



AERO.lite

DTV Audio/Loudness Manager

User Manual

Release Date: February 2012

Software Version: 0.0.10



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Regulatory Information and Fusing

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

Canada

This Class A digital apparatus complies with Canadian ICES-003.

UL

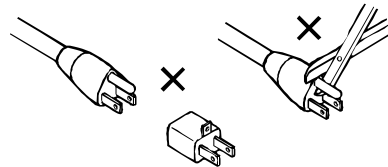


WARNING: Troubleshooting must be performed by a trained technician. Do not attempt to service this equipment unless you are qualified to do so.

Check that the correct fuses have been installed. To reduce the risk of fire, replace only with fuses of the same type and rating.


Exposed portions of the power supply assembly are electrically “hot”. In order to reduce the risk of electrical shock, the power cord MUST be dis-connected when the power supply assembly is removed.

The ground terminal of the power plug is connected directly to the chassis of the unit. For continued protection against electric shock, a correctly wired and grounded (earthed) three-pin outlet must be used. Do not use a ground-lifting adapter and never cut the ground pin. on the three-prong plug.



UK

As the colours of the cores in the mains lead may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The core that is coloured green and yellow must be connected to the terminal in the plug identified by the letter E or by the earth symbol  or coloured green or green and yellow.
- The core that is coloured blue must be connected to the terminal that is marked with the letter N or coloured black.
- The core that is coloured brown must be connected to the terminal that is marked with the letter L or coloured red.
- This apparatus must be earthed.

EU

This equipment complies with the EMC requirements of EN55103-1 and EN55103-2 when operated in an E2 environment in accordance with this manual.

IMPORTANT SAFETY NOTICE

This unit complies with the safety standard EN60065. The unit shall not be exposed to dripping or splashing and no objects filled with liquids, such as coffee cups, shall be placed on the equipment. To ensure safe operation and to guard against potential shock hazard or risk of fire, the following **must** be observed:

- o Ensure that your mains supply is in the correct range for the input power requirement of the unit.
- o Ensure **fuses** fitted are the **correct rating and type** as marked on the unit.
- o The unit **must be earthed** by connecting to a correctly wired and **earthed** power outlet.
- o The **power cord** supplied with this unit must be wired as follows:
Live—Brown Neutral—Blue Earth—Green/Yellow

IMPORTANT – NOTE DE SECURITE

Ce materiel est conforme à la norme EN60065. Ne pas exposer cet appareil aux éclaboussures ou aux gouttes de liquide. Ne pas poser d'objets remplis de liquide, tels que des tasses de café, sur l'appareil. Pour vous assurer d'un fonctionnement sans danger et de prévenir tout choc électrique ou tout risque d'incendie, veuillez à observer les recommandations suivantes.

- o Le selecteur de tension doit être placé sur la valeur correspondante à votre alimentation réseau.
- o Les fusibles doivent correspondre à la valeur indiquée sur le materiel.
- o Le materiel doit être correctement relié à la terre.
- o Le cordon secteur livré avec le materiel doit être câblé de la manière suivante:
Phase—Brun Neutre—Bleu Terre—Vert/Jaune

WICHTIGER SICHERHEITSHINWEIS

Dieses Gerät entspricht der Sicherheitsnorm EN60065. Das Gerät darf nicht mit Flüssigkeiten (Spritzwasser usw.) in Berührung kommen; stellen Sie keine Gefäße, z.B. Kaffeetassen, auf das Gerät. Für das sichere Funktionieren des Gerätes und zur Unfallverhütung (elektrischer Schlag, Feuer) sind die folgenden Regeln unbedingt einzuhalten:

- o Der Spannungswähler muß auf Ihre Netzspannung eingestellt sein.
- o Die Sicherungen müssen in Typ und Stromwert mit den Angaben auf dem Gerät übereinstimmen.
- o Die Erdung des Gerätes muß über eine geerdete Steckdose gewährleistet sein.
- o Das mitgelieferte Netzkabel muß wie folgt verdrahtet werden:
Phase—braun Nulleiter—blau Erde—grün/gelb

NORME DI SICUREZZA – IMPORTANTE

Questa apparecchiatura è stata costruita in accordo alle norme di sicurezza EN60065. Il prodotto non deve essere sottoposto a schizzi, spruzzi e gocciolamenti, e nessun tipo di oggetto riempito con liquidi, come ad esempio tazze di caffè, deve essere appoggiato sul dispositivo. Per una perfetta sicurezza ed al fine di evitare eventuali rischi di scossa elettrica o d'incendio vanno osservate le seguenti misure di sicurezza:

- o Assicurarsi che il selettore di cambio tensione sia posizionato sul valore corretto.
 - o Assicurarsi che la portata ed il tipo di fusibili siano quelli prescritti dalla casa costruttrice.
 - o L'apparecchiatura deve avere un collegamento di messa a terra ben eseguito; anche la connessione rete deve avere un collegamento a terra.
 - o Il cavo di alimentazione a corredo dell'apparecchiatura deve essere collegato come segue:
Filo tensione—Marrone Neutro—Blu Massa—Verde/Giallo
-

AVISO IMPORTANTE DE SEGURIDAD

Esta unidad cumple con la norma de seguridad EN60065. La unidad no debe ser expuesta a goteos o salpicaduras y no deben colocarse sobre el equipo recipientes con líquidos, como tazas de café. Para asegurarse un funcionamiento seguro y prevenir cualquier posible peligro de descarga o riesgo de incendio, se han de observar las siguientes precauciones:

- o Asegúrese que el selector de tensión esté ajustado a la tensión correcta para su alimentación.
- o Asegúrese que los fusibles colocados son del tipo y valor correctos, tal como se marca en la unidad.
- o La unidad debe ser puesta a tierra, conectándola a un conector de red correctamente cableado y puesto a tierra.
- o El cable de red suministrado con esta unidad, debe ser cableado como sigue:
Vivo—Marrón Neutro—Azul Tierra—Verde/Amarillo

VIKTIGA SÄKERHETSÅTGÄRDER!

Denna enhet uppfyller säkerhetsstandard EN60065. Enheten får ej utsättas för yttre åverkan samt föremål innehållande vätska, såsom kaffemuggar, får ej placeras på utrustningen." För att garantera säkerheten och gardera mot eventuell elchock eller brandrisk, måste följande observeras:

- o Kontrollera att spänningsväljaren är inställd på korrekt nätspänning.
- o Kontrollera att säkringarna är av rätt typ och för rätt strömstyrka så som anvisningarna på enheten föreskriver.
- o Enheten måste vara jordad genom anslutning till ett korrekt kopplat och jordat el-uttag.
- o El-sladden som medföljer denna enhet måste kopplas enligt följande:
Fas—Brun Neutral—Blå Jord—Grön/Gul

BELANGRIJK VEILIGHEIDS-VOORSCHRIFT:

Deze unit voldoet aan de EN60065 veiligheids-standaards. Dit apparaat mag niet worden blootgesteld aan vocht. Vanwege het risico dat er druppels in het apparaat vallen, dient u er geen vloeistoffen in bekertjes op te plaatsen. Voor een veilig gebruik en om het gevaar van elektrische schokken en het risico van brand te vermijden, dienen de volgende regels in acht te worden genomen:

- o Controleer of de spanningscarroussel op het juiste Voltage staat.
 - o Gebruik alleen zekeringen van de aangegeven typen en waarden.
 - o Aansluiting van de unit alleen aan een geaarde wandcontactdoos.
 - o De netkabel die met de unit wordt geleverd, moet als volgt worden aangesloten:
Fase—Bruin Nul—Blauw Aarde—Groen/eGel
-



WARNING: To reduce the risk of fire, replace fuses only with the same type and rating.

Both units use a universal switching power supply that handles the full range of nominal mains voltages between 90 and 264 VAC and any frequency between 50 Hz and 60 Hz.

Check Main Fuse

The Main fuse rating is T 1A L (1 Amp, 250 V, 20 mm, time-lag, low breaking capacity) for all operating voltages.



WARNING: The power to the unit must be off when the following steps are performed. Ensure that the main power cable to the unit is not connected to a power source.

1. Open the fuse compartment door in the AC power input housing with a small flat-blade screwdriver (Figure 1). Carefully pull out the fuse carrier.
2. Check that the replacement fuse has the correct rating. The fuse carrier must be inserted into the compartment carefully. *Do not force the carrier into the compartment or both could be damaged.*
3. Snap the fuse compartment door closed.

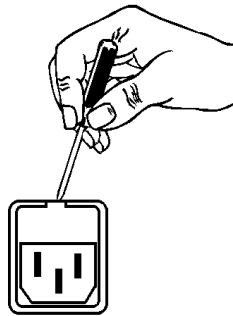


Figure 1 Checking the Main Fuse

Internal Fuse

The switching power supply contains a separate fuse. Most fault conditions should be protected by the main fuse.

If you find it necessary to replace the internal fuse, be certain to replace it with a fuse of the same type and rating as printed on the switching power supply board.

Chapter 1: Introduction and Overview

The Linear Acoustic AERO.lite™ is a compact stereo transmission loudness controller for digital television audio, with the following features:

- AEROMAX® 2.0 channel multistage adaptive wideband and multiband loudness control engine
- AES I/O with reference input
- Auto-sensing HD/SD-SDI inputs and access to all 16 audio channels
- Balanced +4dBu analog I/O and front panel headphone output
- Parallel GPI/O control port for alarms and control
- Flexible audio routing allows conversion between analog, AES, and SDI
- Internal auto-sensing power supply
- Utility ITU BS.1770 loudness meter (Optional)
- SNMP signaling (Optional)
- Backup external 12VDC supply (Optional)

1.1 Principles of Operation

The AERO.lite is a simplified, 2-channel (stereo) version of the Linear Acoustic AERO.one transmission loudness manager. It employs the same integrating long-term loudness controller and multiband short-term loudness controllers found in the AERO.lite and other AERO-series products.

Specific processing presets and adjustments are discussed in Chapter 4. Figure 1-1 shows the internal audio path of the AERO.lite.

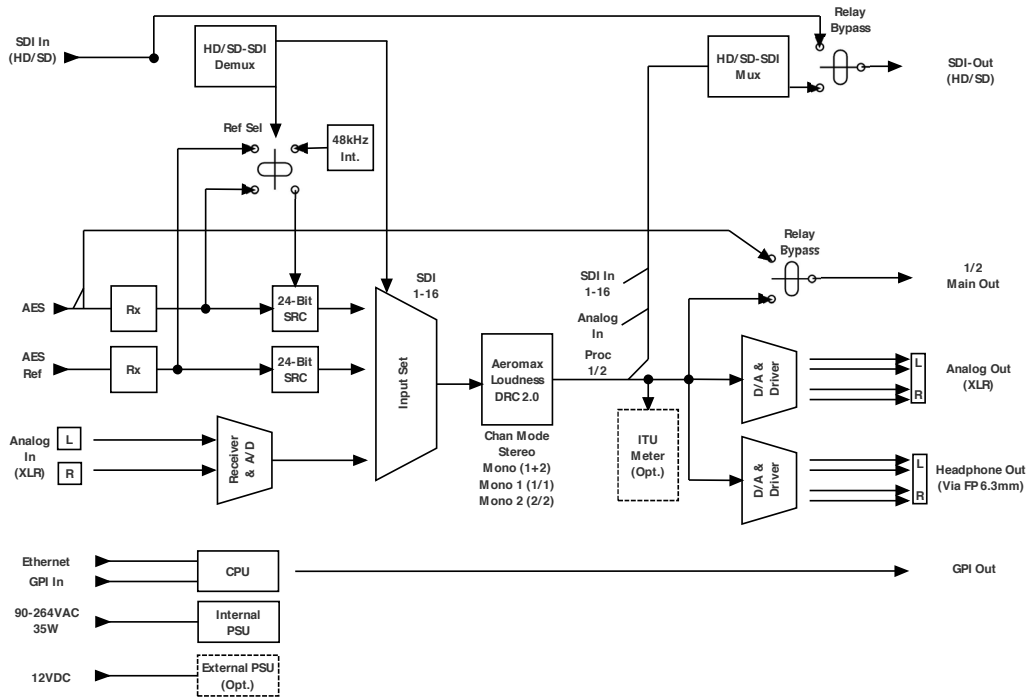
1.2 Location of AERO.lite

Audio processors can be placed in a variety of locations depending upon the design of the transmission path. We recommend you keep the AERO.lite as near to the final emission DTV encoder as possible, as the units work closely together and will benefit from short cable runs and common clocking.

1.3 Reference Levels

The AERO.lite is designed to support a standard reference level of -20dBFS via its digital inputs. Analog inputs support nominal levels from +4dBu (nominal) to +24dBu (maximum). Other levels are supported as the slow-moving Input AGC will easily compensate for differences.

Figure 1.1 AERO.lite Internal Audio Path



Chapter 2: Connections and Quick Setup

Far be it for us to get in the way of you and compelling audio. We want you to get your new AERO.lite up and running just as quickly as you do, and realize this is not the most exciting portion of any user manual. However, being thorough and careful now can prevent common issues related to improper installation later. Honest.

2.1 Unpacking and Inspection

Before unpacking the unit, inspect the outer carton for shipping damage. We use carefully designed shipping cartons and packing materials to protect our products during shipment, but sometimes, bad things happen in transit. If the carton shows damage, inspect the unit carefully in those areas.

In the unlikely even that the unit ever needs to be returned to to the factory, alternate cartons and packing materials may not adequately protect the contents. Therefore, we strongly encourage you to please save the original carton and packing materials.

In addition to a shiny new AERO.lite, we have also included a bag containing a quick-start sheet to get you up and running, an IEC power cord (style matches country of order), this manual, and the much sought-after Linear Acoustic Sharpie marker.

You'll also find the much maligned warranty card, which nearly everyone keeps with the manual (where it does neither you nor us any good). Please, keep your New Year's resolution to always do the right thing, fill out the card, and mail it in. It will allow us to get in contact with you for software or documentation updates, and we promise only to use the information for good, never evil. We won't clog your actual or electronic mailboxes with unsolicited stuff, and we'll never, ever share your information. Alternatively, you may FAX the card to us at +1-717-735-3612. Thank you in advance for helping us help you!

2.2 Installation

AERO.lite installation requires:

- One standard rack space unit with ADEQUATE VENTILATION. The unit relies on convection cooling from the side-panel vents).
- Standard 75-Ohm BNC cables for digital signal connections. To connect digital equipment with 110-Ohm XLR connectors, use impedance-matching transformers (available from Canare, Neutrik, and other manufacturers).
- Standard balanced XLR cables for analog signal connections.
- Proper reference. The unit provides an internal 48kHz reference input, or it can be synchronized to an external source via the AES Reference Input. All inputs have Sample Rate Converters (SRC's) but a master reference is required. Proper reference signal selection and application is imperative for an artifact-free installation. Clicks or pops in the audio can usually be traced back to improper reference configuration.

2.3 Rear Panel

The rear panel of the AERO.lite contains its electrical, signal, and control connections. Specific pinout information for GPI I/O is provided in Chapter 5.

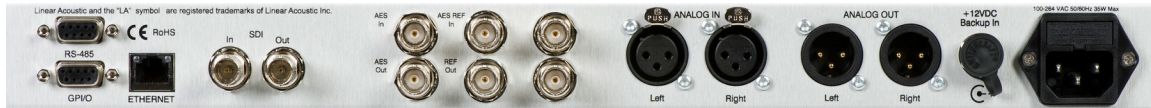


Figure 2-1 Rear Panel

RS-485 Connection

Not used at this time.

2.3.1 GPI/O

Connect dry contact closures here to for external control of certain functions. For example, you may wish to set up a means to recall a “Bypass Processing” preset if EAS is inserted ahead of the AERO.lite (though installing your EAS unit after the AERO.lite is preferred). Note that GPI functions require held closures for the duration of the desired function.

2.3.2 ETHERNET

10/100 BASE-T Network connection used for firmware upgrades and SNMP reporting.

2.3.3 SDI I/O

Permits de-embedding and re-embedding any of the 16 available channels in an applied HD-SDI or SD-SDI signal.

NOTE: Appropriate reference must be applied AND selected for proper operation. To aid in this critical setting, if SDI embedding is enabled, the clock source will automatically be set to SDI.

2.3.4 AES I/O

Inputs and outputs for 75-Ohm digital audio input and output. Note that the sync reference can be set to use this AES Input, or if the input signal is not referenced to the plant or is at a rate other than 48kHz, select the AES or SDI reference.

2.3.5 AES Reference I/O

Use AES Reference I/O to resynchronize the AERO.lite to an external reference, and be sure to choose AES Ref as the clock source in the Setup->I/O menu. Note that the AES Reference output is active and is locked to the selected reference signal (Internal, SDI, AES In, AES Ref In).

2.3.6 Analog I/O

Connect left- and right-channel analog Inputs and Outputs here. If you intend to use the internally-generated 48kHz reference signal, the analog inputs and outputs can be employed with no need for external reference signals.

2.3.7 Power

Connect the supplied IEC power cord to the internal power supply, and the (optional) external 12VDC power supply to the Backup In connection.

NOTE: *If using an alternate 12VDC power supply, it MUST be filtered and regulated and have an output of +12VDC +/-5%. Any damage caused by use of power supplies not provided by Linear Acoustic will not be covered by the warranty.*

2.4 Quick Setup Notes

The Linear Acoustic AERO.lite is configured at the factory and arrives ready to go on the air after making the proper input and output connections and establishing the proper I/O and clock sync settings.

- Apply audio to the SDI, AES, AES Reference, or Analog inputs as appropriate for your individual facilities.
- In the Setup->I/O menu, make sure the Input source corresponds to the type of input employed on the rear panel.
- While in the Setup->I/O menu, be sure to choose the proper clock reference for your application.
- Processed audio will be available on all audio outputs.

The best way to learn the AERO.lite is to explore its different settings with audio applied and monitored. There are several factory presets to support many different applications and tastes. Some presets may not sound much different at first, but will perform differently depending on program content.

NOTE: *For best audio quality, the AERO.lite should be the only processor in line with station audio. Please make sure to remove any legacy processing - especially anything that might be left over from previous analog transmission operations - it will impair the performance of the AERO.lite. We suggest checking station documentation and physical installations to make sure the old gear has been removed.*

3.1 Main Menu (Signal Status Meters)

3.1.1 Audio Input/Output Meters and LKFS Display

Shows input and output audio levels on the left and right channels, and the current loudness LKFS loudness measurements.

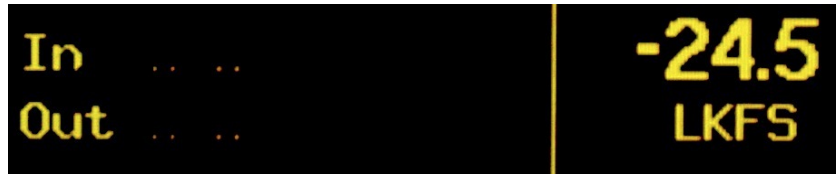


Figure 3-2 Input/Output Meters and LKFS Display

3.1.2 AGC/Processing Meters

Shows the amount of gain expansion or reduction of the wideband input AGC (W) and each band of the multiband AGC's (1-5). The stationary horizontal line in each band represents 0dB - the center of the meter's range. Meters above this line indicate expansion; meters below it indicate compression (gain reduction). More downward excursion of the meters represents more gain reduction is being applied.

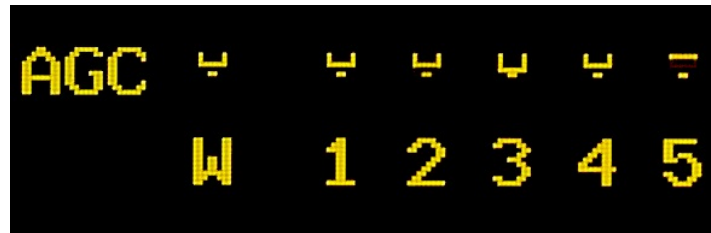


Figure 3-3 Processing Meters

3.1.3 GPI Status Display

Shows the current status of each of the four General Purpose Inputs, plus the current (active) preset.



Figure 3-4 GPI Status Display

3.1.4 GPO Status Display

Shows the current status of each of the four General Purpose outputs.

3.2 Statistics Menu

Provides detailed information about software, firmware and DSP versions, DSP communications status, device options, SNMP errors and packet information, and the presence of AES pairs 1-8, in the following order as you navigate downward in the menu:

3.2.1 Firmware Version

Shows current firmware version.

3.2.2 Device Options

Available options can be viewed by turning the menu knob.

3.2.3 App Uptime

Shows time running since the last reboot.

3.2.4 Ref Chg

Counts the number of times the system reference has changed since last reboot or reset. Moving the menu knob to the right resets the meter.

3.2.5 Reset LKFS

Shows the elapsed time since the last reset of the LKFS loudness meter. Moving the menu knob to the right resets the meter.

3.2.6 SNMP Trap Err(or)s

Indicates the number of SNMP trap errors and the error codes. Moving the menu knob to the right resets the meter.

3.2.7 SNMP Tx Errors

Shows the number of SNMP transmit errors and the error code. Moving the menu knob to the right resets the meter.

3.2.8 SNMP Rx Errors

Shows the number of SNMP receive errors and the error code. Moving the menu knob to the right resets the meter.

3.2.9 SNMP Pkt

Counts the number of trap, transmit, and receive packets since the last reboot or reset. Moving the menu knob to the right resets all counts.

3.2.10 DSP 1 Version

Shows current DSP 1 version.

3.2.11 DSP 1 Tx Errors

Shows the number of transmit errors between micro and DSP 1 and the error codes. Moving the menu knob to the right resets the meter.

3.2.12 DSP 1 Rx Errors

Shows the number of receive errors between micro and DSP 1 and the error codes. Moving the menu knob to the right resets the meter.

3.2.13 DSP 2 Version

Shows the current DSP 2 version.

3.2.14 DSP 2 Tx Errors

Shows the number of transmit errors between micro and DSP 1 and the error codes. Moving the menu knob to the right resets the meter.

3.2.15 DSP 2 Rx Errors

Shows the number of receive errors between micro and DSP 1 and the error codes. Moving the menu knob to the right resets the meter.

3.2.16 AES In Detect

Shows the presence of an AES carrier on any of the 8 audio channels.

3.3 Setup Menu

Entering the setup menu gives you access to several sub-menus, including the **Presets**, **I/O**, **Communication**, and **System** menus.

Moving the menu knob down one step from the main Setup Menu takes you to the these four sub-menus. Moving the menu knob left or right allows you to scroll between them. Once you've entered one of the sub-menus, moving the menu knob up or down navigates through the various functions of each.

Presets and processing are discussed in more detail in Chapter 4.

3.4 Presets Menu

3.4.1 User Preset

Shows the current (active) preset. Turning the menu knob scrolls through all available factory and user presets. An asterisk (*) appears in the display as soon as you move away from the currently employed preset. To put the preset on the air, move the menu knob to the right.

Moving the menu knob down from the User Preset menu provides access to the Input AGC, Multiband AGC, Multiband levels, Final Stage level, and the Preset Name editor. Please see Chapter 4 for a complete explanation of the processing menus.

3.5 I/O Menu

The Input/Output menu is where input and output audio are selected to interface with the loudness control (processing) engine.

3.5.1 Master Bypass

When enabled, de-energizes the audio and SDI relays for a hard bypass. This will create a brief interruption of these signals, and is a feature primarily designed for troubleshooting.

3.5.2 GPI Control

When enabled, the unit is under GPI control and most front-panel controls are disabled. You will also see a “g” in the left corner of the display indicating GPI control is active.

3.5.3 GPI Function (GPI 1-4)

Selects the function of each GPI input. Selections are:

- None: No function has been assigned for this GPI (as you may have guessed)
- Preset: GPI selects a preset.
- Reset LKFS: Resets the LKFS loudness meter.

3.5.4 GPI Preset (GPI 1-4)

Defines which of the stored presets a GPI will recall. Any factory or user preset can be recalled by GPI.

3.5.5 Channel Mode

Determines whether the output will be Stereo, Mono (L and R inputs combined in both L and R outputs), Mono Ch 1 (L channel input present at both L and R outputs), Mono Ch 2 (R channel input present at both L and R outputs). An asterisk (*) appears in the display as soon as you move away from the current setting. To put a new configuration on the air, move the menu knob to the right.

3.5.6 SRC Bypass

When enabled, bypasses the Sample Rate Converters. If the AERO.lite is synchronized to incoming signals and plant reference, there is no reason for the SRCs to be in line, and bypassing them will lower latency by about 3 milliseconds.

3.5.7 Headphone Boost

When enabled, increases the output level of the front panel headphone jack by 12dB. This enables very low-level audio to be heard. CAUTION: The headphone output can get LOUD, please use this selection carefully.

3.5.8 Clock SRC Type

The default selection of “Stable” is intended for external clock sources which are stable and unlikely to be disturbed (i.e. via asynchronous “crash” switching). If the chosen reference is regularly interrupted (yes, we know) then select “Changing” which enables a faster recovery from such disturbances.

3.5.9 Clock Source

Select SDI input, AES Input 1, AES Reference input, or Internal 48kHz (only for analog or stand-alone use).

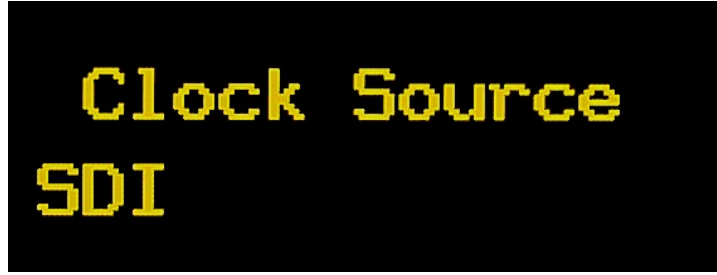


Figure 3-5 Clock Source Status

NOTE: The top status screen will indicate “No Ref” if the chosen reference is not detected. If Internal 48kHz is chosen, the status screen will indicate “Int Ref” to indicate that while valid for analog-only operation, the unit is not synchronized to any reference.

3.5.10 Proc In 1/2 Src

Determines which source provides audio for the loudness processing engine. Turning the menu knob scrolls through the following choices.

- SDI In (1/2, 3/4, 5/6, 7/8, 9/10, 11/12, 13/14, 15/16): Uses the selected SDI audio pair.
- Analog XLR In: Uses the analog audio inputs.
- AES In 1/2: Used the AES inputs.

3.5.11 SDI Embed Audio

Selects whether to enable audio re-embedding or pass the SDI signal through the AERO.lite untouched. Note this does not affect de-embedding, which is active at all times.

3.5.12 SDI Out

Selects the source for re-embedding into an applied SDI signal. Choices are the processed output (1/2), the input of any SDI pair, the AES inputs (1/2), the analog XLR inputs (1/2), or Muted. Turning the menu knob scrolls through these choices.

3.5.13 Integration Time (ITU Meter Option)

Adjusts the length or storage time of the integrator for the loudness meter. Faster settings (shorter times) will produce more quickly-moving readings and may result in less accurate average loudness readings. Choices are 3 seconds, 10 seconds, 30 seconds, and Infinite. The default setting is 10 seconds. Turning the menu knob scrolls through available settings.

The ITU Meter Option is discussed in more detail at the end of this chapter.

3.5.14 GPO (1-4) Alert When

Configures each of the four general purpose outputs

- Never: GPO inactive
- Follow GPI: Each GPO will match the state of the corresponding GPI, so that if GPI 1 is commanded Low, GPO 1 will follow.
- LKFS Over Thr: GPO will be active if the currently monitored input audio exceeds the adjustable threshold (described below).
- LKFS Under Thr: GPO will be active if the currently monitored input audio falls below the adjustable threshold (described below).
- Silence Detect: GPO will be active if silence (no audio) is detected at the currently selected input.
- Reference Loss: GPO will be active if a loss of the currently selected sync reference is detected.

3.5.15 GPO Threshold (1-4)

Adjustable from Mute to 0db, with -40dB as the default by turning the menu knob.

3.5.16 GPO On Delay (1-4)

Adjusts how long the unit will wait before triggering the GPO. Settings between 0 and 20 seconds are selectable by turning the menu knob. The default setting is 0 seconds.

3.5.17 GPO Off Delay (1-4)

Adjusts how long to hold a GPO function once triggered.

3.6 Communication Menu

Displays and, where applicable, adjusts the IP address, subnet mask, and MAC address. Changes can be made to the highlighted values by turning the menu knob. To move back and forth between settable value fields, move the menu knob left or right. An asterisk (*) indicates changes have been made to the particular parameter. To apply the changes, move the menu knob to the right one step past the final field. *When changes are applied, the front panel logo backlight will turn red, the unit will immediately reboot, and there will be an interruption to program audio.*

3.6.1 IP Address

Allows you to assign an IP address to the AERO.lite.

3.6.2 Net Mask

Allows you to configure the subnet mask.

3.6.3 Port Number

The port number is factory set at 2002.

3.6.4 MAC Address

Displays the unique MAC address of your particular AERO.lite.

3.6.5 SNMP Trap Address (1 & 2)

Two trap IP addresses can be set and any messages will be relayed to both. Please see section 3.8 for detailed SNMP information.

3.7 System Menu

Allows IP and I/O settings to be set back to factory defaults. These settings can be reset individually or together by turning the menu knob to scroll through IP Comm, I/O, or All.

3.8 ITU-R BS.1770 Meter (Option)

The goal for most broadcasters today is to transmit a signal that pleases audiences and is neither too loud nor too soft. If this is accomplished, and the transmitted loudness matches the corresponding loudness metadata (called *dialnorm* in the Dolby Digital encoder), compliant output can be achieved.

The ITU Meter Option is a simple utility ITU loudness meter used for calibrating the final loudness of the AERO.lite. This meter and others like it are based on an international standard developed to give an objective *estimation* of loudness levels, which are normally very subjective.

ITU meters are not perfect. They get us closer to agreement, and as long as everyone uses meters that comply with the BS.1770 standard, results can be much more consistent world-wide.

Integration provides a running average of a certain times worth of audio samples. Longer integration times give a better view of an entire program segment, with Infinite being the best. However, an infinite integration must be reset after each segment, else the meter becomes less sensitive to short term events that might occur and so is generally not a practical choice for continuous metering. However, when used correctly it can be an ideal choice and we provide a way to reset the meter via the front panel and a GPI control.

Very short integration times do not provide enough detail about the overall average for longer program or commercial segments. The CRC in Canada determined that 3 seconds is about fastest useful integration time, but in practical terms for checking the output of a station, it is probably still too fast. It will show variations quickly and tend to result in overly dense processing settings.

The best results for continuous loudness monitoring will be obtained with 10-second or 30-second integration times. Known as "leaky integration" these settings provide a continuous reset of the integrator. For the 10-second selection, samples that enter will "leak out" the integrator after 10 seconds.

3.9 SNMP (Option)

The AERO.lite supports error reporting via the Simple Network Management Protocol (SNMP). Status of critical information such as PSU health, unit bypass, audio presence, levels over/under threshold, loss of synchronization and others are reported.

The current AERO.lite MIB file is copied below. For use in an SNMP management system, this data can simply be copied and pasted into a text file that can be re-named LINEAR-ACOUSTIC-AERO-LITE.mib.

```

-----

LINEAR-ACOUSTIC-LA2002-MIB DEFINITIONS ::= BEGIN

-- MIB for Linear Acoustic la2002 devices

IMPORTS
    enterprises                FROM RFC1155-SMI
    TRAP-TYPE                  FROM RFC-1215
    OBJECT-TYPE                FROM RFC-1212;

linearAcoustic OBJECT IDENTIFIER ::= { enterprises 28660 }
la2002          OBJECT IDENTIFIER ::= { linearAcoustic 2002 }
la2002-system  OBJECT IDENTIFIER ::= { la2002 1 }
la2002-status  OBJECT IDENTIFIER ::= { la2002 2 }

--
-- la2002-system
--

-- model
la-model          OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0..40))
    ACCESS      read-only
    STATUS      mandatory
    DESCRIPTION
        "Linear Acoustic Model."
    ::= { la2002-system 1 }

-- software version
software-version OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0..40))
    ACCESS      read-only
    STATUS      optional
    DESCRIPTION
        "Device's software version."
    ::= { la2002-system 2 }

-- firmware version
firmware-version OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0..40))
    ACCESS      read-only
    STATUS      optional

```



```
DESCRIPTION
    "Devices's firmware version."
    ::= { la2002-system 3 }

--
-- la2002-status
--

-- Power Supply 1
power-supply-1 OBJECT-TYPE
    SYNTAX    INTEGER {fail (1), ok (2)}
    ACCESS    read-only
    STATUS    mandatory
    DESCRIPTION
        "Status of power supply 1."
    DEFVAL { 1 }
    ::= { la2002-status 1 }

-- Power Supply 2
power-supply-2 OBJECT-TYPE
    SYNTAX    INTEGER {fail (1), ok (2)}
    ACCESS    read-only
    STATUS    optional
    DESCRIPTION
        "Status of power supply 2."
    DEFVAL { 1 }
    ::= { la2002-status 2 }

-- Master Bypass
master-bypass OBJECT-TYPE
    SYNTAX    INTEGER {off (1), on (2)}
    ACCESS    read-only
    STATUS    optional
    DESCRIPTION
        "Status of Master Bypass."
    DEFVAL { 1 }
    ::= { la2002-status 3 }

-- System Reference
system-reference OBJECT-TYPE
    SYNTAX    INTEGER {absent (1), present (2)}
    ACCESS    read-only
    STATUS    optional
    DESCRIPTION
        "Status of System Reference."
    DEFVAL { 1 }
    ::= { la2002-status 4 }

-- Audio Detected (Primary)
pri-audio-detected OBJECT-TYPE
    SYNTAX    INTEGER {no (1), yes (2)}
    ACCESS    read-only
    STATUS    optional
    DESCRIPTION
```

```
"Detection of Primary Audio Signal."
DEFVAL { 1 }
::= { la2002-status 5 }

-- GPO1 Current State
gpo1-status OBJECT-TYPE
SYNTAX    INTEGER {off (1), on (2)}
ACCESS    read-only
STATUS    optional
DESCRIPTION
    "Status of GPO1."
DEFVAL { 1 }
::= { la2002-status 6 }

-- GPO2 Current State
gpo2-status OBJECT-TYPE
SYNTAX    INTEGER {off (1), on (2)}
ACCESS    read-only
STATUS    optional
DESCRIPTION
    "Status of GPO2."
DEFVAL { 1 }
::= { la2002-status 7 }

-- GPO3 Current State
gpo3-status OBJECT-TYPE
SYNTAX    INTEGER {off (1), on (2)}
ACCESS    read-only
STATUS    optional
DESCRIPTION
    "Status of GPO3."
DEFVAL { 1 }
::= { la2002-status 8 }

-- GPO4 Current State
gpo4-status OBJECT-TYPE
SYNTAX    INTEGER {off (1), on (2)}
ACCESS    read-only
STATUS    optional
DESCRIPTION
    "Status of GPO4."
DEFVAL { 1 }
::= { la2002-status 9 }

-- GPO1 Current Assignment
gpo1-assignment OBJECT-TYPE
SYNTAX    OCTET STRING (SIZE (0..40))
ACCESS    read-only
STATUS    optional
DESCRIPTION
    "Assignment of GPO1."
::= { la2002-status 10 }

-- GPO2 Current Assignment
```

```
gpo2-assignment OBJECT-TYPE
  SYNTAX   OCTET STRING (SIZE (0..40))
  ACCESS   read-only
  STATUS   optional
  DESCRIPTION
    "Assignment of GPO2."
    ::= { la2002-status 11 }

-- GPO3 Current Assignment
gpo3-assignment OBJECT-TYPE
  SYNTAX   OCTET STRING (SIZE (0..40))
  ACCESS   read-only
  STATUS   optional
  DESCRIPTION
    "Assignment of GPO3."
    ::= { la2002-status 12 }

-- GPO4 Current Assignment
gpo4-assignment OBJECT-TYPE
  SYNTAX   OCTET STRING (SIZE (0..40))
  ACCESS   read-only
  STATUS   optional
  DESCRIPTION
    "Assignment of GPO4."
    ::= { la2002-status 13 }

--
-- traps
--

-- 10/29/2010 RDC
-- Linear Acoustic rules for enterprise-specific traps
-- 1. Use trap numbers from 10 to 127.
--   This makes them different from generic traps (0 - 5) and
--   lets them fit into a consistent and small space in BER TLV packet.
-- 2. Do not include VARIABLES to keep the overall BER packet
--   size consistent.

-- Power Supply 1 failed
trap-ps1-failed TRAP-TYPE
  ENTERPRISE la2002
  DESCRIPTION
    "Trap, Power Supply 1 failed."
    ::= 10

-- Power Supply 2 failed
trap-ps2-failed TRAP-TYPE
  ENTERPRISE la2002
  DESCRIPTION
    "Trap, Power Supply 2 failed."
    ::= 11

-- Audio Loss (Primary)
trap-pri-audio-loss TRAP-TYPE
```

```
ENTERPRISE Ia2002
DESCRIPTION
  "Trap, Primary Audio lost or not detected."
::= 12

-- Audio Detected (Primary)
trap-pri-audio-detected TRAP-TYPE
ENTERPRISE Ia2002
DESCRIPTION
  "Trap, Primary Audio detected."
::= 13

-- GPO1 Turned On
trap-gpo1-on TRAP-TYPE
ENTERPRISE Ia2002
VARIABLES {gpo1-assignment}
DESCRIPTION
  "Trap, GPO1 On"
::= 14

-- GPO1 Turned Off
trap-gpo1-off TRAP-TYPE
ENTERPRISE Ia2002
VARIABLES {gpo1-assignment}
DESCRIPTION
  "Trap, GPO1 Off"
::= 15

-- GPO2 Turned On
trap-gpo2-on TRAP-TYPE
ENTERPRISE Ia2002
VARIABLES {gpo2-assignment}
DESCRIPTION
  "Trap, GPO2 On"
::= 16

-- GPO2 Turned Off
trap-gpo2-off TRAP-TYPE
ENTERPRISE Ia2002
VARIABLES {gpo2-assignment}
DESCRIPTION
  "Trap, GPO2 Off"
::= 17

-- GPO3 Turned On
trap-gpo3-on TRAP-TYPE
ENTERPRISE Ia2002
VARIABLES {gpo3-assignment}
DESCRIPTION
  "Trap, GPO3 On"
::= 18

-- GPO3 Turned Off
trap-gpo3-off TRAP-TYPE
```

```
ENTERPRISE la2002
VARIABLES {gpo3-assignment}
DESCRIPTION
  "Trap, GPO3 Off"
::= 19

-- GPO4 Turned On
trap-gpo4-on TRAP-TYPE
ENTERPRISE la2002
VARIABLES {gpo4-assignment}
DESCRIPTION
  "Trap, GPO4 On"
::= 20

-- GPO4 Turned Off
trap-gpo4-off TRAP-TYPE
ENTERPRISE la2002
VARIABLES {gpo4-assignment}
DESCRIPTION
  "Trap, GPO4 Off"
::= 21

END
```

Chapter 4: Presets and Processing

The Linear Acoustic AERO.lite contains multiple factory-programmed processing presets that have been developed after many hours of listening and experimenting, using hundreds of program sources across all genres for tuning. Preset creation is an ongoing process, and we regularly implement new presets based on customer feedback.

Unlike other Linear Acoustic products that employ the AEROMAX processing engine, the controls on the AERO.lite have been deliberately kept rather simple. However, several parameters, including AGC gate and freeze thresholds, multiband density, individual band levels, final stage limiter drive and master output, are adjustable.

4.1 Description of Factory Presets

Each unit ships with a number of presets that are useful for most situations. A brief description of each is provided below.

- TV_5B_GEN: This is the factory default and most commonly employed preset. It provides a moderate degree of dynamic range processing and is suitable for all types of content. This preset will deliver audio that will have an average dialog loudness of -24 LKFS.
- TV_5B_LIGHT: Very similar to TV_5B_GEN, but with a lower multiband compression ratio for more gentle action. This lighter processing may result in more *momentary* variation from the loudness target.
- TV_5B_HEAVY: Also similar to TV_5B_GEN, but with a higher multiband compression ratio, resulting in increased density and reduced dynamic range.
- TV_5B_LOUD: Similar to TV_5B_HEAVY, but louder and more punchy.
- ITU_LOUD_LIMIT: Utilizes specially-tuned Input AGC settings that allow the multiband and final limiters to control levels until the AGC catches up to adjust program loudness to a given value. This preset is more appropriate for ingest or live applications than for transmission as the Multiband AGC section is bypassed, which makes it less able to manage the spectral balance of incoming audio.
- PROTECTION LIMIT: Bypasses all processing except for the Final Output Limiter, which is set only to prevent overload.
- SPORTS: Multiband attack and release values have been modified for a smooth and consistent output for typical network sports programming. This preset has less range for both the Input AGC and Multiband AGC sections.
- MUSIC_HVY: Dense processing most suitable for TV music channel applications.

- USER PRESETS (9-16): AERO.lite provides room for 8 additional custom user presets.

4.2 Processing Structure

Below is a drawing showing the general signal path of the AERO.lite processing core.

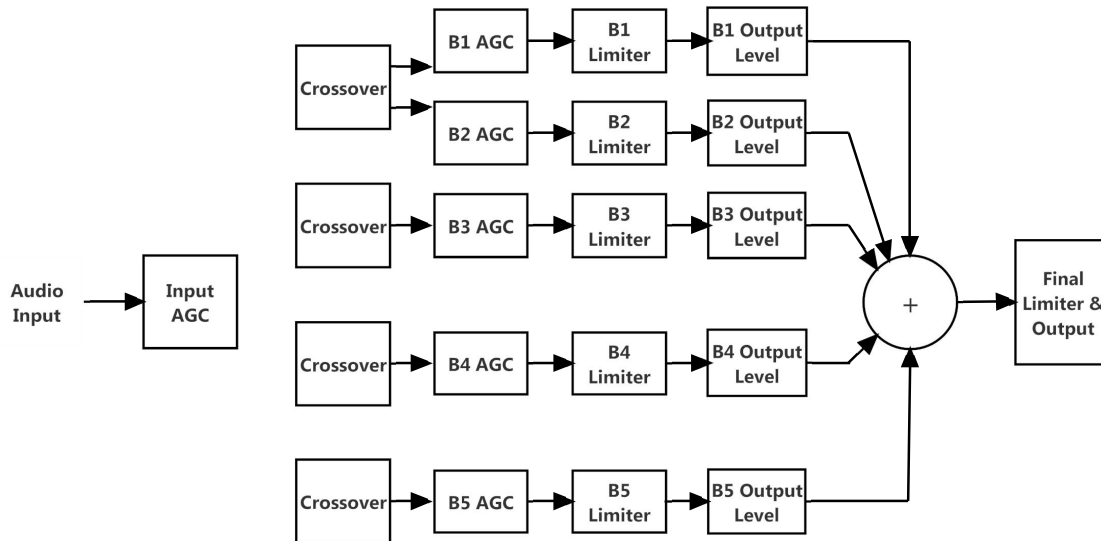


Figure 4.2 AERO.lite Processing Core

Certain parameters such as crossover frequencies and band coupling are not adjustable and are fixed to the most appropriate values. In keeping with the more straight-forward approach of the unit, some processing controls found in other Linear Acoustic products are not adjustable on the AERO.lite.

Moving the menu knob down two steps from the Presets menu will give you access to the adjustable parameters described below. Please see section 3.3.1 of Chapter 3 for more information about menu layout.

4.3 Input AGC

The input AGC is a very slow-acting front-end gain control with a 36dB range whose only purpose is to make sure processing stages that follow it are fed with the proper average audio levels. Being wideband in nature, the Input AGC is not meant to perform rapid gain reduction or expansion which would make its actions more noticeable, as with all wideband gain processors. As a slow gain-rider, its actions are nearly inaudible thanks to the multiband processing that follows it. The Input AGC has two stages of gating, which slows or stops expansion to prevent background noise from increasing.

4.3.1 Gate Threshold

This sets the point at which the Input AGC release slows down by a factor of three to prevent low-level audio (or background noise) from increasing quickly and audibly, while still permitting the AGC to return to unity gain. It is adjustable between 0dBFS and -90dBFS by turning the menu knob. To apply the change on-air, move the menu knob to the right. The default setting varies for different presets.

4.3.2 Freeze Thresh(old)

This sets the point at which the Input AGC remains frozen at its current gain value until audio exceeding this threshold is present. It is adjustable between 0dBFS and -90dBFS in the same manner as the Gate Threshold. The default varies for different presets. Programming containing frequent periods very quiet audio (golf matches come to mind) will benefit from having the Input AGC freeze at a higher (closer to 0dBFS) level. (The noise from the blimp or from someone unwrapping a mint on the next hole should not be brought up to the same level as the announcer).

4.4 Multiband AGC

This section is at the heart of the dynamics processing engine and allows you to adjust overall program density and the extent to which the AERO.lite maintains the spectral consistency of the source material.

4.4.1 Density

The range of this control is expressed in relative numbers between 0 and 10. When you adjust the density control, a combination of changes to the Multiband AGC processor are being made “behind the scenes,” including adjustments to thresholds, attack and release rates, and ratios. Lower numbers result in more conservative, dynamic settings that stay more true to the original program content, while higher numbers will provide “tighter” dynamics and more source-to-source spectral consistency.

4.5 Multiband Levels

This section controls the output of each of the 5 bands in the multiband AGC section and can be used to tailor the overall frequency response of the AERO.lite. Each band (1 - 5) has a range of +/- 12dB, adjustable in 0.25dB increments. Because these controls are located before the final look-ahead limiter, increasing gain may result in more final limiting - perhaps more than desired.

After making significant changes to these levels, we recommend you re-examine the final limiter settings and adjust the Output Limiter Drive control (described below) as needed.

4.6 Final Stage

The final section of the processor is where the final peak limiter and output levels are set. The final limiter is of the wideband, look-ahead variety, extremely fast in nature, and capable of up to 6dB of gain reduction. It is also very transparent and virtually inaudible even at full gain reduction, and designed to control audio peaks that make it through the previous multiband stage.

4.6.1 Output Lim(ite)r Drive

Sets the level at which the wideband sum of all bands is fed to the final limiter over a range of -6dB - +6dB, in 0.25dB increments.

4.6.2 Master Output

Sets the output loudness level for the current preset. If the ITU Loudness Meter option is not present, an external meter such as the Linear Acoustic LQ-1000 or LAMBDA-II is required to properly set loudness levels.

Chapter 5: Troubleshooting

The Linear Acoustic AERO.lite is a very stable and reliable unit, and most problems can be traced back to mis-wiring causing incorrect signals to be applied to the unit, or, more than likely, mis-configuration. As simple as this unit is to use once installed, it is very flexible and thus a necessarily complex processor. In an effort to speed troubleshooting, some common problems and solutions are described below.

5.1 Problems and Possible Causes

5.1.1 Unit Won't Power On

At the risk of sounding like the start of a horribly long and cliché-ridden technical support call, check the obvious and make sure the power cord or cords are plugged into a live AC outlet (it happens).

The next thing to check is the power supply fuse. Remove the power cord and use a small, flat-blade screwdriver to carefully remove the fuse holder from the IEC inlet module. The holder carries a spare fuse and extras were included in the packing kit with the unit. If the fuse is bad and continues to blow, please contact the factory.

5.1.2 Output Audio Clicks and Pops

The most likely culprit of clicks and pops is incorrect reference. The AERO.lite contains sample rate converters that are active by default and allow digital audio signals of any sample rate to be accepted. For installations in digital environments, the AERO.lite *digital outputs* should slave to plant timing. This can be accomplished by ensuring that proper reference is connected and selected: If using the AES outputs, reference should be set to AES Input or AES Reference, or even SDI. For SDI, reference is automatically set to SDI. Internal Reference should be reserved for asynchronous use, such as when using only the analog outputs.

Note that clicks and pops can also originate upstream of the unit. Since AERO.lite will add gain to the input signal, these noises may become more apparent.

5.1.3 Audio Pumps and Breathes

These artifacts are sometimes audible in less sophisticated processors or when the attack and release times are not properly adjusted. The factory presets included with the AERO.lite will not cause pumping or breathing. If you do detect these artifacts, it is possible that audio is being processed somewhere in the plant by legacy gear that has not been removed from the signal path. The AERO.lite performs best when it receives unprocessed audio. If you are using a custom preset in lieu of a factory preset, closely examine attack time, release time, and gating controls and adjust as necessary to avoid these artifacts.

5.1.4 Problems with EAS Encoding

EAS encoding equipment should be located after any audio processor, including AERO.lite. It is critical that processing be minimized for use with current EAS systems.

Chapter 6: Specifications

Table 6-1 Electrical Specifications

Sample Rate	48kHz
Resolution	24-bit
Frequency Response	20Hz - 20kHz below processing thresholds.
Processing Delay	13.7 msec, SRC Off; 16.6 msec SRC On
Processing Algorithms	Linear Acoustic AEROMAX multistage adaptive wideband and multiband loudness and dynamic range control.
SDI I/O	Auto-sensing HD/SD-SDI (SMPTE 292M/259M) inputs, up to 1080i/60/59.94/50Hz, with access to all 16 audio channels.
AES I/O (including AES Ref)	75-Ohm BNC female connectors with 75-Ohm input termination, relay bypassed to outputs in case of power loss or fault; signal levels per SMPTE 276M/AES-31D-2001.
Analog I/O	10K Ohm balanced XLR female stereo inputs, +4dBu nominal, +24dBu max; Balanced XLR male stereo outputs, +4dBu nominal, +24dBu max into 600 Ohms.
Headphone Output	6.3mm front panel connector, +12dBu max into 600 Ohms.
Parallel GPI/O Control Port	9-pin female D connector, 0-5V TTL levels.
Ethernet Port	RJ-45 female jack connector.
Power Requirements	Standard internal supply: 90-264 VAC, 50/60Hz, auto-sensing, 35W maximum. Optional redundant backup supply: 12VDC +/-5% regulated, 2.5A maximum via 2.5mm sealed, locking connector, center pin is positive!

Table 6-2 Mechanical Specifications

Dimensions	1RU height; 1.75"H x 19"W x 11.5"D (44 x 483 x 293 mm)
Net Weight	6 lbs (2.72 kg)
Shipping Weight	8 lbs (3.62 kg) approximate.

Table 6-3 Environmental Specifications

Operating Temperature	Convection cooled. 32 - 122 degrees F (0 - 50 degrees C)
Non-Operating (Stored) Temperature	Minus 4 -158 degrees F (Minus 20 - 70 degrees C)
Regulatory/EMC Limits	<p>North America: Designed to comply with with limits for a Class A digital device pursuant to Part 15 of the FCC rules (CFR). Designed for U.S. and Canadian listing with UL.</p> <p>Europe: Designed to comply with the requirements of Low Voltage Directive 73/23/EEC and EMC Directive 89/336/EEC. Designed for RoHS and WEEE compliance.</p>

Table 6-4 GPIO Parallel Control Port

Pin	Connection
1	GPI 1
2	GPI 2
3	GPI 3
4	GPI 4
5	Ground/Common
6	GPO 1
7	GPO 2
8	GPO 3
9	GPO 4