LINEAR ACOUSTIC®

AERO.100 Audio Loudness Manager User Guide

Release date: November 2016 (v4)
Software Version 3.15.26 and later

Contents

1 Warranty Information

DISCLAIMER OF WARRANTIES: Products manufactured by Linear Acoustic are warranted against defects in material and workmanship for a period of two (2) years from the date of purchase. **THERE ARE NO OTHER IMPLIED OR EXPRESS WARRANTIES AND NO WARRANTY FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

During the warranty period Linear Acoustic Inc. will repair, or at our discretion replace, components which prove to be defective, provided the unit is returned, shipped pre-paid to us directly with a return authorization (RA) number clearly marked on the packaging. **Please note, this RA number must be present or package will be refused and returned to sender.** All requests for repairs MUST include the unit serial number to ensure quick and accurate service.

1. **DEFECTS CAUSED BY UNAUTHORIZED MODIFICATIONS, MISUSE OR ACCIDENTS, UNAUTHORIZED CUSTOMER REPAIRS, OR ANY FURTHER DAMAGE CAUSED BY INADEQUATE PACKAGING FOR SERVICE RETURN ARE NOT COVERED BY THIS WARRANTY.**

PLEASE SAVE THE SHIPPING CARTON AND ALL PACKING MATERIALS. FAILURE TO RETURN UNIT IN ORIGINAL SHIPPING CARTON AND PACKING MATERIALS WILL RESULT IN A CHARGE FOR NEW SHIPPING MATERIALS.

LIMITATION OF PERIOD OF ACTION ON CONTRACT: No action, regardless of form, arising out of the transactions under this agreement may be brought by buyer, its successors, agents and/or assigns, more than three years from date of purchase.

LIMITATION OF LIABILITY: It is understood and agreed that Linear Acoustic's liability whether in contract, in tort, under any warranty, in negligence or otherwise shall not exceed the cost of repair or replacement of the defective components and under no circumstances shall Linear Acoustic be liable for incidental, special, direct, indirect or consequential damages, or loss of use, revenue or profit even if Linear Acoustic or its agents have been advised, orally or in writing, of the possibility of such damages.

This product contains Audyne dynamic range processing and is manufactured under license.

This product optionally contains technologies from Dolby® Laboratories. Manufactured under license from Dolby Laboratories. Dolby and the double-D symbol are trademarks of Dolby Laboratories.

This product optionally contains Nielsen Watermarking technology and is manufactured under license.

Linear Acoustic, the "LA" symbol, UPMAX, AEROMAX, AERO.100, AERO.air, AutoNorm, MetaMAX, AutoMAX-II, AutoVoiceover, AutoVOX, AutoSAP, and CrowdControl, are trademarks or registered trademarks of Linear Acoustic Inc., all other trademarks remain the property of their respective owners.

2 Regulatory Notices and Fusing Information

2.1 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.

2.2 Canada

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

2.3 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 disconnected 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 power outlet must be used. Do not use a ground-lifting adapter and never cut the ground pin on the three-prong plug.
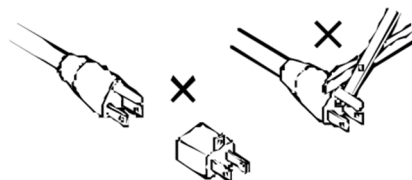
2.4 UK

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.

2.5 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 LIQUID S, 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:

- ENSURE THAT YOUR MAINS SUPPLY IS IN THE CORRECT RANGE FOR THE INPUT POWER REQUIREMENT OF THE UNIT.
- ENSURE FUSES FITTED ARE THE CORRECT RATING AND TYPE AS MARKED ON THE U NIT.
- THE UNIT MUST BE EARTHED BY CONNECTING TO A CORRECTLY WIRED AND EARTHED POWER OUTLET.
- 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 CLABOUSSURES OU AUX GOUTTES DE LIQUIDE. NE PAS POSER D'OBJETS REMPLIS DE LIQUIDE, TELS QUE DES TASSES D E CAFÉ, SUR L'APPAREIL. POUR VOUS ASSURER D'UN FONCTIONNEMENT SANS DANGER ET DE PRÉVENIR TOUT CHOC ÉLECTRIQUE OU TOUT RISQUE D'INCENDIE, VEILLEZ À OBSERVER LES RECOMMANDATIONS SUIVANTES.

- LE SELECTEUR DE TENSION DOIT ÊTRE PLACÉ SUR LA VALEUR CORRESPOND ANTE À VOTRE ALIMENTATION RÉSEAU.
- LES FUSIBLES DOIVENT CORRESPONDRE À LA VALEUR INDIQUÉE SUR LE MATERIEL.
- LE MATERIEL DOIT ÊTRE CORRECTEMENT RELIÉ À LA TERRE.
- LE CORDON SECTEUR LIVRÉ AVEC LE MATERIEL DOIT ÊTRE CABLÉ D E 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 U SW.) IN BERÜHRUNG KOMMEN; STELLEN SIE KEINE GEFÄßE, Z.B. KAFFEETASSEN, AUF DAS GERÄT. FÜR DAS SICHERE FUNK TIONIEREN DES GERÄTES UND ZUR UNFALLVERHÜTUNG (ELEKTRISCHER SCHLAG, FEUER) SIND DIE **FOLGEND EN REGELN UNBEDINGT EINZUHALTEN:**

- DER SPANNUNGSWÄHLER MUß AUF IHRE NETZSPANNUNG EINGESTELLT SEIN.
- DIE SICHERUNGEN MÜSSEN IN TYP UND STROMWERT MIT DEN ANGABEN AUF DEM GERÄT ÜBEREINSTIMMEN.
- DIE ERDUNG DES GERÄTES MUß ÜBER EINE GEERDETE STECKDOSE GEWÄHRLEIS TET SEIN.
- DAS MITGELIEFERTE NETZKABEL MUß WIE FOLGT VERDRAHTET WERD EN:
  PHASE—BRAUN NULLEITER—BLAU ERDE—GRÜN/GELB

NORME DI SICUREZZA – IMPORTANTE

QUESTA APPARECCHIATURA È STATA COSTRUITA IN ACCORD O 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 ÊLETTRICA O D 'INCENDIO VANNO OSSERVATE LE SEGUENTI MISURE DI SICU REZZA:

- ASSICURARSI CHE IL SELETTORE DI CAMBIO TENSIONE SIA POS IZIONATO SU L VALORE CORRETTO.
- ASSICURARSI CHE LA PORTATA ED IL TIPO DI FUSIBILI SIANO QUELLI PRESCRITTI DALLA CASA COSTRU TTRICE.
- L'APPARECCHIATURA DEVE AVERE UN COLLEGAMENTO DI MESSA A TERRA BEN ESEGUITO; ANCHE LA CONNESS IONE RETE DEVE
- AVERE U N COLLEGAMENTO A TERRA.
- IL CAVO DI ALIMENTAZIONE A CORREDO DELL'AP PARECCHIATU RA DEVE ESSERE COLLEGATO COME SEGUE:
  FILO TENSIONE—MARRONE NEUTRO—BLU MASSA—VERDE/GIALLO

AVISO IMPORTANTE DE SEGURIDAD

ESTA UNIDAD CUMP LE CON LA NORMA DE SEGURIDAD EN60 065. LA UNIDAD NO DEBE SER EXPUESTA A GOTEOS O SALPICADURAS Y N O DEBEN COLOCARSE SOBRE EL EQUIPO RECIPIENTES CON LIQUIDOS, COMO TAZAS DE CAFE. PARA ASEGURARSE UN FUNCIONAMIENTO S EGURO Y PREVENIR CUALQUIER POS IBLE P ELIGRO DE DESCARGA O RIESGO D E INCENDIO, SE HAN DE OB SERVAR LAS SIGUIENTES PRECAUCIONES:

- ASEGÚRESE QUE EL SELECTOR DE TENSIÓN ESTÉ AJUSTADO A LA TENSIÓN CORRECTA PARA SU ALIMENTACIÓN.
- ASEGÚRESE QUE LOS FUSIBLES COLOCADOS SON DEL TIPO Y VALOR CORRECTOS, TAL COMO SE MARCA EN LA UNIDAD.
- LA UNIDAD DEBE SER PUESTA A TIERRA, CON ECTÁNDOLA A UN CONECTOR DE RED CORRECTAMENTE CABLEADO Y PUESTO A TIERRA.
- EL CABLE DE RED SUMINISTRAD O CON ESTA UNIDAD, DEBE SER CABLEADO COMO SIGU E:
  VIVO—MARRÓN NEUTRO—AZU L TIERRA—VERDE/AMARILLO

VIKTIGA SÄKERHETSÅTGÄRDER!

DENNA ENHET UPPFYLLER SÄKERHETS STANDARD EN60065. ENHETEN FÅR EJ UTSÄTTAS FÖR YTTRE ÅVERKAN SAMT FÖREMÅL INNEHÅLLANDE VÄTSKA, S ÅSOM KAFFEMUGGAR, FÅR EJ PLACERAS PÅ UTRUSTNINGEN." FÖR ATT GARANTERA SÄKERHETEN OCH GARDERA MOT EVENTUELL ELCHOCK ELLER BRANDRISK, MÅSTE FÖLJANDE OBS ERVERAS :

- KONTROLLERA ATT SPÄNNINGSVÄLJAREN ÄR IN STÄLLD PÅ KORREKT NÄTSP ÄNNING.
- KONROLLERA ATT SÄKRINGARNA ÄR AV RÄTT TYP OCH FÖR RÄTT STRÖMSTYRKA SÅ SOM ANVISN INGARNA PÅ ENHETEN FÖRESKRIVER.
- ENHETEN MÅSTE VARA JORDAD GENOM ANSLUTNING TILL ETT KORREKT KOPPLAT OCH JORDAT EL-UTTAG.
- EL-SLADDEN SOM MEDFÖLJER DENNA ENHET MÅSTE KOPPLAS ENLIGT FOLJANDE:
  FAS—BRUN NEUTRAL—BLÅ JORD—GRÖN/GUL

BELANGRIJK VEILIGHEIDS-VOORSCHRIFT:

DEZE UN IT VOLDOET AAN DE EN60065 VEILIGHEIDS-STANDAARDS. DIT APPARAAT MAG NIET ORDEN BLOOTGESTELD AAN VOCHT. VANWEGE HET RISICO DAT ER DRUPPELS IN HET APPARAAT VALLEN, DIENT U ER GEEN VLOEISTOFFEN IN BEKERS OP TE PLAATSEN. VOOR EEN VEILIG GEBRUIK EN OM HET GEVAAR VAN ELECTRIS CHE SCH OKK EN EN HET RISICO VAN BRAND TE VERMIJDEN, DIENEN DE VOLGENDE REGELS IN ACHT TE WORDEN GENOMEN:

- CONTROLEER OF DE SPANNINGSCAROUSSEL OP HET JUISTE VOLTAGE STAAT.
- GEB RUIK ALLEEN ZEKERINGEN VAN DE AANGEG EVEN TYPEN EN WAARDEN.
- AAN SLUITING VAN DE UNIT ALLEEN AAN EEN GEAARDE WANDCON TACTDOOS.
- DE N ETKABEL DIE MET DE UNIT WORDT GELEVERD, MOET ALS VOLGT WORDEN AAN GESLOTEN:

FASE—BRUIN NUL—BLAUW AARDE—GROEN/GEEL

2.6 Fusing Information

⚠️ 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.
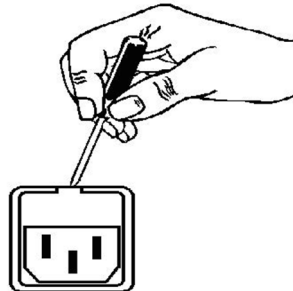
2. Check that the replacement fuse has the correct rating. The fuse carrier must be inserted into the compartment carefully. Do not force the carrier into the compartment or both could be damaged.

3. Snap the fuse compartment door closed.

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.

2.7   Notice

All versions, claims of compatibility, trademarks, etc., of hardware and software products not made by Linear Acoustic which are mentioned in this manual or accompanying material are informational only. Linear Acoustic makes no endorsement of any particular product for any purpose, nor claims any responsibility for operation or accuracy. We reserve the right to make improvements or changes in the products described in this manual which may affect the product specifications, or to revise the manual without notice.

2.8   Updates

The operation and features of the AERO.100 are determined largely by software. From time to time we may release new versions to add features and fix bugs. Check the Linear Acoustic web site for the latest information.

2.9   Feedback

We welcome feedback on any aspect of AERO.100 or this manual. In the past, many good ideas from users have made their way into software revisions or new products. Please contact us with your comments.

2.10   Service

You must contact Linear Acoustic before returning any equipment for factory service. We will need your unit's serial number, located on the back of the unit. Linear Acoustic will issue a return authorization number, which must be written on the exterior of your shipping container. Please do not include cables or accessories unless specifically requested by the Technical Support Engineer. Be sure to adequately insure your shipment for its replacement value. Packages without proper authorization may be refused. US customers, please contact Linear Acoustic Technical Support at +1 (717) 735-3611 and listening through to the end of the message. All other customers should contact local representative to make arrangements for service.

2.11 Support

You may reach our 24/7 Support team anytime around the clock by calling:
+1 (717) 735-3611 and listening through to the end of the message.

For billing questions or other non-emergency technical questions, call:
 +1 (717) 735-3611 between the hours of 9:00 AM to 5:00 PM, USA Eastern time, Monday through Friday.

Our Fax number: +1-717-735-3612
Technical support is available at support@linearacoustic.com

All other questions, please email sales@linearacoustic.com

The Linear Acoustic web site has a wealth of information which may be useful for product selection and support. The URL is www.linearacoustic.com.

2.12   Register Your Product

Did you know that all Linear Acoustic products come with a 2-Year Warranty? Take a moment to activate your coverage online under the Support tab at www.linearacoustic.com.

3 Introduction to AERO.100

3.1 Definitions and Abbreviations

AD is associated dialogue and is similar to descriptive video service in North America. AD is used in Europe.

AES is sometimes used in the manual as an abbreviation for an AES-3 digital audio connection.

An **AMX Instance**, or simply "Instance", refers to a virtual block of processing capability. The AERO.100 comes loaded with one AMX5.1 Instance and, optionally, can have one additional Instance of AMX5.1, AMX2.0, or AMX5x2 added at the time of purchase or in the field at a later time.

- An AMX5.1 Instance is capable of processing a surround program and two stereo programs. This is referred to as 5.1 + 2 + 2 (or in some references as 5.1 + 2 + Local)

- An AMX2.0 Instance is capable of processing three stereo programs. One source can be 5.1 or mixed 5.1 and stereo. The 5.1 source will be downmixed. AMX2.0 is also referred to as 2 + 2 + 2 (or in some references as 2 + 2 + Local)

- An AMX5x2 Instance is capable of processing five stereo programs. One source can be 5.1 or mixed 5.1 and stereo. The 5.1 source will be downmixed. AMX5x3 is also referred to as 2+2+2+2+2.

In addition to multiple independent loudness control processors an Instance has many processing functions. These include:

- Loudnes management
- Two UPMAX II upmixers, one for main program and one for local insert. (In AMX5.1 instances only)
- Automatic and seamless switching between surround and upmixing of stereo inputs (AUTOMAX)
- Downmixing with a choice of left only/right only (Lo/Ro) or Dolby ProLogic left total/right total (Lt/Rt)
- Creation of dual channel mono from one channel of an input pair (for SAP, DVS and local emergency audio)
- Automatic replacement of SAP (or any stereo/mono source) with a downmix of the main channel
- SDI source pair shuffling and embedding of AES digital audio inputs into the SDI output
- Local program insertion
- EAS or local emergency audio insertion

A **DRC** is the Dynamic Range Control portion of an Instance which provides loudness control and audio processing including downward expansion and parametric equalization (PEQ) in addition to mulriple stages of single band and wide band (WB) processing. Each Instance has 3 or more DRC engines; DRC 1, DRC 2 and DRC 3 (also called DRC Local) are the minimum number for any instance. In the AERO.100 interface, DRC 1, DRC 2 and DRC Local are sometimes referred to as DRC - Program 1, DRC - Program 2 and DRC - Local. An AMX5x2 engine has five DRC engines; DRC 1a, DRC1b, DRC 1c, DRC 2 and DRC3

DRC Local (or just "Local") is the DRC with the capability to replace the output of DRC 1(a), DRC2, or or both DRC 1(a) and DRC 2 programs, with locally inserted audio. The replacement can be triggered by GPI, by IP command or manually.

Please see the block diagrams of the AMX5.1 and AMX5x2 and AMX2.0 instances for more information about signal flow.

DARS is "digital audio reference signal". This is an AES digital audio signal and can be silent or contain audio. A timing reference is derived from the AES signal's timing. This is NOT word clock.

DVS is descriptive video service

SAP is secondary audio program

This rest of this Section includes:

- A description of back panel connectors

- System block diagrams

- A note on powering the AERO.100

See *Connector Pinouts*, at the end of the manual, for AES and analog connector, Metadata, and GPI pinout tables.

3.2   AERO.100 Basics

The Linear Acoustic AERO.100 Audio Loudness Manager is a state-of-the-art, adaptive, multiband, broadcast audio loudness controller with one or (optionally) two processing Instances, each of which can be an AMX5.1, AMX5x2 or AMX2.0.

Each processing engine within the configuration can apply loudness control to the incoming audio content. An AMX5.1 can accept either discrete 5.1 audio or 2.0 content and upmix 2.0 content to 5.1 surround. The 2-channel DRCs can function as independent stereo processors for other audio programs such as SAP or DVS, or provide an Lo/Ro or Lt/Rt downmix of the 5.1 output (including automatic replacement of a downmix in the absence of SAP audio) and,

depending upon the specifics of the configuration, insert local audio such as EAS or local emergency audio.

The AMX2.0 processing engine can downmix surround content to stereo to provide full time stereo output with sources that are a mix of 5.1 surround and stereo programs. The additional 2 channel DRCs provide SAP and/or DVC features and local program insertion.

The AMX5x2 processing Instance provides five stereo DRCs and DRC 4 and DRC 5 provide the same SAP and DVS and local insertion features as the AMX5.1 and AMX2.0.

Professional audio metadata can be applied to the AERO.100 to minimize processing and control functions, such as upmixing. AERO.100 protects itself against loss of incoming metadata with reversion modes that apply user set reference loudness values. The resulting audio is clean, consistent, and appropriately dynamic - perfect for transmission to consumers via Dolby® Digital (AC-3), Dolby Digital Plus (E-AC-3), or any other format.

The AERO.100's features include:

- Program configurations: any combination of two AMX5.1 (5.1+2+2), AMX2.0 (2+2+2), or AMX5x2 (2+2+2+2+2) processing engines with support for local input on the last stereo DRC of each instance.

- HD/SD-SDI audio de-embedding and re-embedding for all eight embedded channel pairs plus four pairs of AES-3, unbalanced, I/O.

- AEROMAX® multiband loudness processing which provides ATSC A/85 and EBU R128 compliant audio. AEROMAX includes wideband input AGC plus two additional wideband AGC's, two to five bands of multiband AGC and limiting, parametric EQ, look-ahead final peak limiting, and selectable multiband source noise reduction.

- ITU-R BS.1770-3 meters for LKFS or EBU R-128 measurement of each output program.

- Selectable independent upmixers for main and local program sources, utilizing the industry-standard UPMAX®II algorithm and AUTOMAX® detection and automatic switching between stereo and discrete 5.1 sources.

- Full-time Lt/Rt or Lo/Ro downmix (or stereo output) of main 5.1-surround or main stereo channel program is selectable on two stereo program outputs.

- SDI video delay.

- Dual, redundant, auto-ranging power supplies.

- Decoding options: Dolby Digital, Dolby Digital Plus and/or Dolby E.

- Encoding options: Dolby Digital, Dolby Digital Plus and/or Dolby E.

- GPI and Ethernet control.

- NfRemote IP-based, full-function remote control for configuration and monitoring.

- Nielsen® Watermark encoding option for all program outputs.

- Internal logging of loudness measurement data, True Peak, and channel configuration (acmod) and the value of dialog normalization (dialnorm) found in the Dolby encoded bitstream for each program output.

3.3   Back Panel

Figure 3-1 AERO.100 back panel

Figure 3-1 shows the AERO.100 back panel. Its connector functions are described below from left to right:

- **Analog I/O** (DB9F) – not used

- **Metadata I/O** (DB9F) – RS-485 metadata (no crossover cable required)

- **Reserved** (RJ45) – Reserved for future use

- **ETHERNET** (RJ45) – Auto-sense 100/1000 BASE-T, *requires connection to stable network*

- **SDI I/O** (dual BNC) – Auto-sensing SD/HD, supports 16 audio channels, VANC metadata, and has internal compensating video delay

- **Main AES I/O** (BNC) – 4 AES digital audio pairs I/O

- **AES Ref** (BNC) – Apply 48 kHz DARS (Digital Audio Ref Signal), or any AES signal, but not video. Use only if SDI embedding is disabled.

- **ENC Out** (BNC) – Encoder output, fed in parallel with AES digital SDI audio output pair 15/16

- **Vref** (BNC) – Video reference input (supported with firmware versions 0x20000053 and above.)

- **LTC In** (BNC) – LTC timecode input (not currently supported)

- **AES I/O** (DB25) – 4 AES audio pairs

- **GPI/O** (DB25) – Eight parallel inputs, 5-V TTL levels, active low

- **PSU1/PSU2** – AC power inlets

Note!

All BNC inputs are 75-Ω internally terminated.

3.4   System Block Diagram

Figure 3-2 shows AERO.100's physical I/O on the left and right sides, respectively, and AMX5.1 processing (5.1 + 2 + 2).
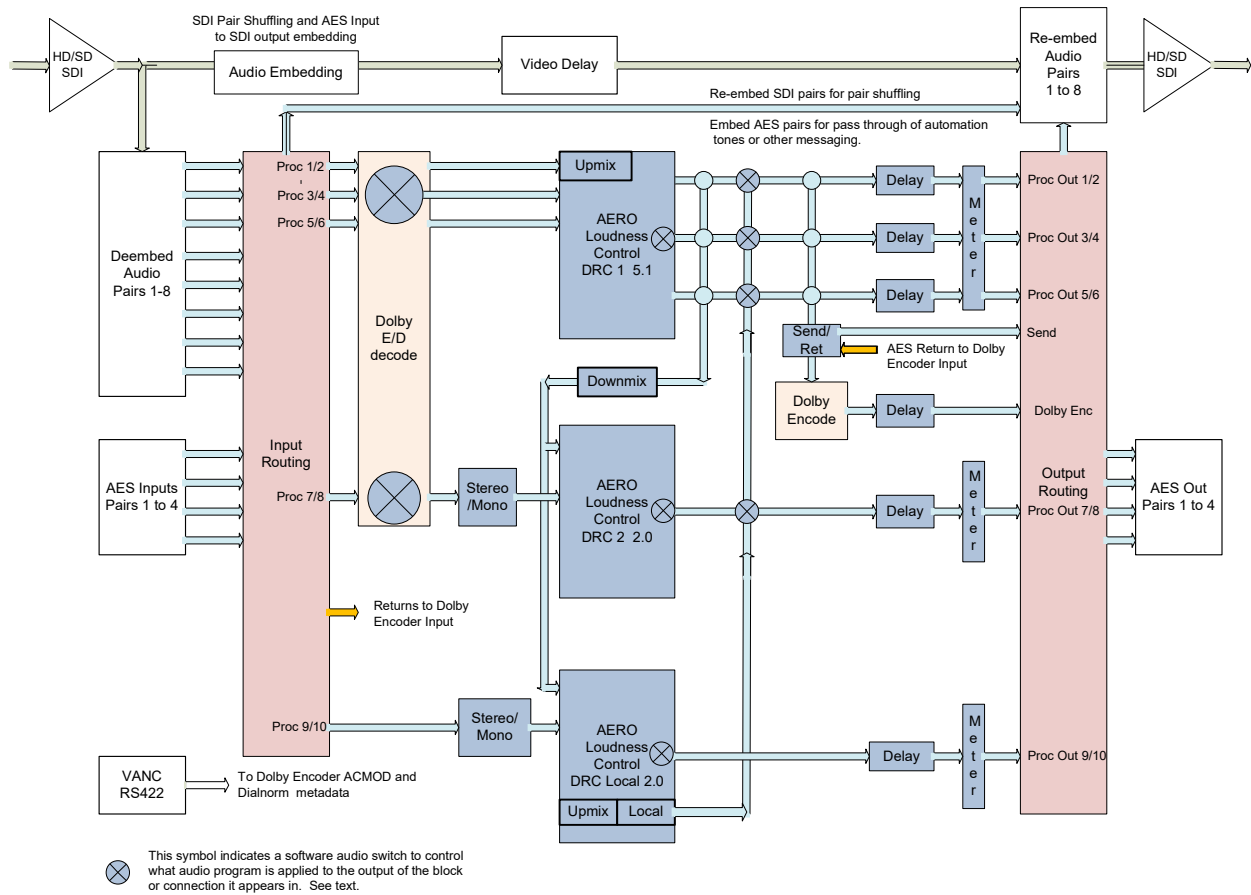

Figure 3-2 AERO.100 block diagram AMX5.1 (5.1 + 2 + 2)

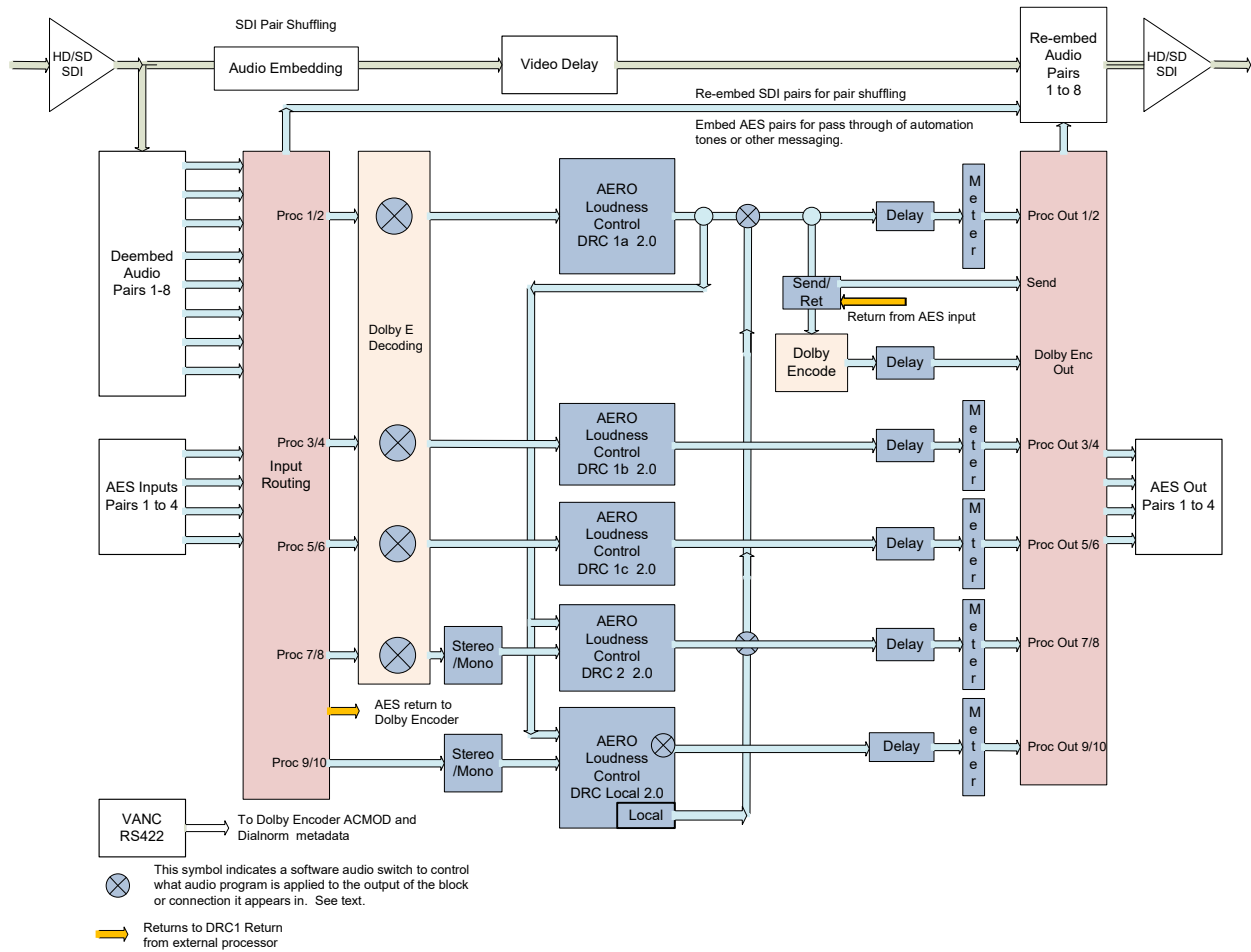Figure 3-3 shows a detailed view of AMX5x2 processing (2+2+2+2+2).

Figure 3-3 Instance AMX5x2 (2+2+2+2+2)

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Figure 3-4 shows a detailed view of AMX2.0 processing (2+2+2).
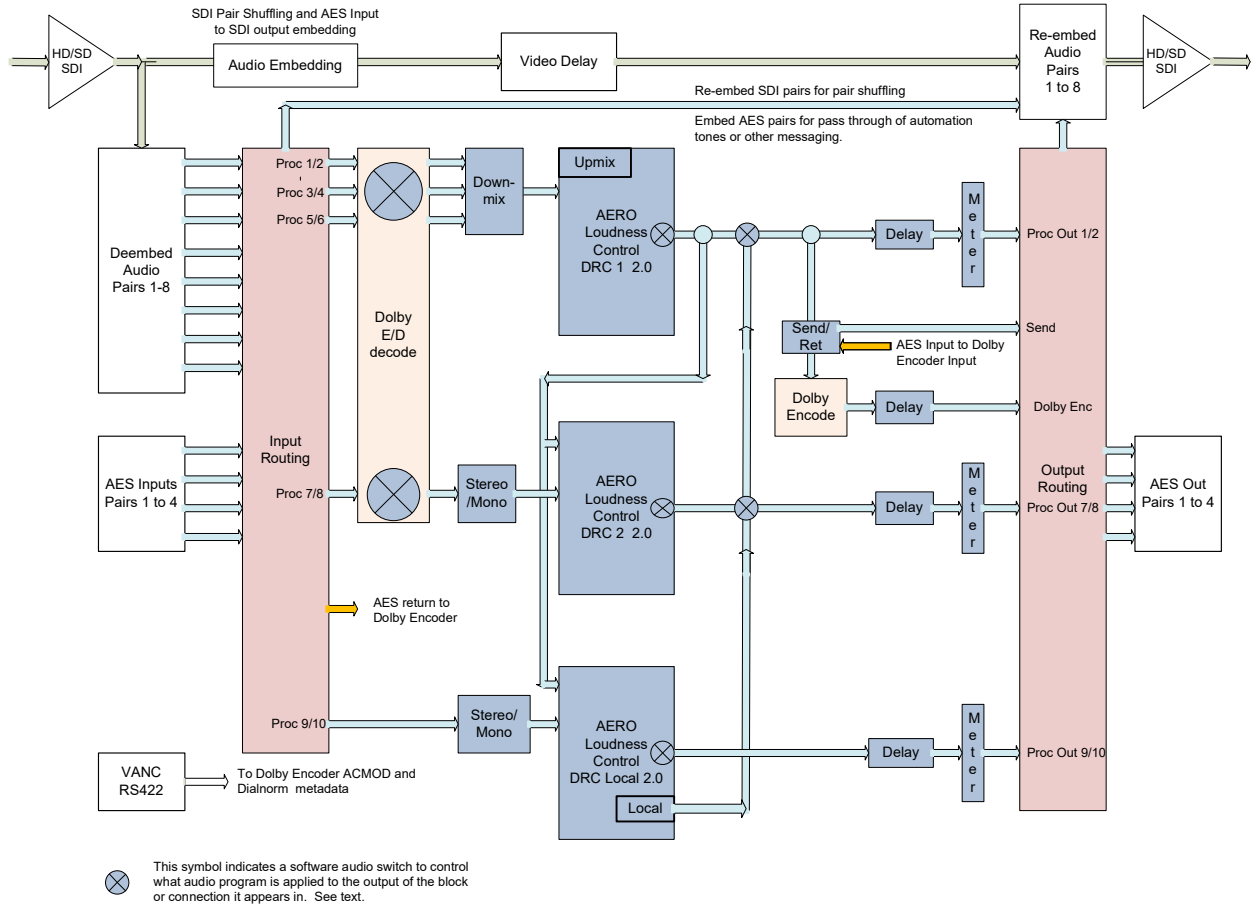

Figure 3-4 Instance AMX2.0 (2+2+2)

3.5   Getting Started

This user guide is intended to be read while in front of a running AERO.100 unit. It is most helpful if the source(s) that will be used is actually connected to the AERO.100. Doing this provides feedback to the user, via the meters and IP audio monitoring, about the configuration changes being made.

To make learning your way around the AERO.100 as useful and rewarding as possible there is some information that you should have at hand:

• The IP address and subnet mask to be assigned to the AERO.100.

• Any gateway and DNS information for the network to which it will be attached.

• NTP server address(s)

• The IP address of the PC that will be used to connect to the AERO.100.

• Knowledge of where the source audio program(s) are embedded in the SDI source.

• Knowledge of where the loudness controlled audio program(s) need to be embedded in the SDI output.

Having this information will allow you to configure the unit for use as you learn to navigate the AERO.100 using NfRemote.

Note!

Newer software versions of AERO.100 **REQUIRE A PASSWORD** to operate. Be sure that a password has been entered in your AERO unit before upgrading to version 3.14.26 or higher. Saving an empty password field (or restoring a configuration that does not have a password) will prevent any further access to the unit. The unit must be returned to the factory to restore a password.

Even experienced users should look at Section 7 Configuration Check List. This contains a brief description of all of the items that need to be configured for typical use.

Section 9 Special Features, describes some of the special processing features that are part of the AERO.100 and where to find them.

If you are a new user, please register on the Linear Acoustic website at www.linearacoustic.com. Click the Log In button and follow the instructions there. One benefit

of registering is that there are Application Notes, available on the AERO.100 page. These provide specific configuration details about how to configure AERO.100 for specific needs such as EAS insertion, local emergency audio insertion, local program insertion and guides to adjusting loudness control settings, to name a few examples. Software updates and user manuals can also be found on the product pages.

3.6   Power

The AERO.100 is equipped with two power supplies (dual redundant internal PSUs). Always connect BOTH power inlets to clean AC power sources, ideally from separate AC power feeds. Remember, this is primarily to protect you against unreliable *power sources* and not from problems with AERO.100's power supplies. We strongly recommend using an uninterruptible power supply (UPS) on at least one if not both of the AC power feeds.

Apply AC power to power on the AERO.100; there is no power switch. The blue light behind the Linear Acoustic logo illuminates. Startup is complete when the front panel displays the AERO identification and serial number, the software version and the surrent IP address. This process may take up to two minutes.

To power off, just remove both AC power cords from the unit.

4 NfRemote

The New Framework Remote (NfRemote) is an IP remote interface. NfRemote is a **full featured remote control GUI** for AERO10/100/2000 and LQ1000 units. It is provided with the AERO.100. It can be installed on most recent desktop, laptop, or tablet PCs running **MS Windows** XP, Vista, 7, Windows 8, or Windows 10. Touchscreen support is provided for devices that support this functionality.

All of the AERO.100 configuration and parameter adjustments can be made via the Nf Remote client. The remote has additional capabilities:

- Streaming audio back over the local network to the host computer. Audio can be monitored pre and post processing and at several points internal to the loudness controller.

- Presets (System I/O setup, main upmix, local upmix, loudness control) can each be saved to the host PC and restored from the host PC.

- The entire AERO.100 configuration can be saved to and restored from the host PC.

- Presets and configurations can be shared between AERO.100 units.

- Six meter configurations, each unique to a given PC, can be saved to the local PC and recalled at the push of a button.

- Multiple NfRemote session can be run on a single PC for metering and control of multiple AERO.100 units.

- Multiple PCs can simultaneously connect to a single AERO.100

    Note!

    _____

    If the IP address displayed on the AERO.100 screen is 127.0.0.1 this indicates that there is not a valid IP connection to the AERO.100.

    If the AERO.100 shows an IP address of 169.x.x.x then the AERO.100 is connected to a valid Ethernet port and cannot fetch a DHCP address or the user has not set a fixed IP address in the AERO.100.

    _____

4.1   Launching NfRemote

The NfRemote version for your AERO.100 is available on the USB flash drive that comes in the box with each new unit and is also available in the AERO.100 HTTP server. NfRemote can also be downloaded can also be downloaded from our website

Every new version of NfRemote is **backward compatible with all previous versions**.   The same software is used for configuration, control and metering of AERO.10/100/1000/2000 units. Always update your NfRemote when you update your AERO.100 software.   The latest version will be included with new software releases.

Find the NfRemote.exe on the USB flash drive that came with the unit or download it from www.linearacoustic.com.

Place NfRemote.exe on your desktop. Click on NfRemote.exe to launch the installer and select **Install** from the menu. See Figure 4-1.
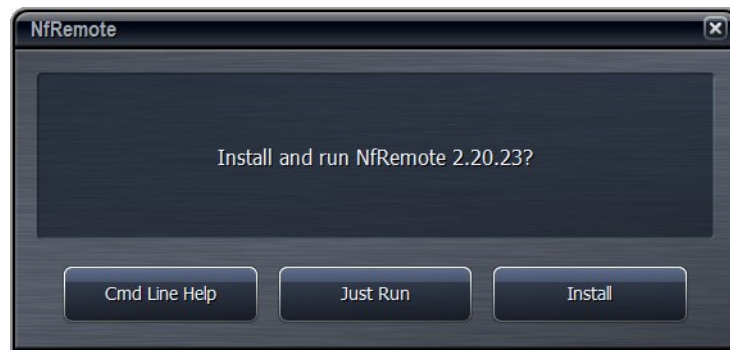
Figure 4-1 Remote software installer

Launch the NfRemote software by clicking thw desktop icon.

Power on the AERO 100. For initial configuration it is convenient to connect a PC and the AERO to a switch with DHCP. The AERO is supplied with DHCP enabled.

Alternately a PC's Ethernet port can be connected directly to the AERO using an ordinary Ethernet cable. Setting a fixed IP on the PC, in the same subnet as the AERO.100 IP address, will allow the PC to connect to AERO.100. Make sure that your PC is in the same subnet but not the same IP address as the AERO.100.

In the NfRemote application:

1. Enter the AERO.100 IP address, and password. The factory default password is 1234.
2. You can also add a name for the AERO.100.
3. Select the control type (mouse, touch, etc.) from the drop down.
4. Click Add so that NfRemote remembers the entry.

5. Click Connect and NfRemote should connect to the AERO.100.
See Figure 4-2, below.
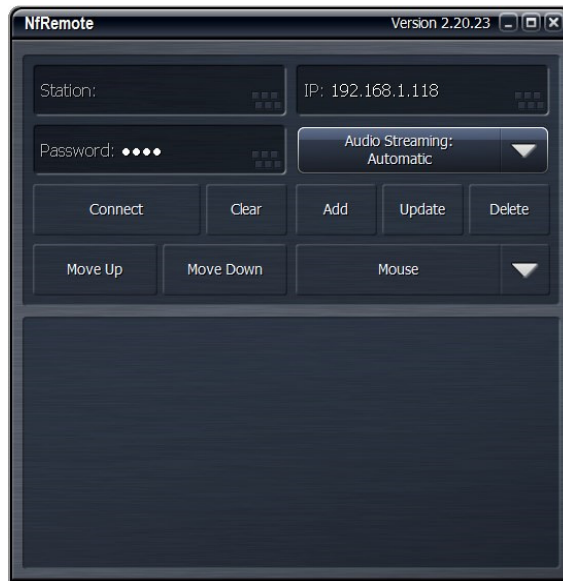
Figure 4-2 NfRemote start screen

Click Connect and the connection screen will be displayed and NfRemote will open.
See Figure 4-3
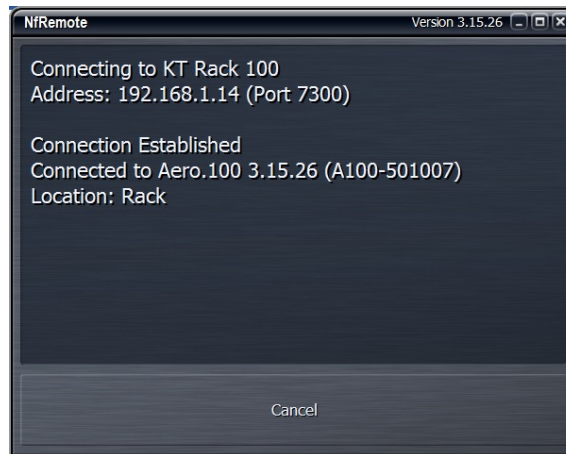
Figure 4-3 NfREmote connection screen

If NfRemote fails to connect make sure that the IP address shown on the unit's front panel is the one entered in NfRemote and ensure that your PC is in the same subnet and has the same subnet mask and does not have the same IP address as the AERO. If the units are connected to a network switch ensure that there are no address conflicts in the subnet. If there is difficulty connecting when using a network switch connect the PC directly to the AERO and give the PC

an IP address that is in the subnet with the AERO's IP address. A crossover cable is not needed for this.

4.2   Using NfRemote

After successful connection, Nfremote starts at the Home Screen. The NfRemote interface screen is fully re-sizeable and can be adjusted in the same manner as any MS Windows app screen. That is, via handles at each corner. The displays and windows will dynamically adjust themselves to make the best use of available screen real estate as you resize the window.

The first time NfRemote starts it is in Tree navigation mode. Tree navigation works in the same way that front panel navigation works. Each time you click a menu item it opens the next menu level and so on down through the menus. 'Breadcrumbs' are shown in the space below the meters. Home is shown at left below the meters. See Figure 4-4.

Figure 4-4 Home screen, Tree mode (default)

At the top of NfRemote are displays that indicate the AERO.100's CPU load, client volume (streaming audio), headphone volume, and the host PC's CPU load. See Figure 4-4. In some cases, when the display is made smaller, these controls combine and a drop-down arrow appears allowing you to activate individual controls.

Note!

In no case should the AERO.100 CPU load exceed 80% for any length of time. This should be a rare occurrence and may be due to an excessive number of simultaneous NfRemote connections.

Click the **Menu** button (top right) to select Tree or Tabbed navigation, full screen meter display, lock the window's onscreen position, maximize the window, enter full screen mode, or close the window. When the display is in meters only mode, place the mouse in any meter window and left click to return to the NfRemote configuration screen.

Figure 4-5 Menu drop down selections

Note that the menu buttons below the meters show where you are in the menu:

- Home > System > I/O Setup > SDI Embedding

- The selections for SDI embedding are shown at the bottom of the display Tree and

  Tabbed navigation refer ONLY to how information and controls are displayed on the

  screen, not the number of controls available or their precision.

The default mode is Tree Navigation (shown in Figures 4-4 and 4-5). This devotes the top of the screen to meter displays while the bottom is reserved for menus and controls. The area between these two sections displays breadcrumbs indicating where you are in the menu

hierarchy. The on-screen arrows can be clicked to navigate between the most recently visited controls. The "ribbed" section of the display, to the far right of the arrows, allows the top and bottom sections to be resized. Place your pointer in the ribbed area and left click and drag to change the relative sizes of the meters and controls. Refer to Figure 5-5, above.

In the Tabbed mode, all menus and all controls are displayed on the screen simultaneously (see Figure 4-6 below). This mode inherently makes menus, controls, and their labels smaller. This mode works best when the remote software window can be made large enough so that all text items can be easily read. In Tabbed mode you have direct access to all menus items and associated controls without having to step through the menu structure in sequence.

Figure 4-6 shows the same menu location as Figure 4-5 but in Tabbed view. Notice that you can see all of the sub-menus of System (top row, right side), all of the sub-menus of I/O Setup in the center section, and all of the available selections under SDI embedding in the bottom section. There are two size adjustments in Tabbed view. One adjusts the meter vs menu item size and the other the relative sizes of the center and lowest section of the menus.

Figure 4-6 NfRemoteTabbed mode

To the right of the **Menu** button, at the top of the NfRemote window, are **six Display Preset buttons** that quickly recall display configurations. Simply select a display preset from 1 to 6 and configure the display settings. (see Section 5.6) The AERO.100 remote software first appears with display preset 1 active. Any changes made to the screen (i.e., selecting between navigation modes, resizing window sections, or choosing the number and/or type of display windows visible) are automatically saved in real time. Switching back to this preset, from any other

preset, automatically recalls your saved settings. Each Display Setting is saved on the local PC so every PC that connects can have 6 unique metering configurations instantly available.

4.3   Ethernet Setup

The Ethernet connection, like a reference signal, must be stable and should always be present. Although initially configured for DHCP (auto-IP address), DHCP can be disabled and a static IP addresses can be entered. We recommend a static IP so that NfRemote and any PCs that need to access configuration, metering, control, or logs will always find the AERO.100 at the same IP address.

To enter a static IP address:

 Starting from the Tabbed NfRemote display select:

1.   System > Network Access > IP Configuration
2.   If the Use DHCP button is lit the IP input selections will be grayed out. Click the Use DHCP button to toggle DHCP off.
3.   Enter the fixed IP address of the AERO, the subnet mask and the Gateway address.
4.   If there is no Gateway enter the AERO's address with the last octet = 1, as shown below in Figure 4-7.
5.   Click Apply
6.   If the PC with NfRemote is connected to the AERO, or to a network switch, using a different subnet and/or IP address then change the address on your PC to one in the same subnet as the new AERO IP address.
7.   Change the AERO address in the NfRemote start menu and click Update to update the AERO's entry.
8.   Double click the entry or click connect to reconnect to the AERO.

FIGURE 4-7 AERO.100 IP address settings

4.4 AERO.100 HTTP Server

The AERO.100 has a built-in HTTP server. Logs of LKFS (LUFS) readings can be accessed through the HTTP server. IP commands, to control the unit remotely, and scripting functions (Section 8) are found here as well as a copy of the latest Nf Remote application.

Only computers that have their IP addresses in the HTTP white list, found in HTTP Access, can access the unit's HTTP server. This feature allows automation, scheduling and maintenance computers to access the AERO while computers not in the white list cannot access the unit. An additional security measure is that the AERO will not respond to a Ping request.

In the event that open access to the AERO's HTTP server is desired wildcards can be used in a white list address to allow accress from any number of subnets.

Note!

We recommend that an IP address, in the same subnet as the AERO.100 IP address, is immediately entered in the white list and also stored in a safe place. By setting a computer's IP address and subnet mask to the same IP and subnet mask stored in the white list the computer can access the AERO.100's HTTP server. This access can allow you to recover from a lost password without returning the unit to the factory!

In NfRemote select System > Network Access > HTTP Access   See Figue 4-8

Enter up to 8 IP addresses of computers that require access to the AERO's HTTP server.

An example of a valid entry is 192.168.1.200/255.255.255.0 . The subnet and subnet mask must be the same as the AERO.100 IP address assignment but must NOT be the same address. The addresses of any PCs that will access the logs, control the AERO.100 using commands over IP, or is permitted to download the NfRemote software can be entered in the white list up to a total of 8 addresses.

Wild cards can also be used to allow an entire subnet access. Example: 192.168.1.*
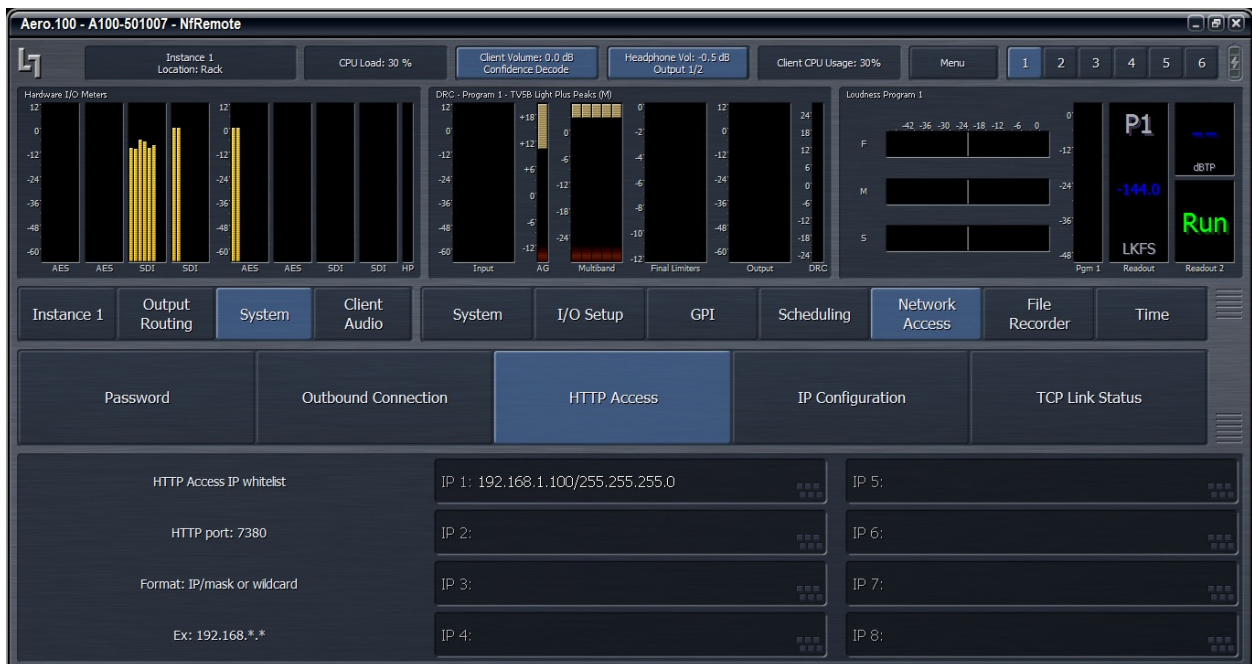
Figure 4-8 HTTP access

4.5   Downloading NfRemote From the AERO.100 HTTP server

These instructions assume that the IP address of the PC being used has been entered in the AERO.100 white list. If this has not been done, see section 4-4.

Make sure that your PC is in the same subnet as the AERO.100 and connect to the AERO.100 HTTP server using any browser. To do this enter the AERO.100's IP address in the browser followed by the HTTP server's port number, 7380.

- In some browsers you simply enter the address and port of the AERO.100: For example: 192.168.1.102:7380.
- In MS Internet Explorer you must enter: http://192.168.1.102:7380, replacing 192.168.1.102 with the AERO.100's IP address.

Right click on the NfRemote link in the HTTP server home page and save NfRemote.exe to your PC. Locate the exe on your PC and launch the installer and select **Install** from the menu. Go to Section 4.1.

4.6   Password

A password must ALWAYS be set in the AERO.100. The factory set password is "1234". If you choose to change the password keep it in a safe place. If the password is lost or removed the unit must be sent back to the factory to regain control of the unit.

To change the password in NfRemote:

1. Select System > Network Access > Pasword See Figure 4-9

2. Enter the new password twice

3. The Label on the button at the bottom of the display will change from Clear Password to Update password. Click Update password. New the new password is now entered

Remember to update the password in NfRemote to reconnect to the unit.
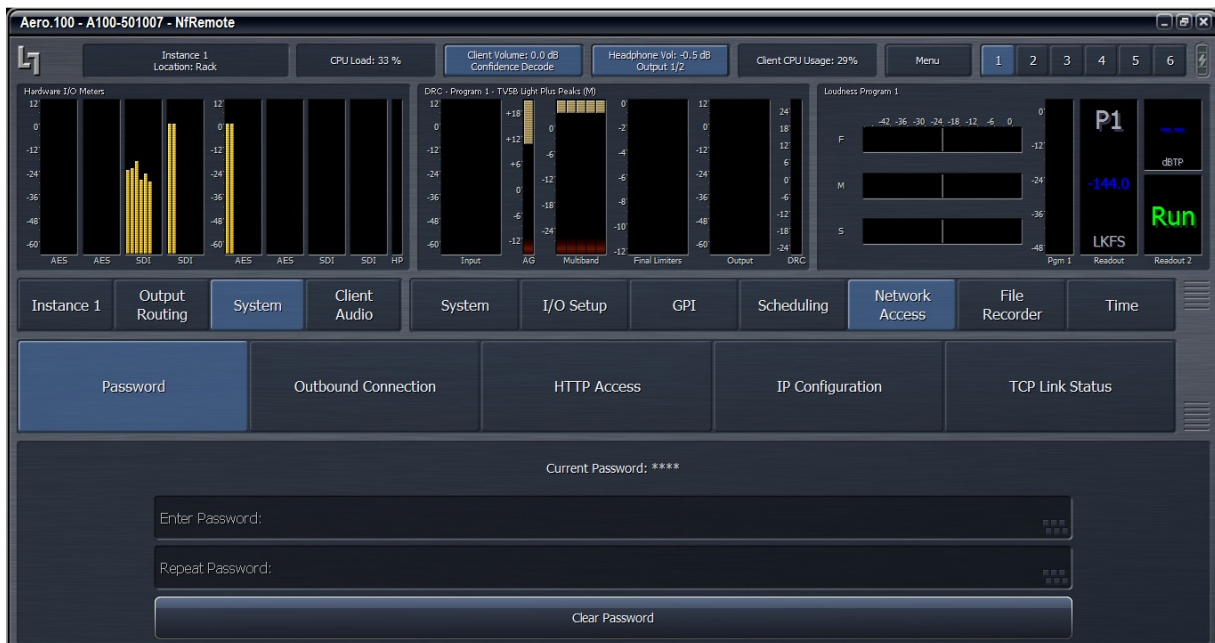
Figure 4-9 Change password screen

In software/firmware versions after 3.15.26/0x0000053 a password is not required. A password is, however, recommended.

4.7 NTP Setup

A reliable time standard is required for time stamping loudness logs and for Nielsen encoding when used. The AERO.100 can synchronize its internal clock to a network time server using NTP. All three of the time setup menus; Time Zone; NTP; and Set Clock Manually; can be seen in Figure 4-10, below.

1. Start by setting your time zone. Time settings should be done before the unit is placed on-line.

   Note!

   ___

   Setting the Time Zone requires a reboot of the AERO.100!

   ___

2. Next disable NTP and set the time and date manually in the Set Clock Manually menu.

3. When NTP Synchronization is disabled it allows changes to be made in the NTP server addresses. Enter the network NTP server addresses and enable NTP.

Figure 4-10 NTP configuration

To verify NTP operation:

1. Click on NTP tab and Disable NTP Synchronization.

2. Click on Set Clock Manually and change the time by a few hours.

3. Go back to NTP tab and see that the time is incorrect.

4. Enable NTP Synchronization.

5. Time should jump to correct current time. If the display does not change to the correct time then the NTP server(s) are not reachable by the AERO.

4.8   Configuring Meter Displays

Although up to eight meters can be shown on the NfRemote screen at once, each additional meter takes away screen space from the others. Depending on your monitor size you may find it practical to limit the number of meters on any one screen. The six display presets (top right of NfRemote screen) can be used to quickly switch between different meter selections. However, any display preset can also be used to create full screen meter displays. More meters can be configured on the same full screen view than are practical when the menus are visible.

Note that the **display settings for each Instance are unique**. All 6 display settings for Instance 1 are entirely independent of the settings for Instance 2. If you have 2 AMX Instances loaded in your AERO.100 then display setups will need to be created for Instance 2 as well as Instance 1. All of the meter setup examples described here are done in Instance 1. To setup meter displays for Instance 2 simply click Instance 2, in the menu. All of the meter display presets can be configured for the second Instance.

The meter configurations described here will be used in the I/O and preset configuration examples that follow.

To setup Instance 1, display preset 1, start by clicking display preset 1 (next to Menu button) then click on:

1. Instance 1 > (any selection from Input to Output) > Display Settings

2. Display 1 > Common > Hardware I/O

3. Display 2 > Program 1 > DRC-Program 1

4. Display 3 > Program 1 > Loudness Program 1

5. See Figure 4-11 below.

Figure 4-11 NfRemote Display Preset 1

Click display preset 2 and then click:

1. Display 1 > Program 2 > DRC-Program 2

2. Display 2 > Program 2 > Loudness Program 2

3. Display 3 > Program Local > DRC- Local

4. Display 3 > Program Local > Loudness Local

Click display preset 3 and then click:

1. Display 1 > Program 1 > Loudness-Program 1

2. Display 2 > Program 1 > Graph Program 1

3. Display 3 > Program 2 > Loudness Program 2

4. Display 3 > Program 2 > Graph Program 2

5. Local Display 3 > Program Local > Loudness Local

6. Display 3 > Program Local > Graph Local

To remove a display, click on Display Settings, select any Display and select Off from the menu.

To aid in setting up the DRCs (loudness controllers) and also to evaluate content pre and post processing there are several audio analyzers available in the Display settings menus:

For each Pgm there are meters for:

- DRC activity
- DOLBY DIGITAL PLUS Confidence (decode)
- ITU Loudness Meter
- ITU Loudness Graph
- EBU Loudness Range.
- True Peak readings are shown on each Program Loudness meter.
- When a Program Loudness Meter is set to measure Integrated Loudness the measurement is started and stopped from the Instance x > Output > Meter > PGM window. The Program Loudness meter will indicate if the integration is in Run or Stop mode.

Common meters include:

- Instance I/O
- Hardware I/O
- Oscilloscope
- RTA
- FFT

The oscilloscope, RTA and FFT are valuable monitoring and diagnostic tools that can measure and display signals from myriad patch points within AERO.100. Extensive setup controls are provided for these meter types. An example is shown in Figure 4-12, below.

Two RTA meters and the DRC 1 meter are configured in meter preset 4. RTA meter 1 is surrounded by a yellow border indicating setup parameters for this meter are shown at the bottom of the window.

Figure 4-12 Settings for the RTA meter

4.9   Configuring Loudness Meters

ITU-BS.1770-3 loudness meters for each output in each Instance are provided. The loudness meter is tied to a specific Instance and program output and the meter settings can be different for each program output. This allows program-specific monitoring if desired. The loudness meter setups for Instance 1 are located here:

Instance 1 > Output > Loudness Meter

See figure 4-13, below.

Figure 4-13 Settings for the program-specific ITU meter

The integration time of the 3 bar graph meters can be chosen as well as the integration time of the digital readout. The integration of the digital readout can also be manually controlled to measure specific programs or over specific time periods.

Note that the meter settings do not affect the loudness log readings.

Remember that the meter setup for each Instance is independent. To see both instances at the same time two NfRemote sessions can be opened on the same PC at the same time. One session can view Instance 1 and the second can view Instance 2.

4.10 Configuring I/O

4.10.1   SDI Source

Connect your SDI program to the AERO SDI Input. If the power is off or the unit is starting the bypass relays connect the SDI input to the SDI output.

The SDI audio **de-embedder is always active** so any of the SDI embedded audio pairs can be processed and the audio, including Dolby encoded audio, can be sent to any of the AES digital audio outputs.

If SDI embedding is NOT enabled then all of the SDI embedded audio channels in the SDI source are passed to the SDI output.

If SDI embedding is enabled then any of the following signals can be routed to any SDI embedded output pair.

- Any SDI embedded source pair can be routed to any SDI embedded output pair. We call this audio (pair) shuffling.
  Any AES digital audio input pair can be routed to any SDI output pair.
- Any of the processed audio output pairs, including encoded outputs, can be routed to any SDI embedded output pair.
- If a processed output is chosen as the output source in the SDI Embedding menu: System > I/O Setup > SDI Embedding > Output 1/2 (any output) then the specific processed output is chosen in the Output Routing menu: Output Routing > AES/SDI Outputs > SDI Outputs. A walk-through of the I/O setup follows.

An example of a channel map for an SDI program with embedded audio is:

- Embedded pair 1/2:   Stereo or 5.1 Lf/Rf
- Embedded pair 3/4:   Silent when pgm is stereo or C/LFE
- Embedded pair 5/6:   Silent when program is stereo or Ls/Rs
- Embedded pair 7/8:   Channel 7 only SAP or DVS
- Embedded pair 9/10 to 15/16: Silent or not used.

A typical SDI embedded audio output channel map is:

- Embedded pair 1/2:   Dolby Digital bitstream
- Embedded pair 3/4:   SAP/DVS (LPCM)
- Embedded pair 5/6:   Not used
- Embedded pair 7/8:   Downmix (or stereo) of DRC 1 (main program).
- Embedded pair 9/10 to 15/16: Not used.

We will use the above example to configure the AERO.100. Some adjustments need to be made if your channel map is not the same as the example here.

4.10.2   SDI Embedding

1. Select display preset 1 (next to Menu at top left of NfRemote screen)

2. Select System > I/O Setup > SDI Embedding. The screen looks like Figure 5-10, below.

3. Note that the hardware I/O meter shows the audio present on the SDI source and the audio assigned to AES and SDI output pairs.

4. Click SDI Embed to enable embedding. The "enabled" indicator turns yellow.

5. Click the Output 1/2 drop down and select Processed 1/2.

6. Repeat for each Output drop down, selecting Processed 3/4 through 7/8 for Outputs 3/4 to 7/8.

7. For Outputs 9/10 through 15/16 select Mute.

8. See Figure 4-14.

Figure 4-14 Enable embedding and select embedded output sources

4.10.3   Instance 1 Input Sources

1. Select Instance 1 > Input > Source. The screen looks like Figure 5-11, below.
2. Select Input 1/2, drop down and select SDI 1/2.
3. Repeat for Inputs 3/4, 5/6 and 7/8 selecting SDI 3/4, SDI 5/6 and SDI 7/8.
4. Select Input 9/10 and select Off.
5. Set other sources as shown in Figure 4-15.

If there is audio embedded in the SDI source it should be visible in the hardware I/O meters as well as the Instance 1 DRC meter and the Program 1 output meter.
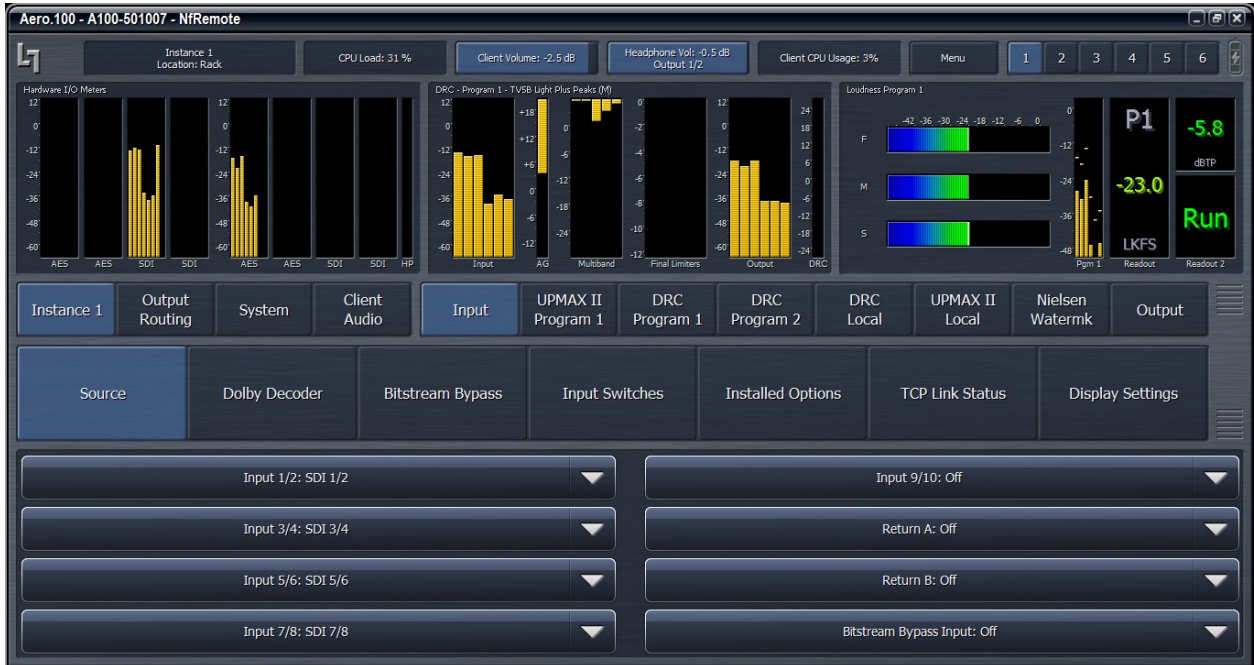
Figure 4-15 Select Instance 1 input sources

4.10.4   Output Routing

Select Output Routing > AES/SDI Outputs > SDI Outputs.

1. Select SDI Out 1/2: Instance 1 DD+ Out

    Note!

    The Dolby Digital Plus output can be Dolby Digital or Dolby Digital Plus. This selection is made by navigating to: Instance 1 > Output > DD+ Encoder > Codec and selecting from the Drop Down. Other parameters for the selected Dolby encoder can also be made on this screen.

2. Select SDI Out 3/4: Instance 1 Processed 7/8
3. Select SDI out 5/6: Off
4. Select SDI Out 7/8: Instance Processed 9/10
5. Select SDI Out 9/10 through 15/16: Off

See Figure 4-16, below.
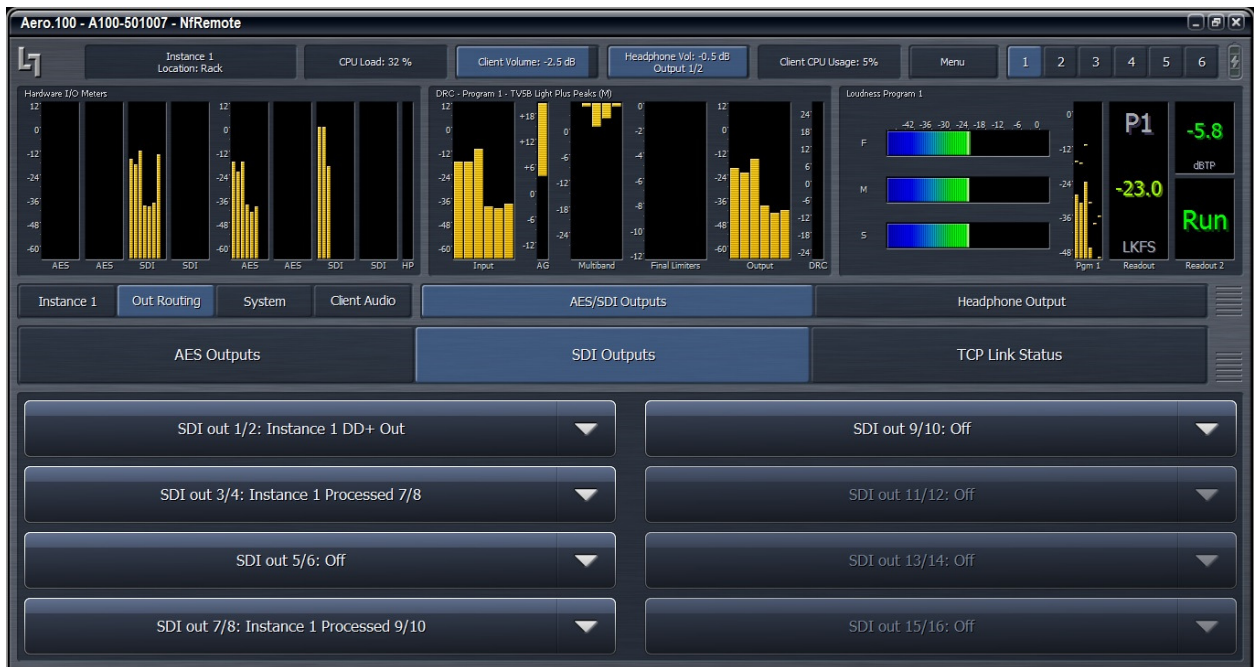
Figure 4-16 Select Output Routing

4.10.5   AES Audio Output Routing

The Dolby encoded main program and the downmix will be sent to the AES outputs. The Dolby encoded output for easy quality measurement and the downmix for distribution to internal audio monitors.

AES output routing is straight forward. Each of the 4 AES digital audio output pairs can be assigned to carry any of the AERO.100 processed outputs. The AES output drop down choices for a 5.1 Instance are:

- Off

- Instance 1 Processed 1/2

- Instance 1 Processed 3/4

- Instance 1 Processed 5/6

- Instance 1 Processed 7/8

- Instance 1 Processed 9/10

- Instance 1 DOLBY DIGITAL PLUS Out

If there is a second Instance installed then these 6 selections are also in the drop down list.

If Instance 2 is a stereo Instance then the selections are:

- Off

- Instance 2 Processed 1/2

- Instance 2 Processed 7/8

- Instance 2 Processed 9/10

- Instance 2 DOLBY DIGITAL PLUS Out

The Dolby encoder source is always the audio processed in DRC 1 of an Instance.

To setup the AES outputs as described above:

Select Output Routing > AES/SDI Outputs > AES Outputs

AES out 1/2: Instance 1 DD+ Out

AES out 3/4; Instance 1 Processed 9/10

AES out 5/6 through 15/16 are all Off.

Handling single channel sources on 1/2 of an digital audio pair is a standard feature of the AERO.100. See section 8.1.

Creating a full time downmix of the DRC 1 output is also a standard feature of AERO.100. See section 8.2.

To create a Downmix output see section 8.2

4.10.6 Reference

The AERO.100 can be referenced to:

- AES DARS (or any AES signal applied to the Ref In connector)
- AES In 1
- SDI
- Internal 48 kHz (standalone use only).
- Video Ref (starting with version 3.15.26)

If SDI embedding is not used then a sync reference source must be chosen.

Select System > I/O Setup > H/W I/O Setup

Select the Clock Reference drop and down a select a reference. Note that if Embedding is enabled the Clock Reference drop down will show SDI and be grayed out indicating that it cannot be changed. To ensure that audio is embedded to the very tight timing tolerances required the AERO uses the SDI source itself as the timing reference when embedding is enabled.

4.10.7   Configuring Video Compensation Delay

The included video compensation delay can help re-time audio and video/ancillary data signals from SDI Input to SDI Output to match audio processing latency. Normal practice is to set the video delay to the next whole video frame value that is greater than the total latency of the audio processing and any Dolby encoding that may also be done in the AERO.100.

Rough timing is set via the Delay control (milliseconds), and the Fine control can adjust to the microsecond. Once video delay is set, A/V lipsync can be accomplished in the I/O Menu using the Audio Delay for each processor output pair. A separate delay for the Dolby encoder output allows both LPCM and Dolby encoded audio to be embedded with proper lipsync.

To set the Video delay:

1. System > I/O Setup > SDI Video Delay

2. Use the coarse adjustment to set delay to 264ms
    a. From specifications: Processing Latency 180ms + Dolby Digital encoding 64ms = 244ms.
    b. Nearest whole frame delay greater than 244 ms is 8 frames = 264 ms.
    c. Calculations using 30fps/.33 sec per frame

3. Using a wave form analyzer with timing display the coarse and fine adjustments can be used to match the AERO.100 video output to house sync.

See Figure 4-17 below.

Figure 4-17 Left: SDI video delay settings

4.10.8   Audio Delay

In the following example the SDI output of the AERO is to match the facilities video sync reference. The total audio latency through the AERO is processing/loudness control latency + Dolby Digital Plus encoder = 244 ms. An additional 22ms of video delay is added to make the AERO video output an even number of frames and match facility timing.   This brings the total video dealy to 264ms.

The Dolby Digital encoded output must be delayed an additional 22 ms to get into lipsync with the picture.

1.   Select: Instance 1 > Output > Output Delay

2.   Set: DD+ Encoder Delay 1-6:22ms

It is common to have both a Dolby encoded output and baseband (LPCM) audio output embedded in the SDI output. All audio needs to be synced with picture. The baseband audio processing/loudnes control latency of the AERO.100 is only 180 ms. To maintain lipsync additional audio delay must be added to the LPCM output(s).

1.   Total video delay = 264 ms.
2.   Total LPCM delay = 180 ms
3.   264 ms – 180 ms = 84 ms.

4. An additional 84 ms of delay must be added to each LPCM pair to keep the LPCM audio output in sync with the picture. See Figure 4-18 below.

Figure 4-18 Audio Delay

Note that each Instance has independent LPCM and Dolby encoded output delays.

A waveform monitor that compares the timing of an SDI source to the facility sync signal should be used to accurately match the AERO video outpu to houe sync.

4.11 Dolby Encoding

Dolby Digital Plus encoding, which encludes Dolby Digital (AC3) encoding, and Dolby E decoding can be added to each AMX instance as an option.

Select Instanc1 > Ouput > Dolby+ Encoder

Configuration for the Dolby Encoder is done here. The first drop down (top right) shows:
Codec: Dolby Digital (AC3)

The data rate for Dolby encoded 5.1 and 2.0 outputs are selectable as are metadata preferences for the Dolby Digital decoders in the receivers. Please note that not all receivers use the encoded metadata preferences.

See Figure 4-19, below.

Figure 4-19: Dolby Encoder

A Dolby Digital encoder licensed to an AMX5.1 Instance can operate in both Dolby Digital 5.1 mode and stereo mode. The encodeding mode can be switched using externally applied metadata, using GPI, network commands, or manually.

Select Instance 1 > Input > Input Switches

Enabling Mute 3-6 switches the Dolby encoder to stereo mode.
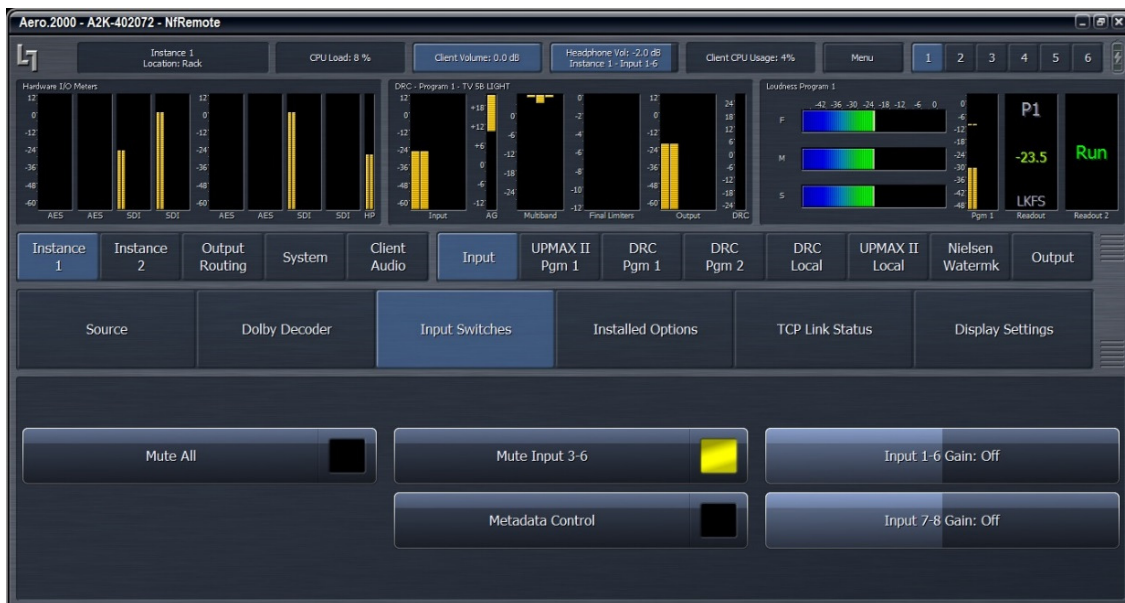Disabling Mute 3-6 switches the Dolby encoder to 5.1 mode.
See Figure 4-20

Figure 4-20: Mute Input 3-6

The GPI command to automate switching between Dolby Digital encoding for 5.1 surround and 2.0 Stereo is shown in Figure 4-21, below.
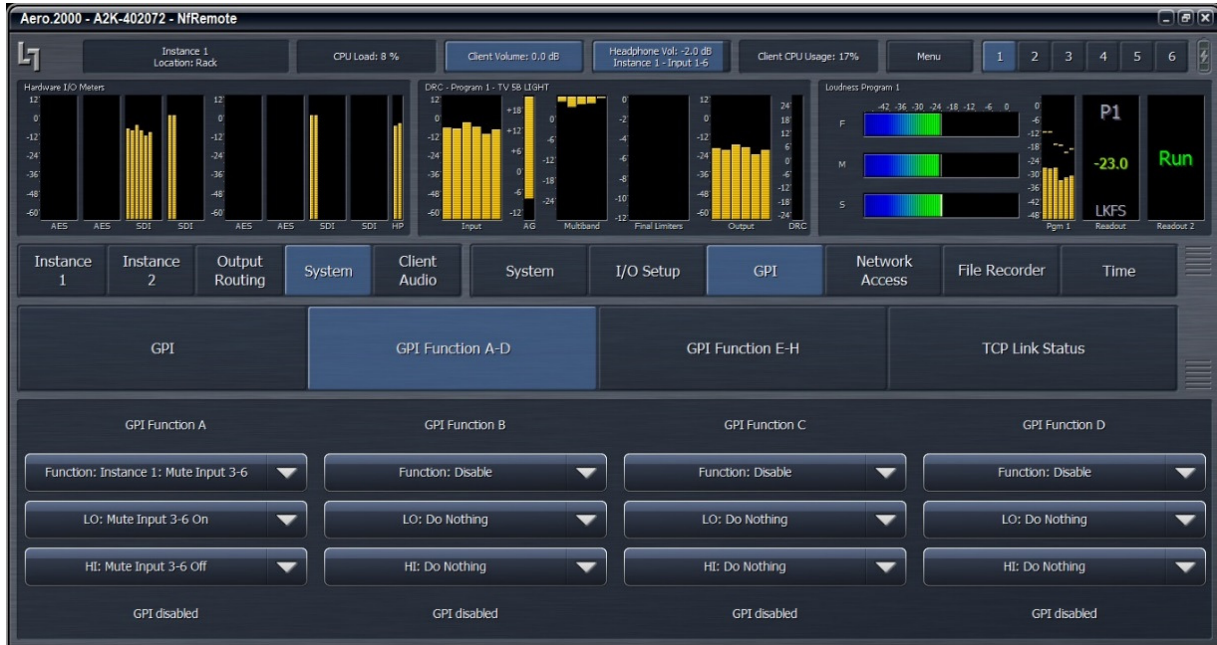
Figure 4-21 GPI control of channel 3-6 muting

4.12 Dolby Decoding

Dolby E, Dolby Digital and Dolby Digital Plus decoding can be optionally added to each instance. The configuration options are shown here:

Instance 1 > Input > Dolby Decoder

The AERO will automatically decode a Dolby E, Dolby Digital or Dolby Digital Plus source that is routed to AERO Input 1/2. If a Dolbyencoded source is not detected the AERO will automatically look for LPCM audio in the Bypass sources. Bypass Source 1/2 through 7/8 can be selected.

The user can choose to decode a 7/8 source in the Dolby encoded source or ignore the 7/8 pair.

See Figure 4-22, below.

Figure 4-22: Dolby Decoder configuration

A Dolby encoded bitstream can also be connected to any of the AERO.100 AES inputs. The sample rate converter (SRC) MUST BE DISABLED for any AES input passing a Dolby encoded bitstream. This setting is found here: System > I/O Setup > SRC Bypass.

4.13 UPMAX

UPMAX II with AUTOMAX source detection provides 5.1 surround viewers with a consistently excellent surround experience and is the industry standard upmix processor. Uniquely, UPMAX II does not rely on detection of out-of-phase audio to produce the surround channel signals. It produces an upmix that, when downmixed, provides a near identical stereo output compared to the original. It also does a superb job of keeping dialogue out of the rear channels. Viewers listening in stereo get a consistently good downmix. It is a win-win situation.

4.13.1 Enable and Configure UPMAX

1. Navigate to Instance 1 > UPMAX II Pgm1 > Load Preset.

2. Select the "UPMAX Center Diverged" preset.

3. Click Main Settings

4. Some software versions have a Power Enable.

    a. Enable Power

b. Disabling the Power removes the latency compensation for UPMAX II and decreases audio latency by 15ms.

5. Click Upmix Enable to make the indicator yellow.

6. Select the Auto Mode drop down and select Auto Mode On. See Figure 4-23.

7. Click Transitions

8. Click Discreet -> Upmix drop down and select Very Quick

9. Click Upmix -> Discreet drop down and select Quick

10. The setting in 7, above, will keep the sound stage from shifting when a stereo program follows a 5.1 program. When a 5.1 program follows a stereo program the crossfade can be slightly slower (number 8 above) but the center channel still must be passed quickly.

11. Click Save Preset and save the changes as a new name.

Figure 4-23 Configure UPMAX II

4.13.2 UPMAX Operating Modes

1. Upmix Disabled.
   a. Stereo sources routed to Input 1/2 are sent to the loudness controller
   b. 5.1 surround sources routed to Inputs 1/2, 3/4, 5/6 are sent to the loudness controller

2. Upmix Enabled and Auto: Off.

a. The source routed to Input 1/2 will always be upmixed
b. A surround source routed to Inputs 1/2, 3/4, 5/6 will have its Lf and Rf pair upmixed as if it were a stereo source. **This should always be avoided.**

3. Upmix Enabled and Auto: On.
   a. 5.1 surround sources routed to Inputs 1/2, 3/4, 5/6 are passed through to the loudness controller
   b. If Input channels 3, 5 and 6 are below the 5.1 surround detection threshold the unit will crossfade to an upmix of channels 1 and 2.
   c. Audio above the 5.1 surround detection threshold level, on channels 3, OR 5 OR 6, will result in a crossfade back to 5.1 pass through mode.
   d. The 5.1 threshold and crossfades are set here:
      i. Instance 1 > UPMAX II Pgm 1 > Auto Mode Settings > Discrete Detection Threshold:
      ii. Instance 1 > UPMAX II Pgm 1 > Transitions > Discrete -> Upmix
      iii. Instance 1 > UPMAX II Pgm 1 > Transitions > Upmix -> Discrete

4. Upmix Enabled and Auto: Metadata Auto/No

5. Upmix Enabled and Auto: Metadata Yes/Auto

6. Upmix Enabled and Auto: Metadata Yes/No

4.13.3 Adjusting the Upmix

There are many adjustable parameters that allow UPMAX to be tuned to suit the source material. The flexibility allows UPMAX and AUTOMAX to be used by broadcasters of sports, music, entertainment, and mixed content and for both live and recorded programs.

A preset that we call "Center Diverged is used by a great many broadcasters that have varied content throughout the day. The settings are shown in Figures 6-16, 6-17 and 6-18, below. TV channels that specialize in a particular content type such as sports, old TV shows or movies can finely tune UPMAX to present the best possible 5.1 surround sound from their stereo content.

1. UPMAX Parameters: Instance 1 > UPMAX II Pgm 1 > Main Settings
   a. Center Extraction enables the creation of a center channel from the stereo source
   b. Surround Extraction enables the creation of the Ls and Rs rear channels from the stereo source.
   c. LFE Generation enables the creation of a .1 (LFE) channel that is downmix compatible, low pass filtered, and bass enhanced low frequency content from the L, C and R channels.

     d. Generate LFE When Upmix Disabled enables the addition of the LFE content described above to the existing 5.1 surround content.

2. UPMAX Parameters: Instance 1 > UPMAX II Pgm 1 > Adjust
    a. Center Exclusivity
      i. Controls how much of the Lf/Rf audio that UPMAX uses for center channel audio is removed from Lf and Rf channels
      ii. 0 % removes little of the audio used for center channel from Lf/Rf
      iii. 100% removes most of the audio used for center channel from Lf/Rf
      iv. Recommended starting value 60%
    b. Upmix Center Width
      i. Controls how much of center channel audio is distributed to Lf/Rf
      ii. Total power is preserved
      iii. 0% and no center channel audio is spread to Lf/Rf
      iv. 100% and center channel level is 0 dB and all of the center is in Lf/Rf
      v. Recommended starting value 33%
    c. 5.1 Center Width
      i. Affects the center channel spread in 5.1 surround sources
      ii. Total power is preserved
      iii. Controls how much of center channel audio is distributed to Lf/Rf
      iv. 0% and no center channel audio is spread to Lf/Rf
      v. 100% and center channel level is 0 dB and all of the center is in Lf/Rf
      vi. Recommended starting value 0%
    d. Center Level
      i. Adjusts level of center channel in UPMAX output
      ii. Adjustment range is +/- 6dB
      iii. Recommended starting value 0 dB
    e. LFE level
      i. Sets level of LFE channel
      ii. Adjustable from -18 dB to 0 dB
      iii. Recommended starting value -10dB
    f. Surround Depth
      i. Controls the amount of suitable Lf/Rf content that UPMAX uses to create the surrounds
      ii. 0% and the surround level is 0 dB
      iii. 100% and UPMAX uses all of the appropriate Lf/Rf audio for Ls/Rs
      iv. Recommended starting value 100%
    g. Surround Width
      i. Controls how much of the surround content is shared between Ls and Rs channels.

4.14 UPMAX II Local

Some broadcasters need to insert local audio programming into a network or syndicated program feed. It is often an advantage to do this audio insert right in the AERO.100. Setting DRC Local to the Local mode an AES or SDI embedded audio source pair can be routed to the 9/10 input of any processing Instance. The routing is found here:

Instance 1 > Source > Input 9/10.

Any AES or SDI input source can be chosen from the drop-down.

This DRC Local UPMAX upmixing processor is intended to work with a stereo audio source. UPMAX can be enabled or disabled manually, by GPI or by IP command. Setup parameters for the Upmix Local are set, saved and recalled, independently of the DRC 1 upmix. UPMAX local is only available in AMX5.1 Instances.   See Figure 4-24, below.

Figure 4-24: UPMAX Local

4.15 Loudness Control

The heart of the AERO.100 is found in the DRC settings. This is where program loudness control takes place. There are a number of factory presets and they are found here:

Instance 1 > DRC Program 1 > Load Preset.

We recommend starting with a factory preset and modifying it, if necessary, to suit your needs. Which preset you choose and what changes you make depends on your source material and what your goals are for the audio you broadcast. A few guidelines are presented here and descriptions of the factory presets are found in section 5.15.

We also highly recommend saving each audio program's preset with a name that identifies the program. For example, if you decide to use TV 5B Light on multiple channels then save each program's preset with a unique name; TV 5B Light KWXY Main and TV 5B Light KWXY SAP. If any changes are made, however small, to the TV 5B Light KWXY Main preset the changes will not affect the SAP channel. If TV 5B Light is used for multiple audio programs then any change in that preset will affect every program using that preset.

There is independent configuration for each DRC in every AMX Instance.

If the dialogue level of 100% of the content you record, produce, create, ingest, and receive were recorded at the same level then loudness control would be easy. In the real world a typical television station, or channel, receives content from many sources. Dialogue levels, let alone the average program levels, are not consistent. Controlling the loudness of the program material delivered to viewers, and especially the program to program level changes, is one of the original concepts behind Linear Acoustic AEROMAX processing which has been in place long before loudness regulations.

A viewer's home is not the same listening environment as a movie theater or audio mix room or a mixing theater! Home viewers listen at lower levels than professionals do when mixing and reviewing material. A majority of viewers are also listening to programs on the small, low power, rear or down facing speakers in the typical thin panel TV. The proper (and judicious) use of noise reduction, AGC, equalization, wideband and/or multiband compression and look ahead limiting can be used to help recreate the experience at home that the program creator had in mind in the mix room. There is the capability to improve the audio quality of older content that is not up to today's audio quality standards. There is also the power to help automated operations to achieve more consistent audio for live events, live news, and switching between local, syndicated, commercial, promotional and network content.

The ability of AERO.100 processing and loudness control to provide all of these functions in a flexible, high quality and reliable fashion has made Linear Acoustic the choice of some of the largest broadcasters in the world for over 14 years. The continued increase of loudness regulation worldwide is the latest reason for continuing to expand and refine the capabilities of the AERO processors.

What does all of this mean to you, the user?

If the loudness level of the content that you play varies over +/- 10 dB range around your target LKFS level then your primary concern is going to be loudness control. If your content varies +/-

6 dB LKFS (or less) around your target level then much more attention can be given to delivering a faithful reproduction of the program instead of controlling loudness. Some broadcasters feel that delivering a faithful reproduction of the source material at the correct level, no matter how good or bad the source may be, is a worthy goal. The AERO.100 processor can help broadcasters attain any and all of these goals. If the audio levels of your content are nearly correct before playout then start with the TV 5B LIGHT preset. If your levels are not very well controlled, start with TV 5B GEN. From fully wideband to multiband (using two to five bands bands of multiband processing), every AERO processor is capable is meeting any particular needs. A brief description of the factory presets is below.

4.16   Factory Presets

This section lists each preset in alphabetical order, as they appear in the AERO.100 and the remote interface.

All presets are adjusted so that with the input content averaging around -24 LKFS, the output is optimized to produce -24 LKFS, ± 2 dB per ATSC A/85.

Compliance with stricter loudness regulations found in some countries can be achieved by using the new advanced ITU (AI) limiter (software V0.13.55 and later).

> *Note!*
>
> ---
>
> The calibrated output LKFS (LUFS) measurement is made with a Linear Acoustic AERO.100 or LQ-1000 with 10 second integration. Longer integration times produce measurements with less variation.
>
> ---

4.16.1   Fine Arts 5B Gen

Fine Arts 5-Band General offers medium processing appropriate for artistic programming that may have large dynamic range variations. It produces consistent loudness and spectral balance.

4.16.2   ITU 5B Loudness Lim

ITU 5-Band Loudness Limit utilizes a specially tuned Multiband AGC Limiter and the Final Limiter to slowly adjust the average program loudness to a specific loudness value as measured over time. The Multiband Limiters and Final Limiters act until the very slowly responding wideband AGC catches up. The multiband AGC is bypassed (1:1) so spectral balance is unaffected.

This preset can be appropriate for ingest, live, or network transmission applications where content is pre-normalized.

4.16.3   Music 5B HVY

Music 5-Band Heavy is an aggressive preset for TV music channels that effectively delivers music programming to small televisions and portable receivers.

4.16.4   MVPD 5B Gen

MVPD 5B Gen is intended for Multiple Video Program Distributors who may not have full control of all programs, interstitials or commercials present in a given network stream. It applies medium-light multiband processing, sets Gate and Freeze to prevent background noise pull-up, and is tuned for all genres.

4.16.5   Net 5B Limit

Net 5B Limit applies a final polish to an already consistent network program prior to distribution. A combination of TV 5B Light and ITU 5B Loudness Limit, this preset has a very slow input AGC, and a lighter multiband AGC. It preserves microdynamics and pulls the low-level information up slightly while protecting against long-term loudness shifts.

4.16.6   Protection Limit

Protection Limit sets all processing to unity gain and leaves only look-ahead peak limiters in the signal path. The master output level is set to 0 dB, so applied signals get a unity gain path through the processor.

4.16.7   Reference Settings

This preset offers standard processing test settings that match TV 5B Gen.

4.16.8   Sports 5B GEN

Sports 5-Band General provides medium processing that features quick response with minimal background pumping. It keeps dialogueue present and audible, even in rich surround mixes.

4.16.9   TV 4B GEN

Television 4-Band General is essentially the same as TV 5B Gen (below) with four audio bands. This keeps all other settings the same, lessens the density and impact on dialogueue, and results in more open sounding audio, albeit with less short-term dynamic loudness control.

4.16.10   TV 5B GEN (Default)

Television 5-Band General is the factory default preset and also the most commonly used. It provides moderate dynamic range processing, and is appropriate for all content types.

4.16.11   TV 5B HVY

Although Television 5-Band Heavy is similar to TV 5B Gen, its multiband compression ratio is higher, which creates a denser but less dynamic sound useful for systems with smaller speakers.

4.16.12   TV 5B LIGHT

Although Television 5-Band Light is similar to TV 5B Gen, its multiband compression ratio is lower (2:1) for more subtle action. This is an excellent preset for content known to be consistent that needs just a bit of spectral polish. Note that this preset allows more variations without correction, but for already consistent content, this is not an issue.

4.16.13   TV 5B LOUD

Television 5-Band Loud is similar to TV 5B Hvy, but louder and punchier.

4.17   Making Changes to Presets

A frequent user question is, "How do I adjust the preset?". There is tremendous range in the many (over 200) audio processing and loudness control parameters that are provided. This makes the AERO.100 extremely flexible and usable for any content type. It also means that proper adjustment requires time and the desire to listen to the results. Fortunately there are a few core controls that provide the needed control for a wide range of content. Here are some suggestions for making adjustments.

First, read the description of the presets. After selecting a factory preset listen to a range of content before making changes. If you start with TV 5B Gen and you immediately feel there is too much compression then change to TV 5B Light or Sports. Listening off-line before putting the unit in the air path provides an opportunity to A/B presets and find something close to what you want.

To compare settings:

1. Navigate to Instance 1 > DCR Program 1 > Load Preset

2. Double click any preset and it will load into the current position and be active.

3. Double click on the Preset that you want to compare to the first one. This is now live and the first selection is automatically placed in the Recall Backup button.

4. Pressing the Recall Backup will swap the current preset and the Backup preset to make listening and measurement comparisons easy to make.

AEROMAX processing is used with every type of content; prerecorded and live sports of all kinds; old and new movie channels; old and new TV content; news; interview; and dramas to name a few. The large number of adjustable parameters allows the AERO.100 to be highly tuned to individual program types. However, for use by stations broadcasting mixed formats there are a few parameters which control perhaps 90% of the sound of the unit.

- **Input AGC.** Reduce the Ratio to allow the average output level to vary over a wider range. Increase ratio to decrease the average output range.

  Note!

  ___

   If an adjustment has no units then the adjustment controls more than one parameter at a time and may also be program dependent.

  ___

- **AGC Attack.** Reduce to slow the reaction time of the AGC and allow the output level to change when the input changes rapidly. Increase to speed the AGC reaction time and reduce level changes of the output.

- **Release.** Reduce to make gain recovery slower. This will reduce overall level and dynamics. Increase to make AGC gain recover more quickly. Setting a fast attack and a fast release can make pumping of level audible.

- **Gate Threshold.** Raise the Gate Threshold to reduce AGC release time by ½ for levels below the Gate setting. Raising the Gate above dialogueue level makes dialogueue sound more natural.

- **Freeze Threshold.** The Freeze threshold does not allow the AGC to release until levels exceed the Freeze Threshold. Adjusting Freeze to a level below the lowest dialogue prevents increase in audio during quiet scenes.

  Note!

  ___

  Listen and watch the DRC, AGC, and Program Loudness meters for changes while making any adjustments.

  ___

- **Multiband Setup**. The Multiband Freeze Threshold always tracks the AGC Freeze Threshold. Changing either one changes both. The MB Gate Threshold works the same way as the AGC Gate Threshold. The Multiband Gate and AGC Gate settings are usually matched. If there is too much gain change during dialogue raise the Gate Threshold. This will reduce the speed of multiband gain release in the dialogue region.

- **Multiband AGC > MB AGC Main > Ratio.** The ratio can be set to 1:1 to disable the multiband AGC/Limiter. To create a wideband loudness controller set this to 1:1 and use both the WB AGC 1 and WB AGC 2 to create a smooth single band system that does

not modulate dialogue when loud, frequency limited, passages occur. There will be a wideband preset available for download on the AERO.100 web page.

Note!

Please note that single band operation significantly compromises the ability to control wide level changes, improve marginal content, and present a consistently excellent sound for the home viewer.

- **Multiband AGC > Ratio Override.**   Disable Gain Reduction Ratio Override on all bands to increase peak level without changing the LKFS loudness level of the output. Enable the Ratio Override on the middle bands to maintain very tight control over peak levels.

- **MB Thresholds > Limiter Threshold (coupled).** Increase the threshold for all bands to allow higher peak levels in the output. Observe TP output during loud passages. This adjustment has minimal effect on LKFS loudness level when increased carefully. Use with the Ratio Override control above.

- **Final > Output Level.** Adjust to make average output, as seen on DRC Loudness Meter, match the desired target level. Usually this is -24 dB LKFS for ATSC and -23 dB LUFS for EBU adherents.

Note!

LKFS and LUFS are identical loudness measurement units referring to the ITU B.S. 1770 loudness standard.

If assistance is required to achieve a particular sonic goal please contact your Linear Acoustic representative for assistance.

4.18 Nielsen Watermark

Nielsen encoding is licensed per AMX Instance. If the Nielsen encoding option is licensed in an processing Instance then there is a Nielsen encoder for each of the Instance's 3 DRC outputs. Each Nielsen encoder can use the same or different Nielsen codes. Each Nielsen code requires Check Digits to enable the channel encoder. Only Nielsen can provide an AERO.100 user with the Check Digits.

The Nielsen configuration screen is shown in Figure 5-21.

Figure 4-25: Nielsen configuration

The tabs for each DRC output can be seen in Figure 4-25. Click Channel 1-6, Channel 7/8 and Chanel 9/10 to configure Nielsen codes for each output.

Nielsen encoding can be enabled and disabled for each of the 3 outputs. Please note that Nielsen encoding must be disabled to make changes to the SID or Check Digits.

4.19 GPI Setup

Follow the path System > GPI > GPI. Here there is a GPI enable/disable 'switch'. Click so that the indicator is dark indicating that the GPIs are disabled. The GPIs must be disabled to make changes to any GPI.

Click on: System > GPI > GPI Function A-D. This will display the configuration for the first 4 GPIs. Click GPI Function E-H for the remaining 4 GPIs.

Figure 4-26 shows the list of available functions open for GPI A.

Figure 4-26: GPI drop down selection

In Figure 5-22 a new selection, Task, is added to the GPI menu. A Task is list of commands that can all be performed with a single GPI closure. The creation of scripts for Tasks is covered in Section 7.

Each GPI can be set up with specific functions for open and pulled to ground states as shown in Figure 6-19. GPI Function B is shown to illustrate the choices available for each condition of the GPI. Some functions also allow toggling Lo and Hi states with each state defined separately. See Figure 4-27, below.

Figure 4-27: GPI detail

5 Logs and Control Scripts

Logs and control scripts are found in the AERO.100 HTTP server. To access the HTTP server in your AERO.100 your PC 's IP address must appear in the AERO.100's HTTP white list in order to have access to the built in HTTP server. If this has not been done yet refer to section 4.4.

The script feature is new to version 3.15.26. A script is a series of parameter change commands that can be named and saved as a Task. These tasks can then be assigned to any of the available GPIs. Any command that is available through the AERO.100 HTTP server, as an IP based command, can be placed in a script and saved as a task.   Now GPI control can be used to change any parameters, in any combination. The possibilities are nearly infinite.

5.1   HTTP Server Access

To access the AERO.100's HTTP server use any browser and enter the AERO's IP address and the HTTP server port, 7380. For example: 192.168.1.12:7380

Note!

MS IE requires the entry of: http://192.168.1.12:7380

The HTTP server page that will open is shown in Figure 5-1.
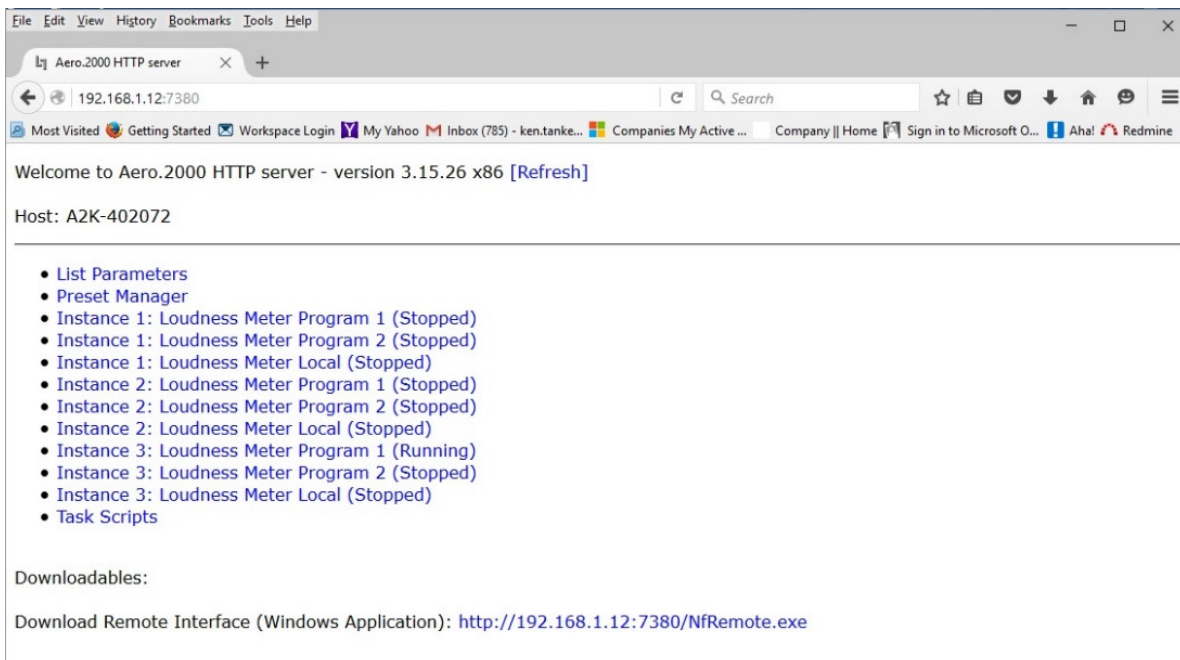

Figure 5-1: HTTP Server Home Page

5.2   HTTP List Parameters

List Parameters shows every parameter in the AERO.100 that can be controlled via the HTTP server and a network command. In Figure 5-2 is the screen you see after clicking List Parameters. Scroll up and down to move through the parameters. You can also use the Edit tool in your browser to open the Find dialogue box to search for parameters.
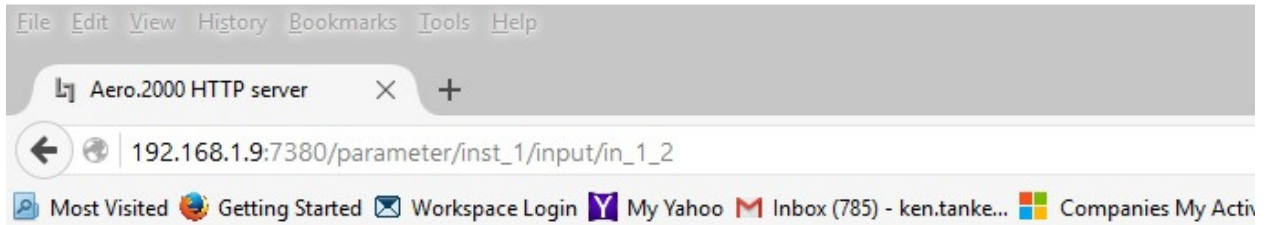

Figure 5-2: HTTP List Parameters

Under Category: Source the first command is /inst_1/input/in_1_2

- The next column shows the current value and it is 9.

- Click on: /inst_1/input/In_1_2

- In the screen that opens you see the command in the browser address line.

- The first line on the browser page shows the current value of the parameter.

- Below this is the command name followed by all of the possible parameter selections, and the command syntax.

- Value 9 = SDI 1/2. This means that the value 9 for routes SDI 1/2 to Instance 1, Input 1/2.
- See Figure 5-3.

File Edit View History Bookmarks Tools Help

Aero.2000 HTTP server   ✕   +

← 🌐 | 192.168.1.9:7380/parameter/inst_1/input/in_1_2

🔎 Most Visited 🦊 Getting Started ✉ Workspace Login Y My Yahoo M Inbox (785) - ken.tanke... ▦ Companies My Activ

/inst_1/input/in_1_2=="9"

Input 1/2: SDI 1/2

Value 0 (Off): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=0
Value 1 (AES 1/2): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=1
Value 2 (AES 3/4): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=2
Value 3 (AES 5/6): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=3
Value 4 (AES 7/8): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=4
Value 5 (AES 9/10): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=5
Value 6 (AES 11/12): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=6
Value 7 (AES 13/14): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=7
Value 8 (AES 15/16): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=8
Value 9 (SDI 1/2): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=9
Value 10 (SDI 3/4): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=10
Value 11 (SDI 5/6): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=11
Value 12 (SDI 7/8): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=12
Value 13 (SDI 9/10): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=13
Value 14 (SDI 11/12): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=14
Value 15 (SDI 13/14): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=15
Value 16 (SDI 15/16): http://192.168.1.9:7380/parameter/inst_1/input/in_1_2=16

Instance: Instance 1
Core: Input
Category: Source

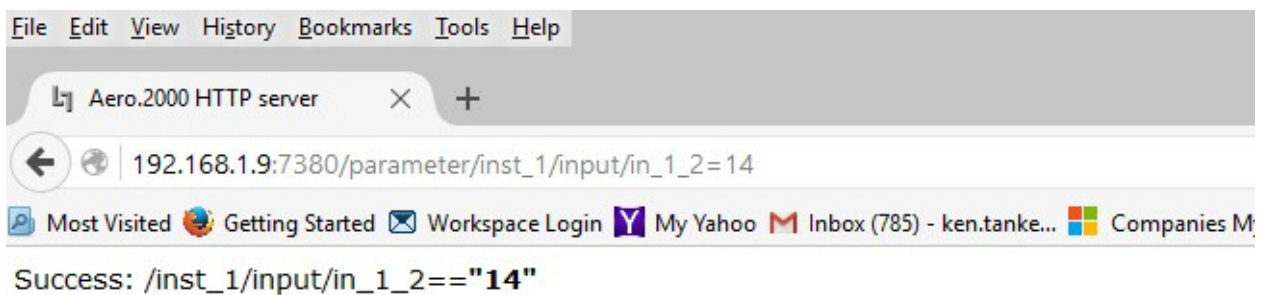Get Value Link: http://192.168.1.9:7380/parameter/inst_1/input/in_1_2%3f

Reload: http://192.168.1.9:7380/parameter/inst_1/input/in_1_2
List Parameters: http://192.168.1.9:7380/listparams

Figure 5-3: Input 1/2 Source HTTP command

The source for Instance 1, Input 1/2 can be changed manually.

- Find the Parameter Value for SDI 11/12 in the list if commands.

- The parameter value is 14

- Click on the command 192.168.1.12/parameters/inst_1/input/in_1_2 = 14

- The source routed to Instance 1, Input 1/2 is changed instantly.

- The command now appears in the browser address line.

- See Figure 5-4

Figure 5-4: Command to route source SDI 11/12 to Instance 1, Input 1/2

A traffic or facility automation system can send multiple commands, one after the other, in order to accomplish any desired changes.

Any number of commands can be placed in a script. The script can be named and the named scripts appear in the AERO GPI menu as Tasks. Tasks can be assigned to GPIs allowing any combination of parameter changes to be accomplished using simple GPI commands.

5.3   Creating a Script

- go to the HTTP main page and click Task Scripts.
- See Figure 5-5
- Click on Create
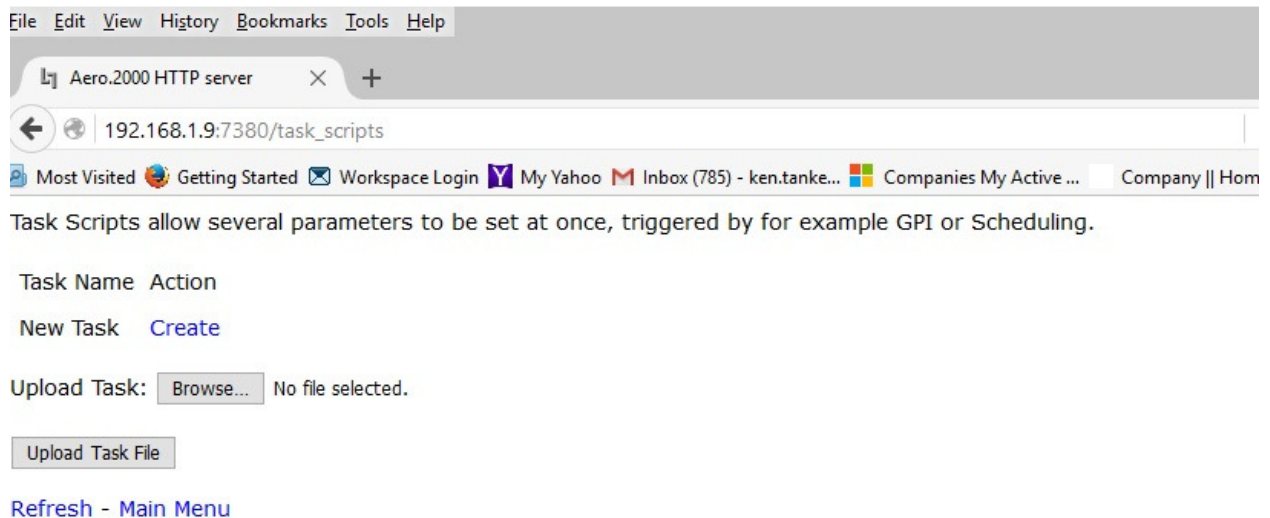
Figure 5-5 Creating Scripts

A new screen opens with a sample script.

See Figure 5-6, below.
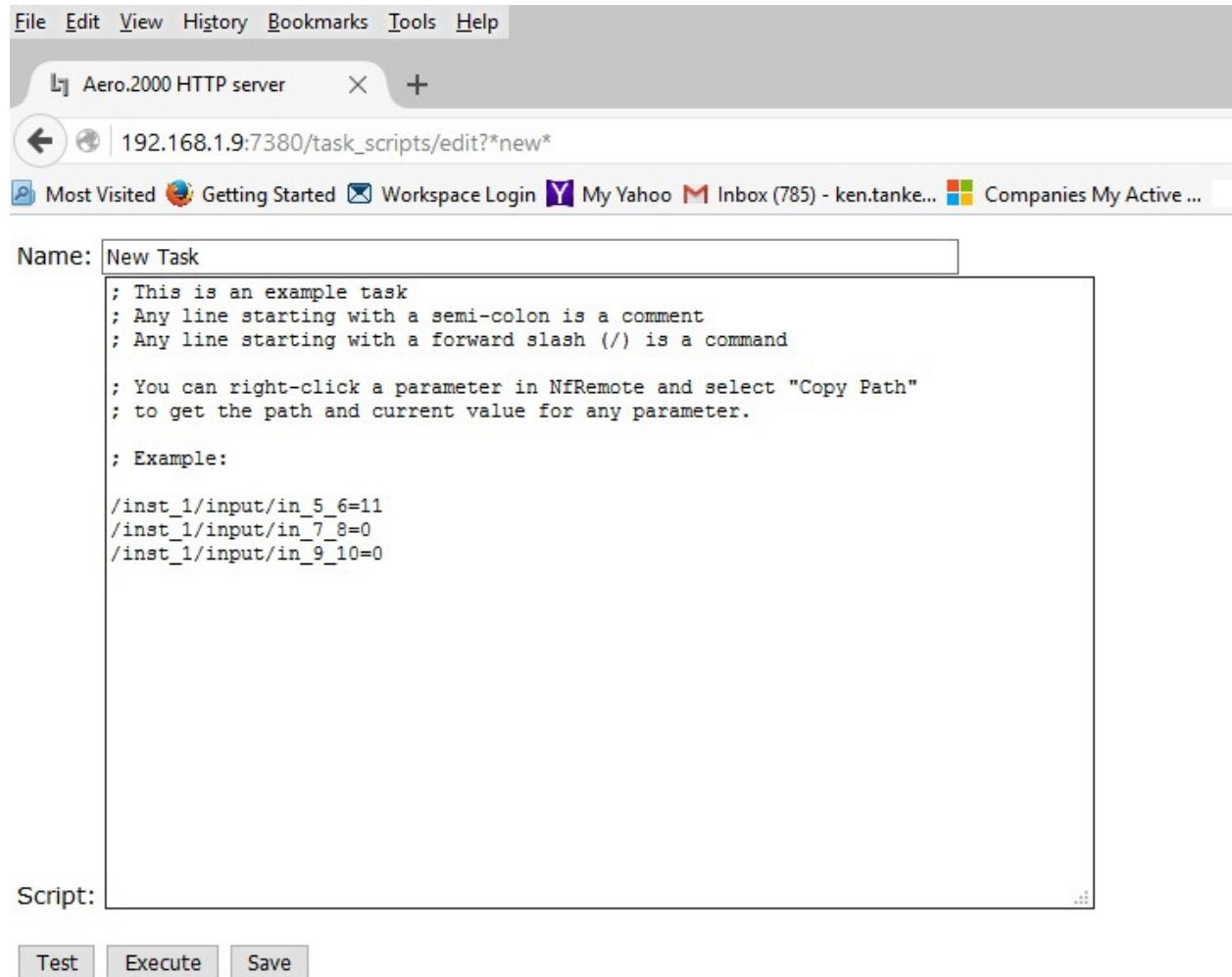
Figure 5-6: Sample script

Type in a name for the script. We recommend that the name is descriptive to make selecting one script, from a number of saved scripts, easy.

Below two scripts will be described.

1. Inst1-SDI-1-2-to-In-1-2-Stereo
    a. Route SDI audio source pair 1/2 to Instance 1, Input 1/2
    b. Mute 3-6 will mute Instance 1, Inputs 3, 4, 5 and 6
    c. set the Dolby AC3 encoder to 2.0 mode
2. Inst1-SDI-5-10-to -In-1-6-Surround
    a. Route SDI audio source pairs 3, 4, 5 to Instance 1, Input 1/2, 3/4, 5/6.
    b. Unmute channels 3-6

c. Set Dolby AC3 encoder to 5.1 mode

The first script, for a stereo program on SDI 1/2 is shown in Figure 5-7.
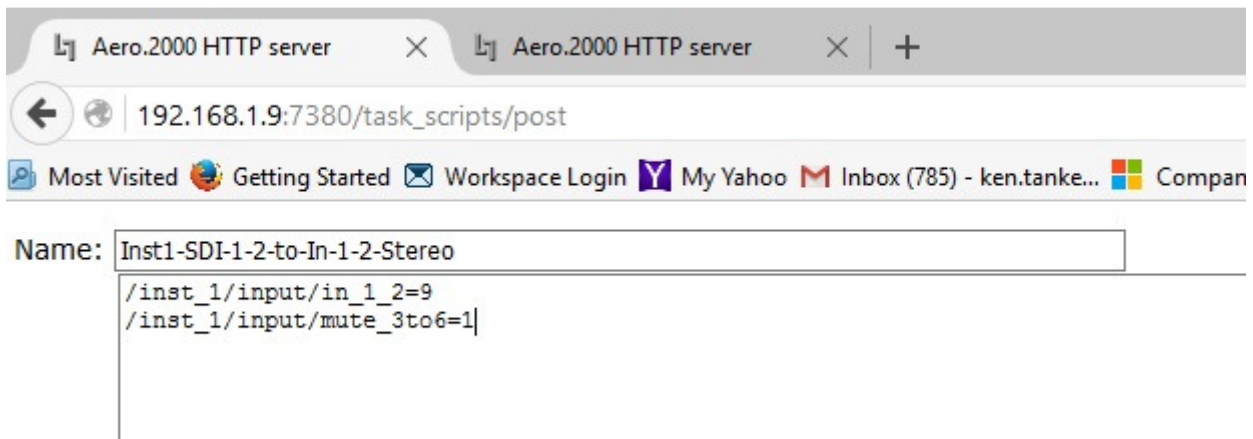
Figure 5-7 Script for stereo source with stereo Dolby AC3 encoding

The second script, for 5.1 surround on SDI 5/6, 7/8 and 9/10 is shown in Figure 5-8
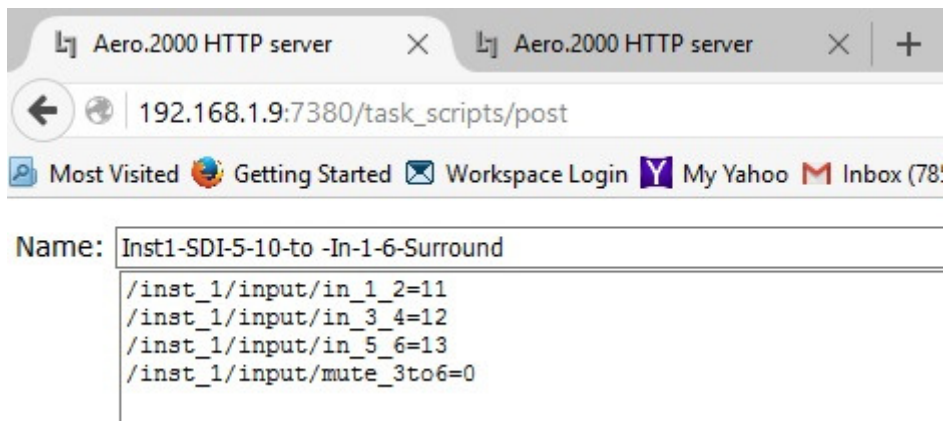
Figure 5-8 Script for surround source and surround Dolby AC3 encoding

Please note that two browser tabs are open in the browsers in Figure 5-7 and 5-8. This will allow the parameters to be open in one and cut and pasted into the script open in the other.

In NfRemote a Right-Click on any control will open a copy dialog box. Click Copy Path and then paste into the script. The result will look like this:

/inst_1/input/mute_3to6=1

This is the command to mute Inputs 3-6 and change the Dolby AC3 encoder to 2.0 mode.

See Figure 5-9 below.

Figure 5-9: Copying the script command for Mute Input 3-6

After creating and saving a script it becomes a Task. To assign Tasks to GPIs:

1. Navigate to System > GPI > GPI Function A-D (or E-H)
2. Click on GPI Function A and select Task from the drop down box
3. Click Lo and select a script to run when GPI A is pulled low.
4. Click Hi and select Do Nothing
5. Click on GPI Function B and select Task from the drop down box
6. Function Click Lo and select a script to run when GPI A is pulled low.
7. Click Hi and select Do Nothing
8. Remember to Enable GPIs for the GPIs to work

See Figure 5-10.

1. GPI A will run the script: Inst1-SDI-1-2-to-In-1-2-Stereo
2. GPI B will run the script: Inst1-SDI-5-10-to -In-1-6-Surround

Figure 5-10: Assign tasks to GPIs

5.4   AERO Scheduling

Another new feature in latest update to AERO.100 is an internal automation system. Any command in the GPI menu, and any Task, can be run according to a day-of-the-week, hour-of-the-day, internal scheduling application. The scheduling is part of the NfRemote GUI and can be found by navigating to:

System > Scheduling > Event x-y

See Figure 5-11.
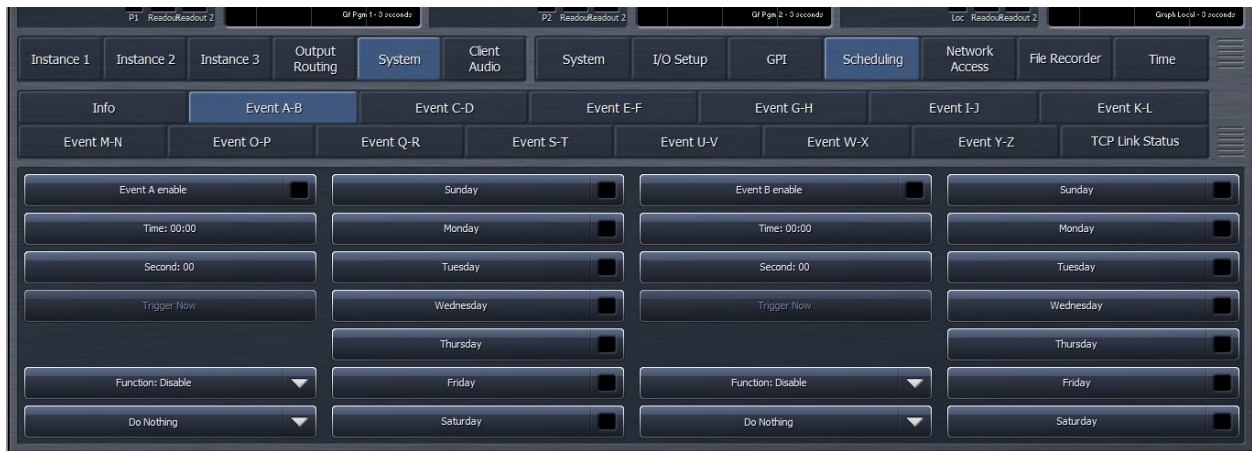
Figure 5-11 Event Scheduler

Two events are shown on each of 13 screens named Event A-B to Event Y-Z.

1. Each event can be scheduled to the hour/minute/second and the day of the week.

2. An event can be scheduled to occur at the assigned time on multiple days.

3. Assignment of the event is done in the same way as a GPI is assigned.

The stereo and 5.1 surround switching Tasks, created in section 8.3, are used in the next example.

Figure 5-12 shows the change to stereo occurring every weekday at 11:29:59 PM. The scheduler works in 24-hour time to avoid errors. The time is shown as 23:59:59. The scheduled event is not enabled yet and can still be modified. All selections are available.

In the next example, shown in Figure 5-13, the AERO is switched to 5.1 surround mode every weekday at 5:59:59 AM. In this figure the event is enabled and al selections are grayed out because they cannot be modified while the event is enabled.

Figure 5-12: Internal Scheduler, Event A

Figure 5-13 Internal Scheduler, Event B, enabled

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5.5 Loudness Logs

The AERO.100 creates and stores logs for each program output. The logs can be found in the unit's HTTP server. Log scan be viewed and moved manually through the HTTP server interface or using standard HTTP Server commands.

1. All logs are in .csv format
   a. To see the full date and time in MS Excel the date column must be formatted
   b. Use Custom format in an MX Excel column
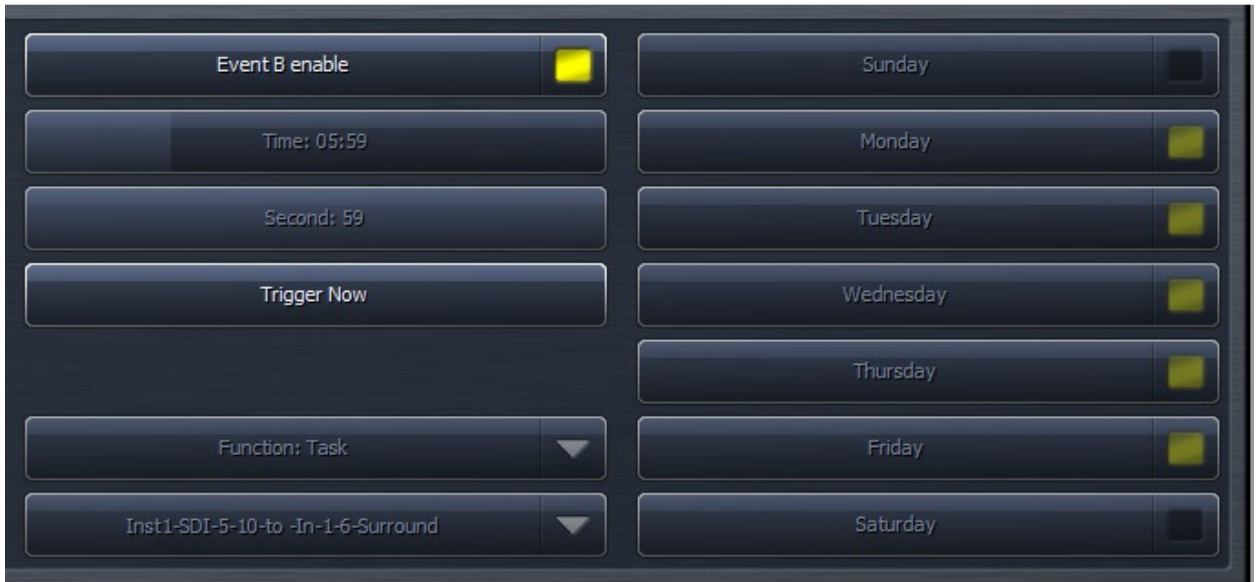   c. dd/mm/yyyy h/mm/sss
2. There are 4 logs automatically created for each program output.
   a. These logs are continually created in a first-in-first-out basis (FIFO).
   b. These logs record the following measurements every second:
      i. 3 second 10 second and 30 second integrated LKFS values
      ii. True Peak
      iii. Dialnorm
      iv. acmod metadata
   c. these three logs are 24 hours, 48 hours and 7 days long
   d. Each log is longer than the specified duration in order to allow time to remove the log with missing any data
3. The fourth log:
   a. records 400ms LKFS measurements every 100 ms.
   b. The log is a 70 minute long FIFO
   c. These values allow any ITU-R BS. 1770-3 measurements to be calculated over any duration of time.
4. There is a 5th manually controlled log.
   a. This log allows an operator to start and stop a log manually
   b. The manual log can be viewed in the HTTP server or downloaded for later viewing

The logs can be found on the main HTTP page. See Figure 5-14, below.

There are links here for the logs of each program output of each Instance.

Notice that after each log is the word (Stopped). This is the status of the manually operated user log.

NOTE!

The 4 automatic LKFS logs described above are always running. None of the settings for the metering displays or any user commands will stop or alter the automatic LKFS logging.
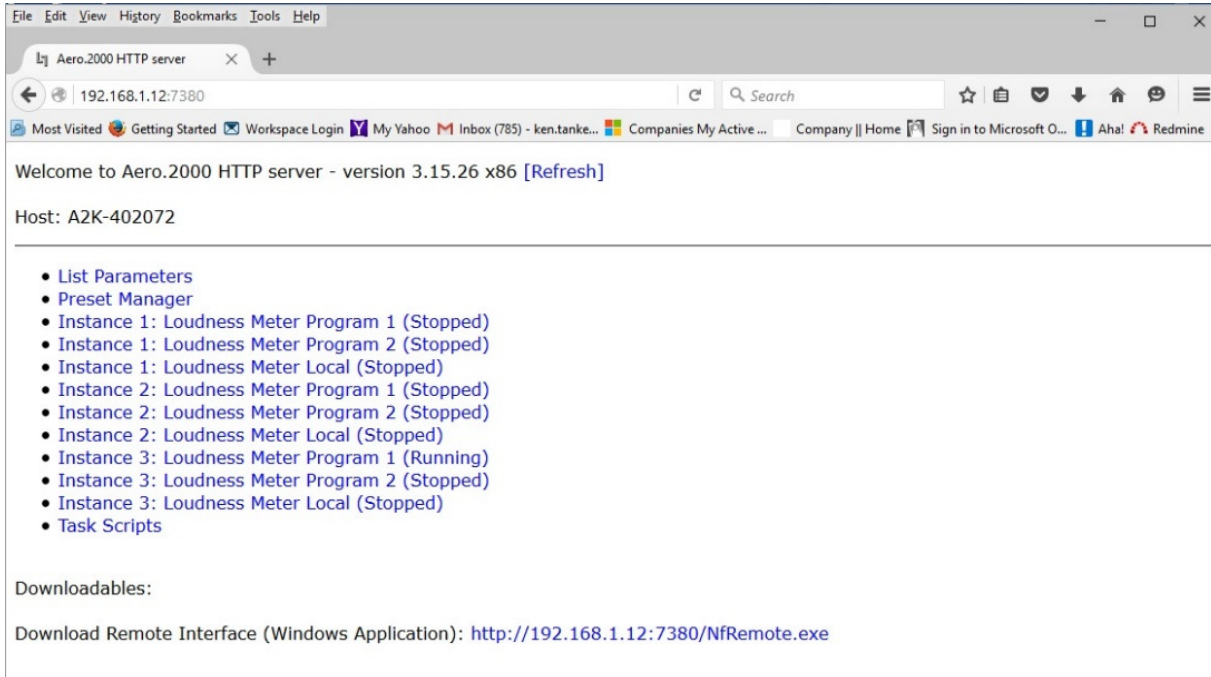
Figure 5-14: Loudness Logs

Click on Instance 1: Loudness Meter Program 1 (stopped). The following screen appears:
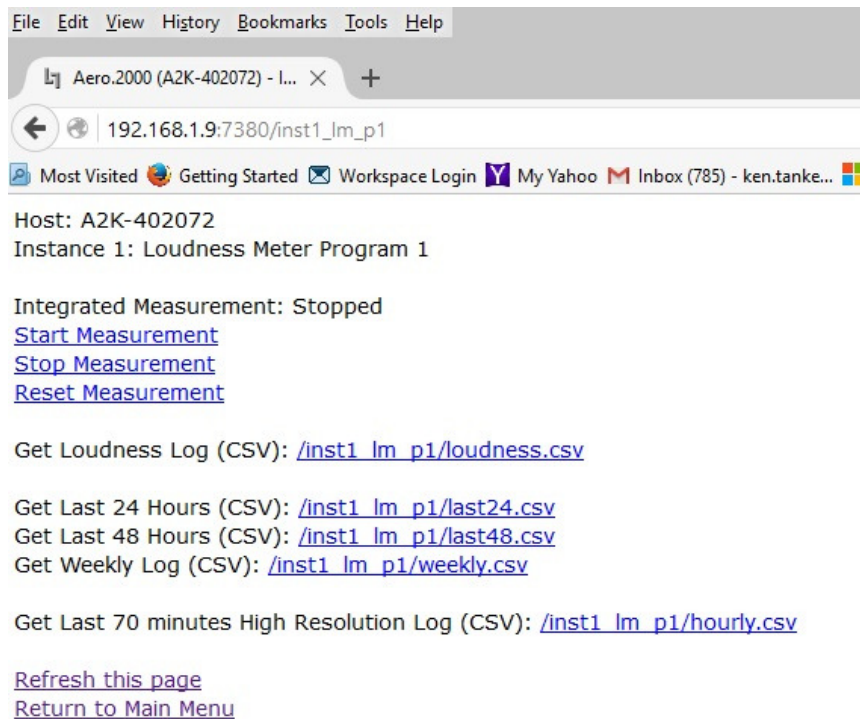
Figure 5-15 Logging screen for Instance 1, Meter Program 1

Double-Click any of the .csv links to open the log file in the browser.

Right-Click and select Save Link As to save the file to the local PC or on a network location.

A sample of the raw log data for the 24 hr., 48 hr., and the 7 day log is shown in Figure 5-16.
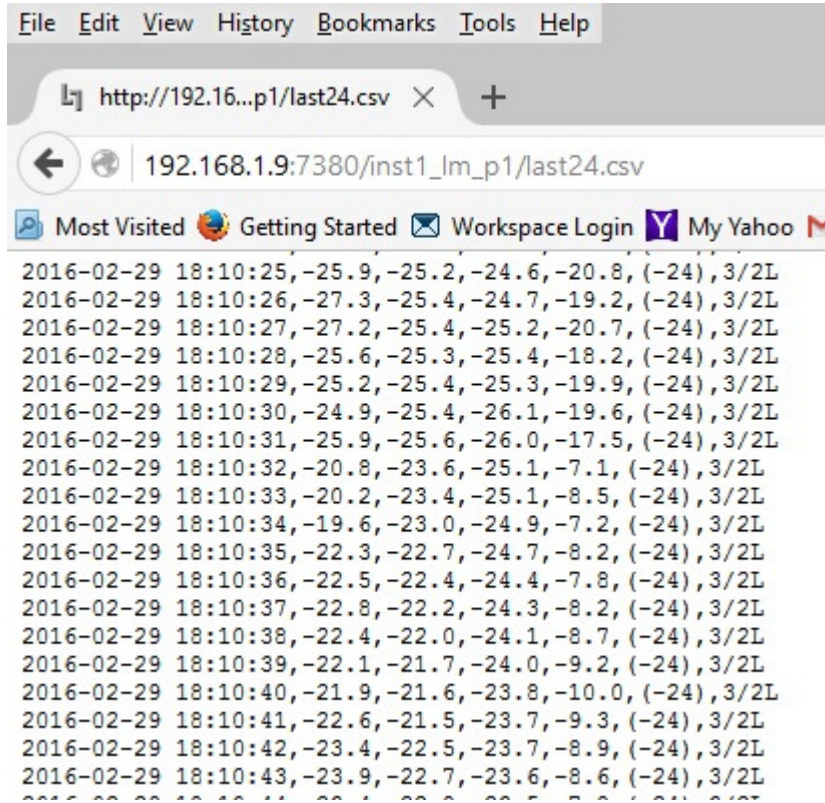
Figure 5-16: Raw Log data

Any of the logs can also be fetched using standard HTTP commands.

Users have written software that downloads the desired logs and saves them or uses them to create a combined traffic log with running LKFS measurements.

The Start, Stop and Reset Measurement links are for the user controlled manual log.

/inst1_lm_p1/loudness.csv is the link to the log for this meter.

Right-Click the link and select Save Link As to save the file on the local PC or network.

Note that at the bottom of manually controlled user log, below the running second measurements, there are several values.

- ITU BS.1770 Integrated Ungated:
- ITU BS.1770-2 Integrated Gated:
- EBU R128 Integrated:
- EBU R128 Integrated:
- Maximum Peak: dBTP
- EBU R128 Loudness Range:

6 Special Features

6.1 SAP (secondary audio program) Handling

In the U.S. many stations have SAP audio for one or more programs. DVS (descriptive video service) is also a requirement. Many networks deliver SAP programming as a single channel of an embedded pair. AERO.100 makes broadcasting SAP easy.

- Instance 1 > Input > Source. Select the SAP source pair, typically 7/8 to Input 7/8. This places SAP audio on the DRC Program 2 input.

- Instance 1 > Output > Output 7/8 > 7/8 Input source. Select 7 Only from the drop down. SAP/DVS audio on channel 7 will made a dual mono pair and loudness controlled.

- SAP/DVS is typically not present for all programs. In order to maintain audio on the SAP channel a loudness controlled downmix of Program 1 (Or simply the stereo audio of Program 1) can be used to automatically replace SAP when there is no SAP source. The assures that programs, promos, commercials and any content that does not have SAP audio will have the main program (Program 1) audio on the SAP channel instead of silence.

- Instance 1 > Output > Output 7/8 > 7/8 Output Mode. Set Output Mode to Auto Downmix. Additional parameters in this menu permit the user to adjust the hold-off time before SAP is replaced and how fast the downmix is replaced by SAP when it returns.

- The SAP source audio can, alternately, be applied to DRC 9/10

- Instance 1 > Input > Source. Select the SAP source pair, typically 7/8 to Input 9/10. This places SAP audio on the DRC Local input. Follow the steps above in the Output 9/10 menu:
  Instance 1 > Output > Output 9/10

6.2 Downmix Outputs

When using a 5.1 Instance (AMX5.1) two downmixes can be created. One uses the DRC Program 2 output and one uses the DRC Local output. In some applications a downmix is embedded in the SDI output for use downstream. For example, an SD output can be down-converted from the HD video, and the stereo downmix can be used for this.

In other applications, like audio for in-house monitoring in control rooms or in-house audio distribution a downmix can be routed an AES digital audio output. The same downmix output can be routed simultaneously to an SDI embedded pair and an AES digital audio output.

Example of a configuration for a downmix output

1. Instance 1 > Output > Output 9/10

2. Set Downmix -> 9/10 to On for a full time downmix from the DRC 9/10 output.

3. There is also a downmix gain control in this menu.

When DRC Local 9/10 output is used for a fulltime downmix the DRC Local processor can still be used for EAS, local emergency audio, or local program audio replacement of Program 1, OR Program 2, OR Program 1 AND Program 2.

6.3 Local Audio Insert/Replace

There are several applications for the audio replacement or override of main program audio.

- Local content may use a different embedded audio pair map than network or syndicated programming.

- Network programming does not use upmixing but all local programming is upmixed.

- Insertion of emergency audio messages or signaling that replaces main audio and/or SAP audio.

- Insertion of emergency audio messages or signaling that ducks main and/or SAP audio.

- Local audio programming that entirely replaces audio programming on the main and/or SAP program(s).

Local audio configuration:

Instance 1 > Input > Source and select the audio source for the DRC Local input. The source can be AES audio or an SDI embedded pair.

Instance 1 > Output > Local > 9/10 Input Mode. Select Local Mode for 9/10 input mode and all the Local menu items becomes active.

Configure operation of the local audio override:

Instance 1 > Output > Local > Destination chooses the program channel, Program 1, Program 2 or both that will be replaced or ducked behind the Local input.

Instance 1 > Output > Local > Local Audio Override drop down offers 4 selections:

- Off: no override or replace

- VOX: if there is audio on the DRC Local (9/10) input then the main program will automatically be overridden. The Holdoff, Crossfade Speed and the duck level of the program audio can all be adjusted in this menu. The main program can be muted or ducked by n dB.

- Override: When in override mode local audio replaces program audio until Override is switched Off.

- Replace: This is used to continuously replace program audio with local audio without regard to whether or not there is audio on the 9/10 input.

- GPI or IP based commands can be used to switch override on and off.

6.4   Dolby Insert

The Dolby encoder licensed to any Instance is internally connected so that DRC Program 1 output of that instance feeds the Dolby encoder. While this makes encoding the main program audio easy there are circumstances when the connection needs to be broken.

Some broadcasters use a viewer ratings system encoder that needs to be inserted after any audio processing but before Dolby encoding.

To configure the Dolby insert proceed as follows for a 5.1 main program:

- Instance 1 > Output Routing > AES Outputs.

- Select AES Output 1/2 = Proc 1/2.

- Select AES Output 3/4 = Proc 3/4.

- Instance 1 > Output > Dolby Digital plus Encoder and Set Insert = On.

- Instance 1 > Inputs > Return A. Select AES 1/2

- Instance 1 > Inputs > Return B. Select AES 3/4

- Connect AERO.100 AES outputs AES Outputs 1/2 and 3/4 to the external watermark encoder inputs 1 and 2.

- Connect external watermark encoder outputs 1 and 2 to AERO.100 AES inputs 1/2 and 3/4.

The typical viewer ratings encoder does not encode to the Ls or Rs channels so pairs 5/6 do not need to be routed outside the AERO.100.   Processed channels 1/2 and 3/4 are routed through the external encoder and directly to the Dolby encoder inputs through the Dolby Inserts. Return A and B are the patch points to the Dolby Insert.

> ### *Note!*
>
> Audio delays may require adjustment depending on the external encoder latency.

6.5   Dolby Encoding of Instance 1 SAP using Instance 2 Dolby Encoder

There are some users that may want to insert a SAP program created in Instance 1 into the stereo Dolby encoder in a stereo Instance 2. This is often the case when the user wants to configure a SAP output that has auto replacement of missing SAP by a downmix of the main channel. In the case of SAP configured on Instance 1, DRC Program 2 Follow the steps below.

1. Output Routing > AES/SDI routing > AES Outputs.

2. Select AES Out 1/2 and select Proc 7/8 from the drop down as the source. Processed SAP is now on AES output 1/2.

3. Instance 2 > Output > Dolby Digital Plus Encoder > Insert and select On.

4. Instance 2 > Input > Source > Return A and select AES 1/2 as the source.

5. Connect a physical unbalanced AES jumper between AERO.100 AES 1/2 Out and AES 1/2 In.

6.6   Auto Replace of Stereo Program by 5.1 Surround Program

There is a feature of the 5.1 surround output channel. The most commonly used source pair configuration for embedded SDI content is to place stereo programs on pair 1 (channels 1/2).

If content is mixed with 5.1 surround and stereo programs then the 5.1 surround content is placed on pairs 1, 2 and 3 (Lf/Rf, C/LFE, Ls/Rs). AUTOMAX will detect that C, Ls and Rs are all below the user set threshold and upmix the Lf/Rf source on pair 1.

Occasionally stereo content is always present on a given pair. For example, stereo is always on pair 1/2. When 5.1 surround is present it is on 3 entirely different pairs. For example, Pairs 3, 4 and 5.

AERO.100 can upmix pair 1 and automatically switch to the 5.1 surround pairs when 5.1 surround audio is present. If a program with stereo only content appears the AERO will switch back to the stereo source.

To configure this example, select SDI 5/6, 7/8 and 9/10 as the sources for Program 1 Inputs 1/2, 3/4, 5/6. See Figure 6-1.

Instance 1 > Input > Source
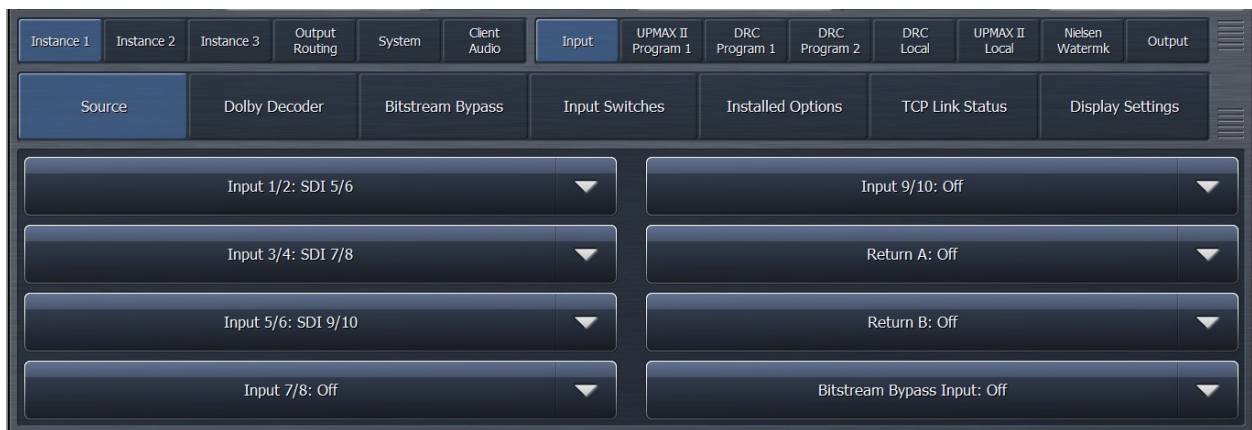
Figure 6-1: Instance 1, Source select for DRC Program 1

To set the stereo source select input 1/2 as the Lt/Rt source on the UPMAX Program 1 Auto Mode tab. See Figure 6-2.

Instance 1 > UPMAX II Program 1 > Auto Mode Settings
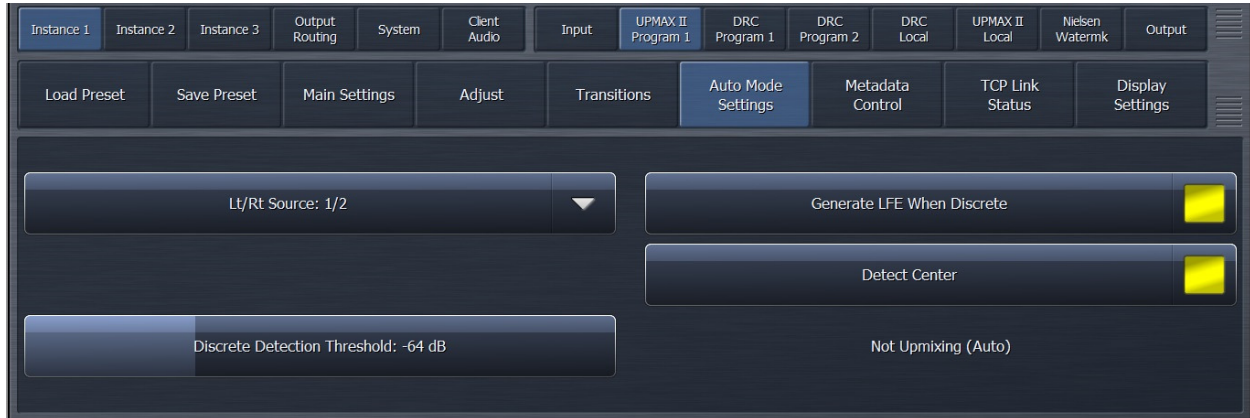
Figure 6-2: Instance 1, UPMAX Program 1, Auto Mode Settings

The Lt/Rt Source drop down allows the selection of inputs 1/2, 7/8, or 9/10 as the stereo source. Any 3 input pairs can be selected as the 5.1 surround source channels for Program 1 Input channels 1/2, 3/4, 5/6. These three AMX5.1 inputs are always used for the 5.1 surround program source.

6.7   Low Latency Mode

A Low Latency mode is available by request.

- Low latency mode does not allow for any Dolby or Nielsen encoding options in the AERO.100
- Processing latency with UPMAX upmixing OFF (disabled) is 45 ms.
- Enabling UPMAX upmixing adds 16ms (stereo content or passthrough of 5.1 surround content)
- Disabling sample rate conversion (SRC) for any AES input decreases the latency on that pair by 1.5 ms.

7 Troubleshooting

AERO.100 is reliable and easy to install. Most problems turn out to be wiring or configuration errors. However, it is a powerful processor with many possible configurations and user-adjustable parameters.

- If you cannot find the source of a problem, simplify the signal path.

- Hard bypass is one of AERO.100's best troubleshooting features. To instantly remove AERO.100 from the signal path, go to:
System > I/O Setup > H/W I/O Setup > Master Bypass and enable the Master Bypass

- Master Bypass enables the relay bypass of SDI in to SDI out and each AES input to its corresponding output.

- To remove processing from the signal path but retain the signal flow each DRC can be switched to bypass. See Fig. 7-1, below.

Fig 7-1: DRC Bypass setting

- Bypass sets all gain control elements to unity. The entire signal path and the latency is maintained but no processing is active.

- Viewing the hardware I/O and Instance I/O meters is a good trouble shooting tool when configuring SDI embedding, DRC Inputs and Output Routing.

7.1   The unit does not power on

1. Check whether the front panel logo is back-illuminated blue and that the fan is turning when AC power is applied.

2. The boot process may take up to two minutes. If the unit boots, you are done.

3. If the fan spins but the unit still does not boot, continue to 4 below.

4. Remove the AC cords and wait two minutes.

5. Plug both AC cords back in to power the unit on.

6. AERO.100 will automatically power back on.

7.2   Dialogue causes surrounds to pump

The current preset may be too aggressive, fast, or the Gate and Freeze settings are inappropriate for the content. Since all processing channels in a program are linked, they all receive the same gain reduction and expansion. The loudest channel initiates the gain control, so it can seem that the surrounds are ducked by dialogueue. Choose a moderate preset, and then carefully adjust Gate and Freeze so crowd noise does not increase when dialogueue stops.

7.3   Output audio clicks and pops

When using the AES-3 inputs the AES reference may be missing or at the wrong sample rate; the unit expects to lock to 48 kHz. AERO.100 defaults to an internal 48 kHz reference if the external reference is removed or missing. This allows audio to continue, but with asynchronous inputs and outputs (due to the sample rate converters on each input pair). Make sure to connect a valid reference signal to avoid this issue.

An improper reference signal in equipment located upstream or downstream from AERO.100 can also cause output noise. Use Master Bypass to verify that AERO.100 is not the problem.

System > I/O Setup > H/W I/O Setup > Master Bypass and enable the Master Bypass

SDI sources that are not synchronous may cause pops and clicks in the audio when switched to the AERO.100. Auto-correction of this state can cause 10 seconds or more of audio muting while the unit re-syncs. If this is the case put a video frame synchronizer in front of the AERO.100 SDI input.

An Ethernet connection to the AERO.100 that is unstable (i.e. bad port or other network issue) can cause the same issue as switching unsynchronized sources into the AERO.100. The Ethernet connection must be stable.

Chattering or other issues with a Dolby encoded source that is connected to an AES-3 input may be due to the input sample rate converter (SRC) not being in bypass. The SRC setting of found here:

System > I/O Setup > SRC Bypass.

7.4   Dolby Digital, Dolby Digital Plus or Dolby E output dropouts

When using the internal Dolby Digital (Digital Plus or E) encoder noise in the Dolby encoded signal is usually caused by not having a proper reference with respect to the DTV video encoder/multiplexer. All gear should be referenced to the local plant timing. In some cases the transmission encoder generates a special reference signal that must be routed back to the AERO.100 and used as its reference. Consult your DTV encoder reference manual for more details.

7.5   Audio sounds strange

Audio that sounds reverberant, hollow or like sound in a tunnel indicates timing differences between the audio channels. Stereo viewers are usually the first to notice such problems. The delay settings in AERO.100 should all be equal, or set explicitly. Offsets of just a few milliseconds can be audible under the right conditions.

For those using a Dolby DP564 AC-3 decoder, one of the monitoring modes uses the analog and digital outputs. This can inject up to 10 ms of delay into the surround channels, which usually elicits complaints. Either bypass the unit or set the monitoring mode to Digital.

7.6   Audio issues disappear in bypass

Since AERO.100 can apply significant gain to incoming signals, previously inaudible sounds may get pulled out of the background. We recommend listening carefully to the station audio for hums, buzzes, clicks, pops, phase issues, frequency response problems, bass build-up and other problems in the source audio. When amplified, these artifacts can ruin otherwise excellent programming.

Ensure that stereo source material that will be upmixed is very clean and that it is actually stereo or it may not sound good in surround.

Ensure that input channels 3, 4, 5 and 6 are silent when source programs changes between stereo and surround. Alternately, use a GPI or command over IP to Mute 3/4 and 5/6.

7.7   Audio fixed by re-boot

Re-booting sometimes fixes audio problems simply because the AERO.100 re-locks to the digital input when it restarts. The AERO restart also causes all downstream devices to re-lock to the incoming signal after reboot. This may hide a timing problem with the incoming signal.

Instead of rebooting, remove the input(s) to the AERO, wait 10 seconds and reconnect. If this fixes the problem (temporarily) it is likely that there is a timing problem with the incoming signal or the AERO reference setting.

Selecting a preset with minimal processing (i.e., Protection Limit) may shed further light on the problem by allowing the input audio to be heard with no loudness control.

7.8   Audio has artifacts

Sometimes described as "squirrels in the surrounds," this is almost always caused by source material that has been low bit-rate encoded and then transcoded back to LPCM.   Program delivery services or server systems use MPEG 1, Layer 2 audio data reduction to save bandwidth. At 256 kbps or higher per stereo pair, there are no issues. However, at or below 128 kbps coding artifacts in the original stereo signal can be unmasked by upmixing and by loudness control. This inferior content has similar results without upmixing if viewers matrix-decode the signal. Matrix decoding is the default mode for most home A/V receivers. We recommend contacting the program provider or server manufacturer. Bandwidth is so inexpensive that there is no good reason to run audio coding at bit rates lower than 256 kbps stereo.

8 Specifications

Table 11-1 Electrical

Processing	
Structure	**AMX 5.1 Instance**: 5.1+2+2 with up to 2 downmix outputs, dual-path upmixing and SAP/DVS capability. **AMX2.0 Instance**: 2+2+2 with Auto SAP/DVS with 3 downmix outputs and SAP/DVS capability. **AMX5x2 Intance:** 2+2+2+2+2 with 2 downmix outputs and SAP/DVS capability.
Algorithms	**AEROMAX®**: ATSC A/85 and EBU R128-compliant loudness control via adjustable wideband and multiband processing. **UPMAX®II**: 5.1-channel upmixing, automatic bypass of discrete content
Options	Dolby Digital and Dolby Digital Plus encoding; 3/2L or 2/0 for AMX5.1 instance. AMX2.0 instance is limited to 2/0 encoding. Dolby E Encoding Dolby Digital, Dolby Digital Plus, and Dolby E decoding; auto sensing of coded or PCM audio. Nielsen Watermark Encoder Low latency mode Crowd Control ITU or EBU labeled metering
Digital I/O	
AES Digital Audio I/O	All inputs are unbalanced, 75 ohm, with internal termination 1-2, 3-4, 5-6, 7-8, AES Ref use BNC (F) connectors. Signal levels per SMPTE 276M/ AES-3ID-2001 All I/O can be assigned as needed
Remote	TCP/IP remote control and audio monitoring via Remote Interface software, a Windows®-compatible application (included) HTTP server allows get/set control from any OS
Ethernet	100 to 1000 BASE-T via RJ-45 connector
GPI/O Control Port	F-DB25 connector, 0–5 V TTL levels, pull to ground activation. 8 GPIs.
Metadata Input	DB9-F connector, 115 kbps, pinout per SMPTE 207M (RS-422/485) Interfaces directly with Dolby Metadata (SMPTE RDD6)

Reference	48 kHz via AES DARS reference input or SDI input
HD/SD-SDI Auto-Sensing I/O	De-embed up to 16 audio channels from SDI, process and/or encode, and re-embed up to 16 channels Signal levels per SMPTE 292M /259M Supports SMPTE 2020 A and B VANC metadata Supports up to 1080p/60/59.94/50 Hz

Table 11-2 Physical

Dimensions	**2RU** **H** = 3.50 in (90 mm) **W** = 19 in (483 mm) **D** = 13.25 in (337 mm)
Net Weight	12.5 lb (6 kg) approximate
Environmental	**Operating**: 0 – 50ºC **Non-operating**: -20 – 70ºC Fan cooled
Power Requirements	Dual redundant auto-sensing power supplies, each rated at 100–240 VAC, 50–60 Hz, 175 W maximum

8.1   Latency

The latency of PCM audio is fixed at 180 ms.

Latency of Dolby Digital Plus encoder is fixed at 64 ms.

Nielsen watermark encoding does not cause additional latency.

Disabling sample rate conversion (SRC) for any AES input decreases the latency on that pair by 1.5 ms.

Synchronization between audio and video is achieved via the included Compensating Video Delay and instance audio delays.

Please refer to website for Manual Addendum-Latency document regarding latency of units with CN1167 cards and later software versions.

8.2   Connector Pinouts

Table 11-3 Analog I/O (F-DB9)

Pin	Not used

Table 11-4 Metadata Input Port Pinout

Pin	Connection
1	Shield
2	TX A asynchronous data out −
3	RX B asynchronous data in +
4	Ground
5	NC
6	Ground
7	TX B asynchronous data out +
8	RX A asynchronous data in −
9	Shield

F-DB9 connector with full-duplex RS-485 protocol running at 115 kbps. Pinout is compatible with SMPTE 207M. Pin-for-pin compatible with Dolby Metadata (SMPTE RDD6).

Table 11-5 AES I/O (F-DB25)

Pin	Not Used

Pin	Function
1	+5 V, 150 Ma
2	GPI A (Active Low)
3	GPI B (Active Low)
4	GPI C (Active Low)
5	GPI D (Active Low)
6	GPI E (Active Low)
7	GPI F (Active Low)
8	GPI G (Active Low)
9	GPI H (Active Low)
10	No Connection
11	Status OK
12	No Connection
13	Ground
14	+5 V, 150 Ma
15	GPO A (currently unused)
16	GPO B (currently unused)
17	GPO C (currently unused)
18	GPO D (currently unused)
19	GPO E (currently unused)
20	GPO F (currently unused)
21	GPO G (currently unused)
22	GPO H (currently unused)
23	Ground
24	No Connection
25	Ground

Appendix 1: Configuration Check List

Here is a list, in order, of what needs to be done to configure an AERO.100 for use in a typical television broadcast facility. This check list starts with the assumption that there is already a connection between an MS Windows PC (or laptop, tablet, etc.) running NfRemote and the AERO.100. This ilist also assumes the source is SDI.

1. System > Time > Time Zone. Set Time Zone and select Yes (in pop-up) to reboot.

2. System > Time > Set Time Manually. Set current date and time.

3. System > Time > NTP. Click NTP Off (indicator black). Enter NTP server addresses. Select NTP On.

4. System > I/O Setup > SDI Embedding. Set SDI embedding On and select audio sources for each embedded output pair.

5. If embedding is set to Off, then: System > I/O Setup > Hardware I/O Setup. Set reference signal

6. System > I/O Setup > SDI Video Delay. Set to 180 ms if there is no internal Dolby encoding. Set to 244 ms if Dolby encoding will be done in the AERO.100

7. Instance 1 > Input > Source. Select the input source for each DRC input pair in Instance 1.

8. If an AMX5.1 Instance will be used for stereo sources full time, then:
    Instance 1 > Input > Input Switches. Select Mute Input 3-6

9. Output Routing > AES/SDI Outputs > SDI Outputs. Select the DRC or Dolby encoder outputs that will be embedded in each SDI output channel pair.

10. Output Routing > AES/SDI Outputs > AES Outputs. Select the DRC outputs that will be embedded in each AES digital audio output pair.

11. Instance 1 > UPMAX II Program 1 > Load Preset. If upmixing will be used select a preset.
    Instance 1 > UPMAX II Program 1 > Main Settings. Click Upmix Enable.
    Instance 1 > UPMAX II Program 1 > Main Settings. Set Automode = Auto for mixed source content or On if all source content is stereo and it will all be upmixed.

12. Instance 1 > DRC-Program 1 > Load Preset. Select and load a loudness control preset.
    Instance 1 > DRC-Program 1 > Final. Set Final Output so that average LKFS output on
    Program 1 loudness meter is on target. (usually -24 dB LKFS or -23 dB LUFS)

13. Instance 1 > DRC-Program 2 > Load Preset. Select and load a loudness control preset.
    Instance 1 > DRC-Program 2 > Final. Set Final Output so that average LKFS output on
    Program 2 loudness meter is on target. (usually -24 dB LKFS or -23 dB LUFS)

14. If the program on DRC-Program 2 is SAP on a single channel of the input pair then 7/8
    Input Source can be selected to take 7 only, or 8 only:
    Instance 1 > Output > 7/8 Input Source. Select 7 or 8.

15. If the program on DRC-Program 2 is SAP and automatic replacement of missing SAP with
    a main channel downmix is desired, then:
    Instance 1 > Output > 7/8 Output. Set 7/8 Output Mode = Auto Downmix. Adjustments
    of downmix output level and crossfades and hold-off for SAP replacement by downmix
    and Downmix by SAP are provided.

16. If a full time downmix is wanted on the DRC 7/8 Output, then:
    Instance 1 > Output > 7/8 Output. Set 7/8 Output Mode = Main Downmix.

17. Instance 1 > DRC-Local > Load Preset. Select and load a loudness control preset.
    Instance 1 > DRC-Local > Final. Set Final Output so that average LKFS output on Program
    Local loudness meter is on target. (usually -24 dB LKFS or -23 dB LUFS)

18. If the program on DRC-Local is SAP on a single channel of the input pair then 9/10 Input
    Source can be selected to take 7 only, or 8 only:
    Instance 1 > Output > 9/10 Input Source. Select 7 or 8.

19. If the program on DRC-Local is SAP and automatic replacement of missing SAP with a
    main channel downmix is desired, then:
    Instance 1 > Output > 9/10 Output. Set 9/10 Output Mode = Auto Downmix.
    Adjustments of downmix output level and crossfades and hold-off for SAP replacement
    by downmix and Downmix by SAP are provided.

20. If a full time downmix is wanted on the DRC 9/10 Output, then:
    Instance 1 > Output > 9/10 Output. Set 9/10 Output Mode = Main Downmix.

21. If the DRC-Local input will be used for main or DRC-Program 2 program replacement, or
    for EAS or for local emergency audio override, the configuration is found here:
    Instance 1 > Output > Local

22. If DRC Local will be used for main program replacement and upmixing of the local input is desired:
    Instance 1 > UPMAX II Local > Load Preset
    Instance 1 > UPMAX II Local > Main Settings
    Instance 1 > UPMAX II Local > Adjust

23. If Nielsen encoding option is included the setup is found here:
    Instance 1 > Nielsen > Channel 1-6, and Channel 7/8 and Channel 9/10.
    Note: Only Nielsen can provide the Check Digits necessary to enable the encoder for each unique SID.

24. Instance1 > Output > Target. This sets the reference level of the loudness meters for each DRC output. If Dolby encoding is included Target also sets the Dolby dialnorm metadata value.

25. Instance1 > Output > Dolby Digital Plus Encoder. If the Dolby encoding option is included, then the settings for Dolby Digital and Dolby Digital + are set in this menu.

26. Instance1 > (any sub-menu) > Display Settings. Any of the available metering can be configured from this menu. There are 6 instance screen recall presets available. These are buttons 1 to 6 in the upper right side of the NfRemote display.

27. Instance1 > Output > Loudness Meter. The loudness meter bar-graph displays and digital readout displays for each DRC output are configured here.

28. Instance1 > Output > Delay. If video delay is set to the nearest full video frame greater than the audio latency of the AERO.100 then additional audio delay can be set here for proper lipsync. LPCM outputs can also be delayed separately from Dolby encoded output delay to allow both to have proper lip synch at the same time.

29. Client Audio > Client Audio Output > Patch Point. Hardware inputs and outputs and many other "patch points" within the AERO.100 can be monitored on a remote PC using NfRemote. A high quality soundcard and a stereo, or surround, playback system allows monitoring of the audio while configuration changes are made. NfRemote provides EQ and other processing to create accurate stereo and surround monitoring environments wherever the PC is located. If the network connection supports it then high quality audio streaming is provided.

30. If there is a second Instance, then steps 7 through 28 are repeated for the additional instance.

Appendix 2: General Notes About NfRemote

Below are several notes about using NfRemote.

- Multiple computers can connect to the same AERO.10/100/2000 unit simultaneously.

- One computer can connect to multiple AERO.10/100/2000/ units simultaneously by running NfRemote multiple times on the same PC. This is a handy feature for monitoring or adjusting main and backup units at the same facility or monitoring and/or configuring units assigned to multiple channels or different stations.

- Each instance of a remote connection requires some horsepower from AERO.100's CPU. Observe the CPU load and do not exceed 80% even for short periods of time.

- Tasks that require significant CPU resources include; using multiple instances of the oscilloscope and streaming client audio to multiple remote computers. Although it is highly unlikely that your AERO.100 CPU would run out of resources, even in a fully configured unit addressed from several remote computers, it is important to monitor the AERO's CPU load! Fortunately, the CPU percentage meter will warn you when resources begin to run low.

- The available bandwidth on the local network determines how robust the remote connection will be.

- The remote software measures available network resources during the initial handshake with AERO.100. If bandwidth is marginal, some patch points may be unavailable for remote monitoring of the oscilloscope and spectrum analyzer.

- The quality of the client audio streamed to a remote computer will be adjusted to best match current network resources.

- The latest version of NfRemote is always included with any software or firmware upgrade. Only the latest version of NfRemote will provide all of the interface features that the latest software and firmware provide. Always update all copies of NfRemote with the latest version after an upgrade. Newer versions of NfRemote are compatible with older software revisions of AERO.10/100/2000.