]** VIDEO MODULATION CONTROL:
Adjust percentage of modulation

**[9]** VIDEO OVER MODULATION LED:
Lights when modulation is above 87.5%

**[10]** ETHERNET LINK, RECEIVE AND TRANSMIT LED:
LED indicators for optional Ethernet connectivity. The LEDs will light only if the RNC option is installed and in use. LEDs will remain off if the RNC option is not installed.

**[11]** LCD SCREEN:
16-character, 2-line Liquid Crystal Display screen for displaying information on the unit

**[12]** KEY-PAD:
Push-down Buttons to navigate between menus and to operate the unit




**[1]** POWER CORD SOCKET:
Power Cord Plug Socket

**[2]** FUSE HOLDER :
1.0 Amp., 250V DC, Slo Blo Fuse

**[3]** AIR CIRCULATION FAN

**[4]** ANALOG RF OUT:
NTSC Analog Output via "F" Connector

**[5]** IF IN :
"F" Connector IF Input

**[6]** IF OUT:
"F" Connector IF Output

**MUST LOOP THE *IF IN* & *IF OUT* CONNECTORS USING THE 6-INCH COAX CABLE PROVIDED IN PACKAGING.**

**[7]** EAS/ALT IF IN:
"F" Connector for Emergency Alert System (EAS) or Alternate Intermediate Frequency (ALT IF) input

**[8]** EAS/ALT IF TERMINAL STRIP:
Terminal Connector for Auto/Manual EAS

**[9]** REMOTE CONTROL:
To daisy chain DAP for optional remote management and control. Requires at least one DAP unit equipped with the Remote Network Card Stock No. 6290-RNC (not shown)

**[10]** 8VSB/QAM INPUT:
"F" Connector for 8VSB off-air or QAM modulated "F" input signal

**DAP PLUS Series:**

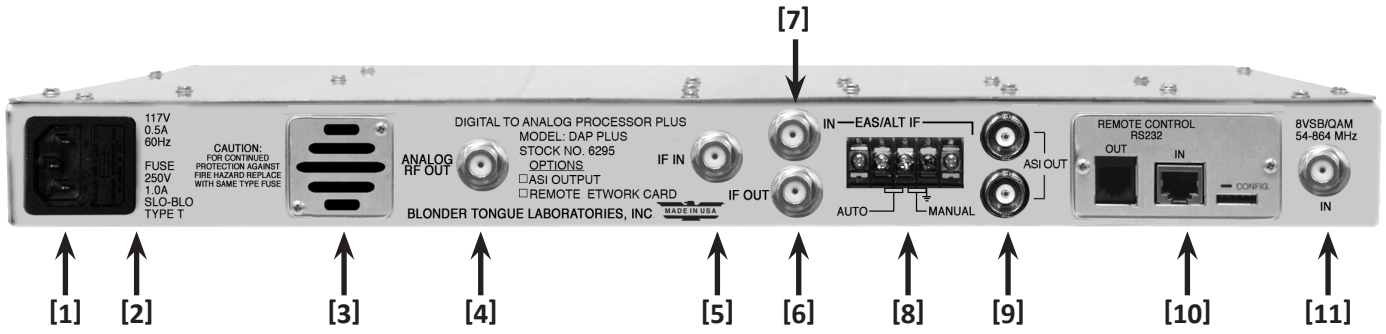
**DAP PLUS** - is the same as DAP, but can process the AFD codes (Active Format Description). AFD is a standard set of codes that can be included in the MPEG video stream to carry information about the picture's aspect ratio and active characteristics. It has been used by television broadcasters to enable 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.

**DAP PLUS ASI** – is the same as DAP PLUS but equipped with an optional ASI output module. The ASI module delivers two (2) additional outputs in ASI streams, each stream containing the same content.

**THE ASI STREAM WILL CONTAIN ALL THE AVAILABLE MAJOR-CHANNELS AND SUB-CHANNELS WITHIN A CHANNEL NUMBER. FOR EXAMPLE, IF THE ANALOG RF OUTPUT IS SELECTED TO BE THE SUB-CHANNEL 7.2, THE ASI OUTPUT STREAM WILL CONTAIN THE MAJOR-CHANNEL 7.1, AND ALL ITS CORRESPONDING SUB-CHANNELS (7.2, 7.3, ETC.)**

**DAP PLUS RNC** - is the same as DAP PLUS but equipped with an optional RNC (Remote Network Card) module which allows for remote monitoring and control of DAP PLUS via Internet and a GUI-based menu using any standard Web browser such as Internet Explorer or Netscape Navigator. Only one RNC is needed to monitor and control all the DAP PLUS units in a headend. Please see Blonder Tongue Labs Document No. 651220500 series for details on the RNC option.

The front panel of the DAP PLUS is identical to the DAP.




**[1]** POWER CORD SOCKET:
Power Cord Plug Socket

**[2]** FUSE HOLDER :
1.0 Amp., 250V DC, Slo Blo Fuse

**[3]** AIR CIRCULATION FAN

**[4]** ANALOG RF OUT:
NTSC Analog Output via "F" Connector

**[5]** IF IN :
"F" Connector IF Input

**[6]** IF OUT:
"F" Connector IF Output

**MUST LOOP THE *IF IN* & *IF OUT* CONNECTORS USING THE 6-INCH COAX CABLE PROVIDED IN PACKAGING.**

**[7]** EAS/ALT IF IN:
"F" Connector for Emergency Alert System (EAS) or Alternate Intermediate Frequency (ALT IF) input

**[8]** EAS/ALT IF TERMINAL STRIP:
Terminal Connector for Auto/Manual EAS

**[9]** OPTIONAL ASI MODULE:
Two (2) ASI output streams. The ASI streams are identical.

**[10]** REMOTE CONTROL:
To daisy chain DAP for optional remote management and control. Requires at least one DAP unit equipped with the Remote Network Card Stock No. 6290-RNC (not shown)

**[11]** 8VSB/QAM INPUT:
"F" Connector for 8VSB off-air or QAM modulated "F" input signal

## 2.3 Product Specification

### INPUT

| | |
|---|---|
| **Connector:** | "F" Female |
| **Standards** | |
| **8VSB:** | ATSC Digital Television A/53E |
| **QAM:** | ITU-T J.83 - Annex B (64 and 256 QAM) |
| **8VSB Mode** | |
| **Tuning Range:** | UHF (NTSC Ch. 14-69), VHF (NTSC Ch. 2-13) |
| **Data Rate:** | 19.392 Mbps |
| **Bandwidth:** | 6 MHz |
| **Power Level:** | -20 to +20 dBmV |
| **QAM Mode** | |
| **Tuning Range:** | CATV (NTSC Ch. 2-135) |
| **Data Rate:** | 38.8 Mbps (QAM 256); 26.97 Mbps (QAM 64) – Auto Detect |
| **Bandwidth:** | 6 MHz |
| **Power Level:** | -20 to +20 dBmV |

### IF (Intermediate Frequency)

| | |
|---|---|
| **Connector:** | "F" Female Input / "F" Female Output |
| **Aural Frequency:** | 41.25 MHz |
| **Visual Frequency:** | 45.75 MHz |
| **Composite Loop Output** | |
| **Aural Carrier Level:** | +20 dBmV |
| **Visual Carrier Level:** | +35 dBmV |
| **Impedance:** | 75 Ω Input / 75 Ω Output |
| **Return Loss:** | 16 dB Input / 15 dB Output |
| **EAS/ALT IF** | |
| **Input Level:** | +38 dBmV @ 45.75 MHz |
| **Switch Isolation:** | Greater than 60 dB |

### General

| | |
|---|---|
| **Dimensions (W x D x H):** | 19.0 x 18.625 x 1.75 inches (483 x 473 x 44 mm) |
| **Power:** | 117 VAC/60 Hz (Fuse: 1 amp, 250 VDC, SloBlo) |
| **Power Dissipation:** | 36 W |
| **Weight:** | 7 lbs (3.2 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 |

### OUTPUT

| | |
|---|---|
| **Connectors** | |
| **Standard RF Output:** | "F" Female |
| **Optional ASI Output:** | 2 x BNC Female |
| **Standard RF Output** | |
| **Frequency Range:** | 54 to 864 MHz |
| **NTSC Channels:** | UHF, VHF, CATV (Standard, HRC, & IRC) |
| **Power Level:** | +60 dBmV (120 dBµV) |
| **Power Level Range:** | +50 to +62 dBmV (in 0.2 dB increments) |
| **Broadband Noise:** | -77 dBc (@ +60 dBmV output level, 4 MHz bandwidth) |
| **Spurious:** | -63 dBc |
| **Impedance:** | 75 Ω |
| **Return Loss:** | 15 dB |
| **Aural/Visual Carrier Ratio:** | -15 dB ±5 |
| **4.5 MHz Aural Inter-carrier Freq. Tolerance:** | ±150 Hz; 32 to 122 °F (0 to 50 °C) |
| **Channel Selectivity** | |
| **Adjacent Aural & Below:** | -40 dB |
| **Adjacent Picture & Above:** | -40 dB ±5 |
| **Visual Carrier Frequency Tolerance** | |
| **Standard Channels:** | ±20 kHz; 32 to 122 °F (0 to 50 °C) |
| **FCC Aeronautical Channels:** | ±5 kHz; 32 to 122 °F (0 to 50 °C) |
| **Video Carrier** | |
| **Frequency Response:** | 1.5 dB Peak-to-Valley (fv-0.5 to fv+4.2 MHz) |
| **Video-to-RMS Hum Ratio:** | 65 dB Peak-to-Peak |
| **Signal-to-Noise Ratio:** | 58 dB (Weighted) |
| **Differential Gain:** | 2.0% @ 87.5% |
| **Differential Phase:** | 1.0 degree |
| **Over-mod. Indicator:** | 87.5% ±2.5 |
| **Chrom./Luminance Delay:** | Per FCC Requirements |
| **Audio Carrier** | |
| **Frequency Response:** | ±1.0 dB (referenced to 75 µ sec pre-emphasis) |
| **Frequency Range:** | 20 Hz to 20 kHz |
| **Signal-to-Noise Ratio:** | 60 dB @ 25 kHz Deviation |
| **Total Harmonic Distortion:** | 0.6 % |
| **Over-mod. Indicator:** | 50 kHz ±2 |
| **Optional ASI Output (DAP PLUS ONLY)** | |
| **Standard:** | DVB-ASI; 50089-9 |
| **No. of Streams:** | Two identical streams |
| **Data Bit Rate:** | 270 Mbps |
| **Transport Stream Rate:** | 160 Mbps (Max) |
| **Output Impedance:** | 75 Ω |

### Alarms/Monitoring/Control

| | |
|---|---|
| **Indicators:** | 8VSB/QAM Lock (Green LED)<br>Stereo Audio (Green LED)<br>EAS or Alternate IF activated (Red LED)<br>Audio Over-modulation (Red LED)<br>Video Over-Modulation (Red LED) |
| **Local Monitoring:**<br>**Local Control:** | Front-panel, 16-character, 2-line LCD screen<br>Front-panel Navigational Key-pad<br>Audio & Video Modulation Adjustment<br>Aural Carrier Adjustment |
| **Remote Monitoring/Control:** | GUI-based menu via Web browser<br>(Available if the optional RNC module is installed) |

# Section 3 – Installation & Power-up

## 3.1 Unpacking

You will find the following items in the box:

DAP Processor (QTY=1)
Power Cord with IEC C13 line socket and 3-pin Type B NEMA 5 plug (QTY=1)
6-inch coax cable for the IF Loop

## 3.2 Installation

The unit is designed to be installed in a standard 19-inch (480 mm) rack (EIA 310-D, IEC 60297, and DIN 41494 SC48D).

**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 unit, 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 unit to reduce heat build-up in the rack which helps to extend the product's life span.

**MUST LOOP THE *IF IN* & *IF OUT* CONNECTORS USING THE 6-INCH COAX CABLE PROVIDED IN PACKAGING.**

## 3.3 Power-up

**THE POWERING REQUIREMENT OF DAP AND DAP PLUS IS 117 VAC/60 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 the unit. The unit is also equipped with a fuse-holder and fuse (SLO-BLO, 1.0 Amps, 250V).

The following message will be displayed on the LCD screen when the unit is first powered-up:

| | | |
|---|---|---|
| POWER SATUS<br>INITIALIZING | DAP ADDRESS<br>00007259 | DAP<br>IS READY |

"DAP ADDRESS" is a unique digital address for the unit and is set at the factory.

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

Upon successful initial power up, the status of the LEDs are as follows:

The "8VSB/QAM LOCK" LED will be flashing Green, indicating that there is no input to the unit. The "STEREO" LED will be solid Green.

After about 30 seconds, the following message will be displayed on the LCD screen:

| |
|---|
| INPUT NOT LOCKED<br>NO SIGNAL |

# 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 for 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

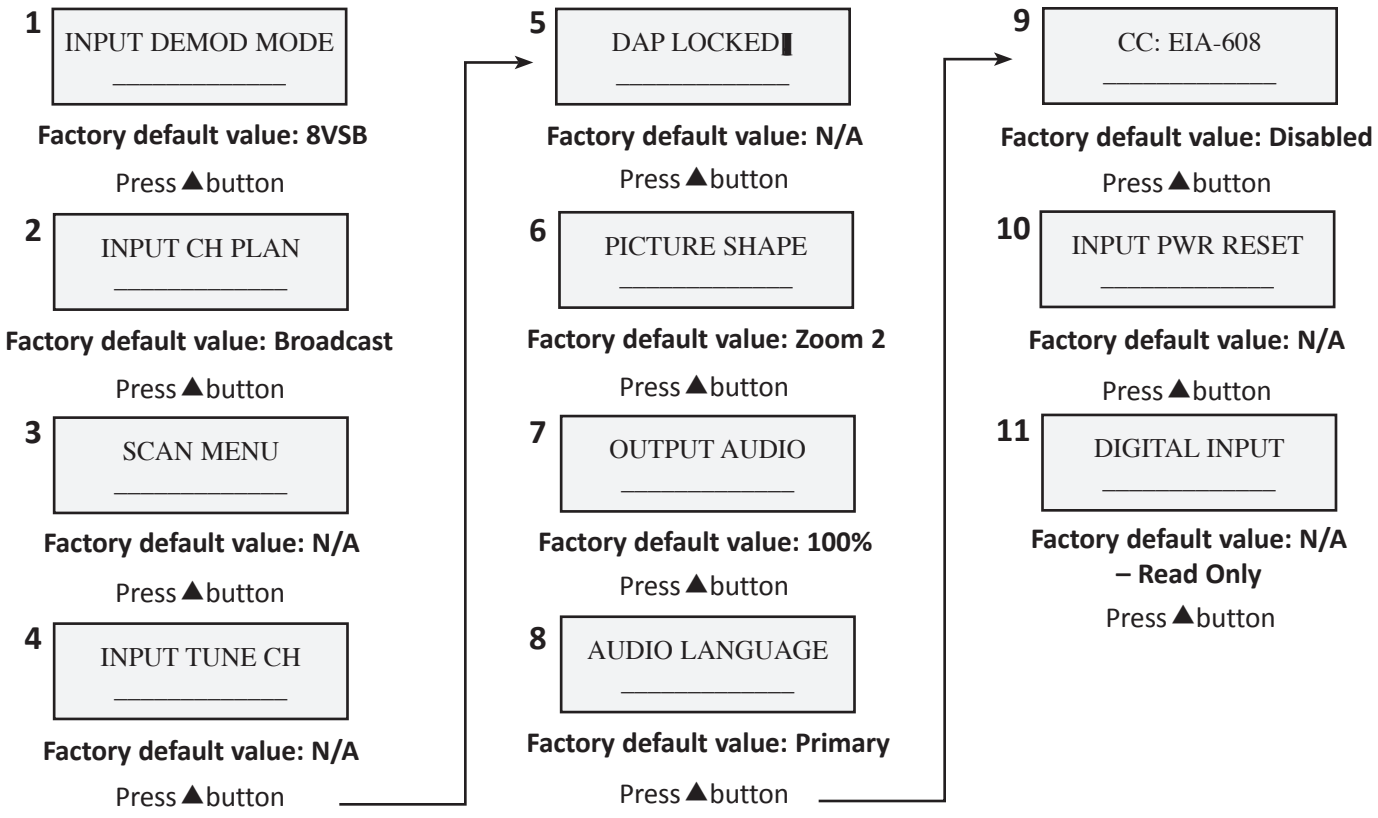
The **(L), (R)** buttons are primarily used to select or to enter new parameter values.

The **(UP), (DN)** buttons are primarily used to toggle between the parameter fields.

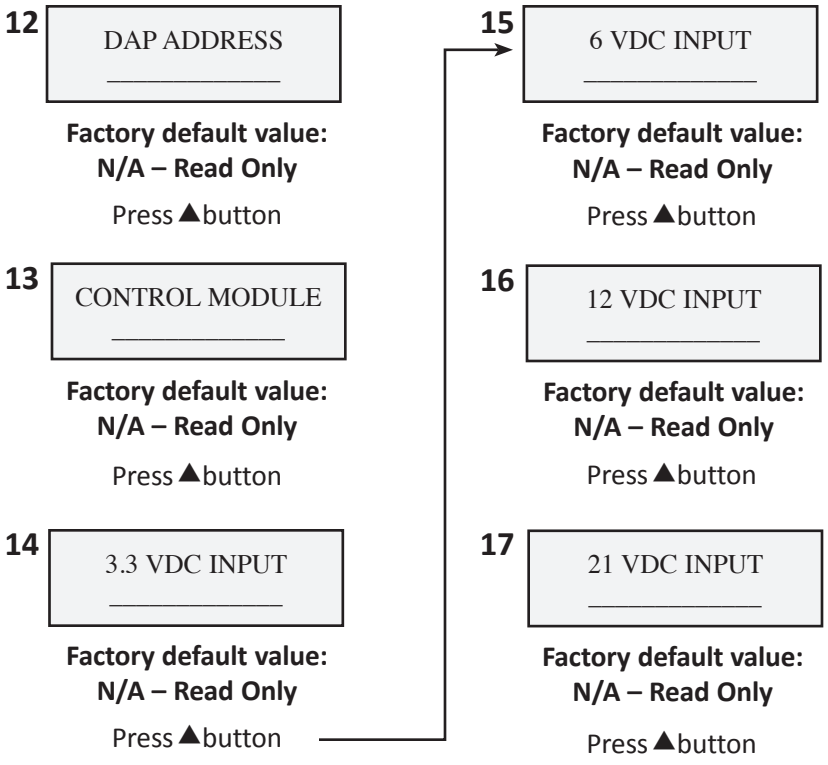
The **(ENTER)** button is used to initiate a parameter value change and to lock the new value after changes are made.

Using the **(UP), (DN)** buttons, you can toggle among the following available "parameter fields" which will be displayed on the LDC screen.

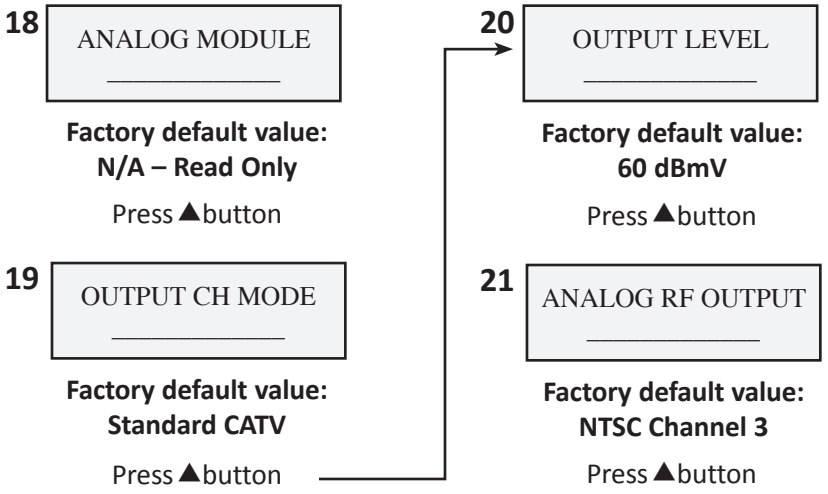
Parameter Fields related to the INPUT are:



Parameter Fields related to the controller circuit-board are:




Parameter Fields related to the OUTPUT are:




Parameter Field related to the AFD (only available on DAP PLUS series of products) is:

## 4.2 Quick Configuration

The following steps provide the minimum requirements necessary to configure the unit. 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) Connect the input via the 8VSB/QAM "F" connector in the rear of the unit.

(3) Select the appropriate “INPUT DEMOD MODE” (8VSB or QAM) – see Section 5.1 for procedures.

(4) Select the appropriate “INPUT CH PLAN” (Broadcast, Standard CATV, HRC, or IRC) – see Section 5.2 for procedures.

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

**A SCAN MUST BE PERFORMED EACH TIME THE “INPUT DEMOD MODE” IS CHANGED.**

(6) Select the desired program via the “INPUT TUNE CH” menu - see Section 5.4 for procedures.

(7) Select the desired “ANALOG RF OUTPUT” - see Section 5.21 for procedures.

(8) Select the desired “OUTPUT LEVEL” - see Section 5.20 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 Front-Panel Status Messages

After the unit is configured and while operating normally, the following “status” message will be displayed on the LCD screen:

```
INPUT LOCKED
SNR=▮B
```

- SNR is displayed when the DAP locks to an input program channel and indicates the signal to noise ratio of the input signal and is expressed in dB. The following are the desired input SNR ranges for the appropriate signal modulation type:

| | 8VSB | 64 QAM | 256 QAM |
|---|---|---|---|
| **Excellent =** | >30 dB | >38 dB | >38 dB |
| **Good =** | 25—30 dB | 30—38 dB | 35—38 dB |
| **Marginal =** | 18—25 dB | 23—30 dB | 30—35 dB |
| **Non-Functional =** | <18 dB | <23 dB | <30 dB |

You can also retrieve the following current configuration information of the unit by pressing the **(R)** or **(L)** buttons:

| | |
|---|---|
| DAP LOCKED<br>7-1 WABC-HD | The above read-only screen indicates the input signal that the unit is locked to – in this case, Sub-channel 7.1 designated as WABC-HD. |
| ANALOG RF OUTPUT<br>CH 003 NTSC | The above read-only screen indicates the analog RF output channel – in this case, NTSC channel 3. |
| OUTPUT LEVEL<br>60.2 dBmV | The above read-only screen indicates the power level of the analog RF output channel – in this case, 60.2 dBmV. |

Possible Error Messages and their meaning are listed below:

- 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
- NO AUDIO indicates no audio signal present
- SCRAMBLED PRG indicates the signal has encryption
- NO PROGRAM will be displayed if a valid lock is acquired but no program signal is actually being detected

## 4.4 Front-Panel Control Adjustment

There are three (3) control pots on the front panel of the unit: Video Level, Audio Level, and Aural Carrier.

VIDEO LEVEL control pot is used to manually adjust the video level. With the intended signal source connected and a representative video program present, turn the Video Level control pot clockwise until the Video Overmodulation LED starts flashing. Then, slightly turn the control pot counter-clockwise so that the Video Overmodulation LED is not flashing anymore. Alternatively, while watching the video on a TV monitor, adjust the control pot to the highest (clockwise) level WITHOUT causing the highlights (white portions of the picture) to become “washed out”.

AUDIO LEVEL control pot is used to manually adjust the audio level. During the highest volume of the audio program, turn the Audio Level control pot clockwise until the Audio Overmodulation LED starts flashing. Then, slightly turn the control pot counter-clockwise so that the Audio Overmodulation LED is not flashing anymore.

AURAL CARRIER control pot is used to manually adjust the aural-to-visual carrier ratio. The recommended ratio is -15 dB.

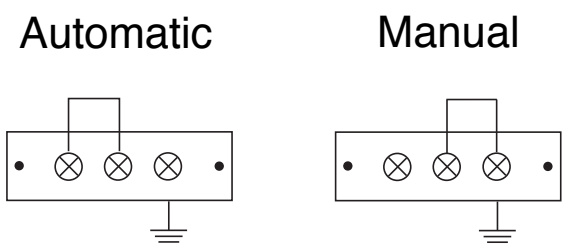
## 4.5 Rear-Panel EAS/ALT IF

There is an "F" connector in the rear-panel of the unit for an incoming (input) EAS/ALT signal (Emergency Alert Signal / Alternative).

Depending on how the EAS/ALT IF terminal strip (in the rear-panel and shown below) is wired, the unit will over-ride its RF Analog output and will replace it with the incoming EAS/ALT signal.

AUTOMATIC: If the EAS/ALT IF terminal strip is wired as shown, the incoming EAS/ALT will automatically over-ride the RF analog output, PROVIDED HOWEVER, that the EAS/ALT IF signal is equal or greater than +38 dBmV.

MANUAL: If the EAS/ALT IF terminal strip is wired as shown, the incoming EAS/ALT will over-ride the RF analog output.



## 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.

Sections 5.1 through 5.11 describe parameters related to the INPUT signal. Some of these parameters are read-only, and some can be modified by the operator.

Sections 5.12 through 5.17 describe parameters related to the controller circuit-board of the unit itself. All of these parameters are read-only.

Sections 5.18 through 5.21 describe parameters related to the OUTPUT signal. One parameter is read-only, and the remaining parameters can be modified by the operator.

Section 5.22 describes parameters related to the AFD (Active Format Description) menu. AFD is only available on DAP PLUS.

### 5.1 "INPUT DEMOD MODE" parameter

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

The factory default is 8VSB.

DAP and DAP PLUS 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 INPUT CH PLAN = Broadcast.

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

See Section 5.2 for details on INPUT CH 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 "INPUT 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 "INPUT CH 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 INPUT 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 INPUT 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<br>ACCEPTED |
|---|

## 5.3 “SCAN MENU”

Four (4) options are available: Exit, Yes, Status, Stop Scan.

You must perform a scan so that the unit 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.

**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.**

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 “INPUT TUNE CH” parameter

The INPUT TUNE CH allows you to select a desired channel from the list of “clear and un-encrypted” channels after the unit 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 “INPUT TUNE CH” 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<br>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 “DAP LOCKED” 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
Center Frequency of the channel above: for example 657 MHz in the case of Ch. 101

## 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<br>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 FEATURE IS DISABLED IF THE AFD OPTION IS ENABLED. SEE "AFD MENU" IN SECTION 5.22.**

## 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 LANGUAGE" parameter

Two (2) options are available: Primary and SAP (Secondary Audio Program).

The factory default value is Primary.

Any program will always contain a primary audio channel, for example English (displayed as "eng" on the LCD screen). Depending on the input source, a program may also contain a SAP as an auxiliary audio channel. SAP is often used for an alternate language, for example, Spanish.

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 LANGUAGE" 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.

**BROADCASTING OF SAP IS NOT WIDELY PRACTICED YET. MANY PROGRAMS MAY NOT INCLUDE A SAP. MANY PROGRAMS THAT DO INCLUDE A SAP, MAY HAVE IT IN THE SAME LANGUAGE OF THE PRIMARY AUDIO.**

## 5.9 "CC: EIA-608" parameter

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

The factory default value is Disabled.

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 "INPUT POWER RESET" parameter

Two (2) options are available: Exit, and Yes.

This is to power-cycle all the internal circuit-boards of the unit pertaining to the processing of the input signal.

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 "INPUT 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 “DIGITAL INPUT” parameter

This is a read-only screen and displays the firmware version of the “digital circuit-board” of the unit, for example:

VER PROD 7.7ms for DAP Series of products.

VER PROD 9.8ms for DAP PLUS Series of products.

### 5.12 “DAP ADDRESS” parameter

This is a read-only screen and displays the 8-digit address of the unit, for example 00012345. You need to know what this address is if you intend to add the optional RNC module (Remote Network Card) to the unit. RNC allows remote monitoring and control of the unit. See Blonder Tongue Labs, Document No. 651220500 series for more detail.

### 5.13 “CONTROL MODULE” parameter

This is a read-only screen and displays the firmware version of the “controller circuit-board” of the unit.

### 5.14 “3.3 VDC INPUT” parameter

This is a read-only screen and displays the actual DC voltage sent from the “controller circuit-board” to the “digital circuit-board” of the unit. The normal operating range is from 2.97 to 3.63 VDC.

### 5.15 “6 VDC INPUT” parameter

This is a read-only screen and displays the actual DC voltage sent from the “controller circuit-board” to the “digital circuit-board” of the unit. The normal operating range is from 5.4 to 6.6 VDC.

### 5.16 “12 VDC INPUT” parameter

This is a read-only screen and displays the actual DC voltage sent from the “controller circuit-board” to the “analog circuit-board” of the unit. The normal operating range is from 10.8 to 13.2 VDC.

### 5.17 “21 VDC INPUT” parameter

This is a read-only screen and displays the actual DC voltage sent from the “controller circuit-board” to the “analog circuit-board” of the unit. The normal operating range is from 18.9 to 23.1 VDC.

### 5.18 “ANALOG MODULE” parameter

This is a read-only screen and displays the firmware version of the “analog circuit-board” of the unit, for example:

FIRMWARE V:1.1

### 5.19 “OUTPUT CHANNEL MODE” parameter

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

The factory default is Standard CATV.

This identifies the mode in which the analog output channel can be selected (see Section 5.21 for details).

STANDARD CATV allows you to select the analog output channel by its designated NTSC channel number, i.e. channel 2 or 135.

FREQUENCY allows you to select the analog output channel by its designated "standard" video center- frequency, i.e. 55.2500 for NTSC channel 2.

HRC and IRC allow you to select the analog output channel by its designated "off-set" HRC or IRC video 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 "OUTPUT CHANNEL 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 to confirm your selection:

| ENTRY<br>ACCEPTED |
|---|

## 5.20 "OUTPUT LEVEL" parameter

This is the output power level of the RF analog channel. The range is from 50 to 62 dBmV, in 0.2 dBmV increments.

The factory default value is 60 dBmV.

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

(2) Press and hold for three seconds the **(ENTER)** button. The 3-digit output level field will flash, indicating that you can enter a new level. Use the **(UP)** or **(DN)** buttons to enter the first digit of the desired output level. For example, if you want to enter 59.8 dBmV, then you must enter digit (5).

(3) Use the **(R)** button to change the position of the cursor and move it to the second position of the output level. Then use the **(UP)** or **(DN)** buttons to enter the second digit of the output level – digit (9) in the case of 59.8 dBmV.

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

(5) Once all the digits of the desired output level 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<br>ACCEPTED |
|---|

## 5.21 "ANALOG RF OUTPUT" parameter

This is the channel number on which the RF analog will appear on a TV set. The factory default value is NTSC channel 3.

If in Section 5.19 you had selected OUTPUT CH MODE = STANDRAD CATV, then you can set the output here by its designated NTSC channel number, for example channel 2 or 135.

To select a new channel number, follow these steps:

(1) Use the **(UP)** or **(DN)** buttons to toggle between the "parameter fields" until you see the "ANALOG RF OUT" field on the LCD screen.

(2) Press and hold for three seconds the **(ENTER)** button. The 3-digit channel number field will flash, indicating that you can enter a new channel number. Use the **(UP)** or **(DN)** buttons to enter the first digit of the desired channel number. For example, if you want to enter channel 24 (024), 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 channel number. Then use the **(UP)** or **(DN)** buttons to enter the second digit of the number – digit (2) in the case of channel 24 (024).

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

(5) Once all the digits of the desired channel number 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

If in Section 5.19 you had selected OUTPUT CH MODE = FREQUENCY, or HRC, or IRC, then you can set the output here by its designated video center-frequency. Follow the steps above to enter the desired frequency value.

## 5.22 "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 DAP PLUS.**
**YOU WILL NOT SEE THIS FIELD IF YOU HAVE PURCHASED A DAP.**
**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 THE UNIT,**
**THE UNIT WILL TREAT THE STREAM AS IF THERE WAS NO AFD CODE, AND WILL ADJUST**
**THE TV SCREEN ACCORDING TO THE CURRENT OPTION.**

# Section 6 – DAP & DAP PLUS Options

## 6.1 DAP RNC

DAP RNC (Remote Network Card) module allows for remote monitoring and control of a DAP unit via Internet and a GUI-based menu using any standard web browser such as Internet Explorer or Netscape Navigator. Only one RNC module is needed to monitor and control all the DAP units in a headend.

The RNC module can only be fitted to the DAP unit in our factory. So you must either purchase the DAP unit with the RNC module, or send an existing DAP unit to our factory for re-fit.

Please see Blonder Tongue Labs Document No. 651220500 series for details on the RNC module.

## 6.2 DAP PLUS RNC

DAP PLUS RNC (Remote Network Card) module allows for remote monitoring and control of a DAP PLUS unit via Internet and a GUI-based menu using any standard web browser such as Internet Explorer or Netscape Navigator. Only one RNC module is needed to monitor and control all the DAP PLUS units in a headend.

The RNC module can only be fitted to the DAP PLUS unit in our factory. So you must either purchase the DAP PLUS unit with the RNC module, or send an existing DAP PLUS unit to our factory for re-fit.

Please see Blonder Tongue Labs Document No. 651220500 series for details on the RNC module.

## 6.3 DAP PLUS ASI

ASI (Asynchronous Serial Interface) is a streaming data format which carries an MPEG Transport Stream (MPEG-TS), and is always 270 Mbit/s.

DAP PLUS ASI module provides two identical ASI output streams. Each ASI stream will carry both the Major-channel and the Sub-channels present in the channel stream. For example, if NTSC channel 7.1 (Major-channel) is broadcast with four additional sub-channels (channels 7.2, 7.3, and 7.4), then each of the two ASI output streams will contain channels 7.1, 7.2, 7.3, and 7.4, DESPITE THE FACT THAT the RF analog output of the DAP PLUS unit will provide ONLY one of the four (4) above channels depending on which channel was selected using the “ANALOG RF OUTPUT” parameter. See Sections 5.21 and 5.4 for details.

The ASI module is available only for DAP PLUS units. It is not available for DAP units.

The ASI module can only be fitted on the DAP PLUS unit in our factory. So you must either purchase the DAP PLUS unit with the ASI module, or send an existing DAP PLUS unit to our factory for re-fit.

## 6.4 DAP PLUS A/R

A/R stands for ASI and RNC. Hence, the DAP PLUS A/R option is a combination of the two available DAP PLUS options discussed above, namely the DAP PLUS ASI and the DAP PLUS RNC.

The A/R module can only be fitted on the DAP PLUS unit in our factory. So you must either purchase the DAP PLUS unit with the A/R, or send an existing DAP PLUS unit to our factory for re-fit.

## Appendix A: CATV Channel Frequency Chart

### CATV Channel Frequency Chart
### 54 MHz to 864 MHz

| EIA Chan. | MHz Center Frequency |
|---|---|
| 2 | 57 |
| 3 | 63 |
| 4 | 69 |
| 5 | 79 |
| 6 | 85 |
| 95 | 93 |
| 96 | 99 |
| 97 | 105 |
| 98 | 111 |
| 99 | 117 |
| 14 | 123 |
| 15 | 129 |
| 16 | 135 |
| 17 | 141 |
| 18 | 147 |
| 19 | 153 |
| 20 | 159 |
| 21 | 165 |
| 22 | 171 |
| 7 | 177 |
| 8 | 183 |
| 9 | 189 |
| 10 | 195 |
| 11 | 201 |
| 12 | 207 |
| 13 | 213 |
| 23 | 219 |
| 24 | 225 |
| 25 | 231 |
| 26 | 237 |
| 27 | 243 |
| 28 | 249 |
| 29 | 255 |
| 30 | 261 |
| 31 | 267 |
| 32 | 273 |
| 33 | 279 |
| 34 | 285 |
| 35 | 291 |
| 36 | 297 |
| 37 | 303 |
| 38 | 309 |
| 39 | 315 |
| 40 | 321 |

| EIA Chan. | MHz Center Frequency |
|---|---|
| 41 | 327 |
| 42 | 333 |
| 43 | 339 |
| 44 | 345 |
| 45 | 351 |
| 46 | 357 |
| 47 | 363 |
| 48 | 369 |
| 49 | 375 |
| 50 | 381 |
| 51 | 387 |
| 52 | 393 |
| 53 | 399 |
| 54 | 405 |
| 55 | 411 |
| 56 | 417 |
| 57 | 423 |
| 58 | 429 |
| 59 | 435 |
| 60 | 441 |
| 61 | 447 |
| 62 | 453 |
| 63 | 459 |
| 64 | 465 |
| 65 | 471 |
| 66 | 477 |
| 67 | 483 |
| 68 | 489 |
| 69 | 495 |
| 70 | 501 |
| 71 | 507 |
| 72 | 513 |
| 73 | 519 |
| 74 | 525 |
| 75 | 531 |
| 76 | 537 |
| 77 | 543 |
| 78 | 549 |
| 79 | 555 |
| 80 | 561 |
| 81 | 567 |
| 82 | 573 |
| 83 | 579 |
| 84 | 585 |

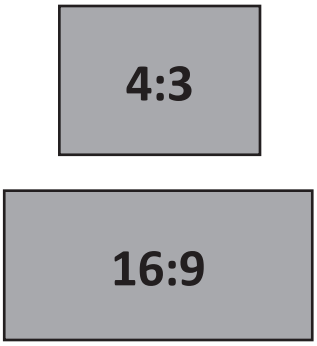
| EIA Chan. | MHz Center Frequency |
|---|---|
| 85 | 591 |
| 86 | 597 |
| 87 | 603 |
| 88 | 609 |
| 89 | 615 |
| 90 | 621 |
| 91 | 627 |
| 92 | 633 |
| 93 | 639 |
| 94 | 645 |
| 100 | 651 |
| 101 | 657 |
| 102 | 663 |
| 103 | 669 |
| 104 | 675 |
| 105 | 681 |
| 106 | 687 |
| 107 | 693 |
| 108 | 699 |
| 109 | 705 |
| 110 | 711 |
| 111 | 717 |
| 112 | 723 |
| 113 | 729 |
| 114 | 735 |
| 115 | 741 |
| 116 | 747 |
| 117 | 753 |
| 118 | 759 |
| 119 | 765 |
| 120 | 771 |
| 121 | 777 |
| 122 | 783 |
| 123 | 789 |
| 124 | 795 |
| 125 | 801 |
| 126 | 807 |
| 127 | 813 |
| 128 | 819 |
| 129 | 825 |
| 130 | 831 |
| 131 | 837 |
| 132 | 843 |
| 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




**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.*

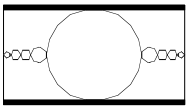
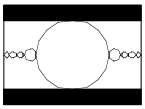
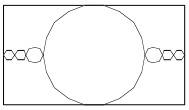
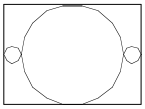
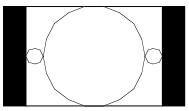
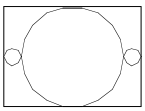
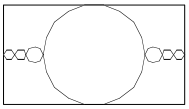
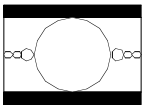
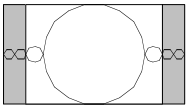
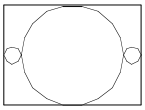
## Appendix C: AFD

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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