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10 Channel 2 Output Aurora Sidecar Handbook

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10 Channel 2 Output Aurora Sidecar Manual

Introduction:

“Congratulations on your purchase of our 10 channel 2 output Aurora Sidecar! I am confident that you will find that its many features and great Class A discrete vintage sound will help you to make great recordings.

The Aurora Sidecar is a large and professional piece of equipment. As such, it will need to be maintained. The better it is maintained, the better service you will have for a longer period of time.

Read through this manual to familiarize yourself with the controls and optimal operating procedures."

-Geoff Tanner

Connecting Aurora Sidecar To Power Source:

The sidecar uses an external linear dc power supply and the correct input voltage must be selected *before* connecting the power supply to ac power.

The red input voltage selector should be positioned up (115v setting) for 100v – 120v ac supplies and positioned down (230v setting) for 220v – 240v ac supplies.

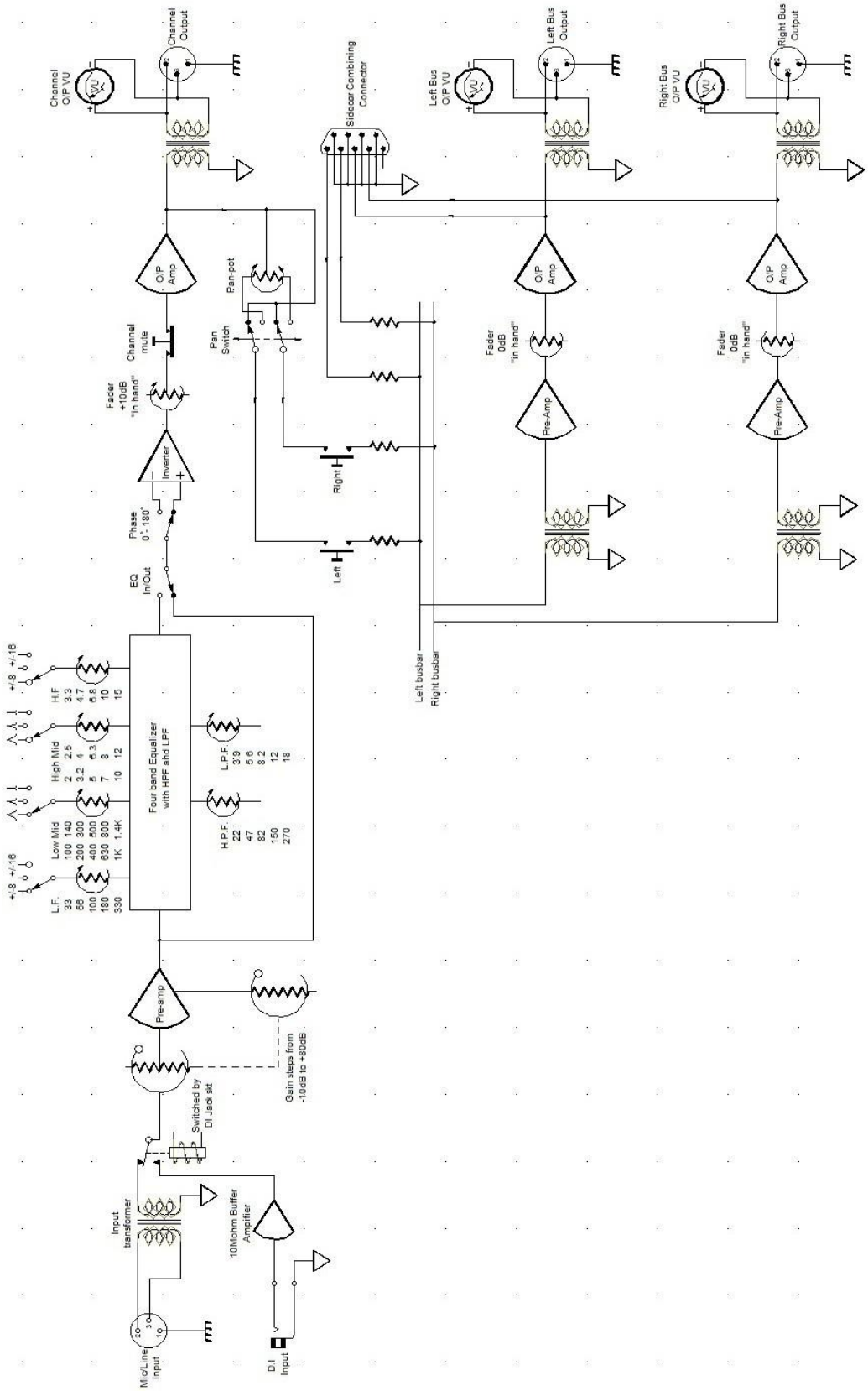
It is very important to ensure the correct input voltage is selected. If 230v is applied when the switch is selected to 115v, the primary windings of the transformer will be damaged and the fuse will blow. Replacing the fuse will not repair the damaged windings and the warranty on the power supply will be voided as there are warnings printed on the front and reverse of the power supply case and emphasized here.

Linear power supplies use a large transformer that will radiate a small electro-magnetic field outside the steel case. Always position the power supply away from any sensitive audio transformers (that you might have in nearby microphone preamplifiers) and do not put anything on top of the power supply that would prevent the heat from the internal heatsink escaping.

Always use a 3 pin ac (IEC) cable and plug to provide the power supply with a safety ground connection. Never use any form of ground lift.

The power supply has both input and output fuses to give maximum protection to both the power supply and the sidecar. It would be very unusual for either the 24v or 48v labeled fuses to blow and this would most likely be caused by a power cable being crushed by a door or wheeling something very heavy over it. Always replace the fuse with one of the same value, as printed below the fuse holder.

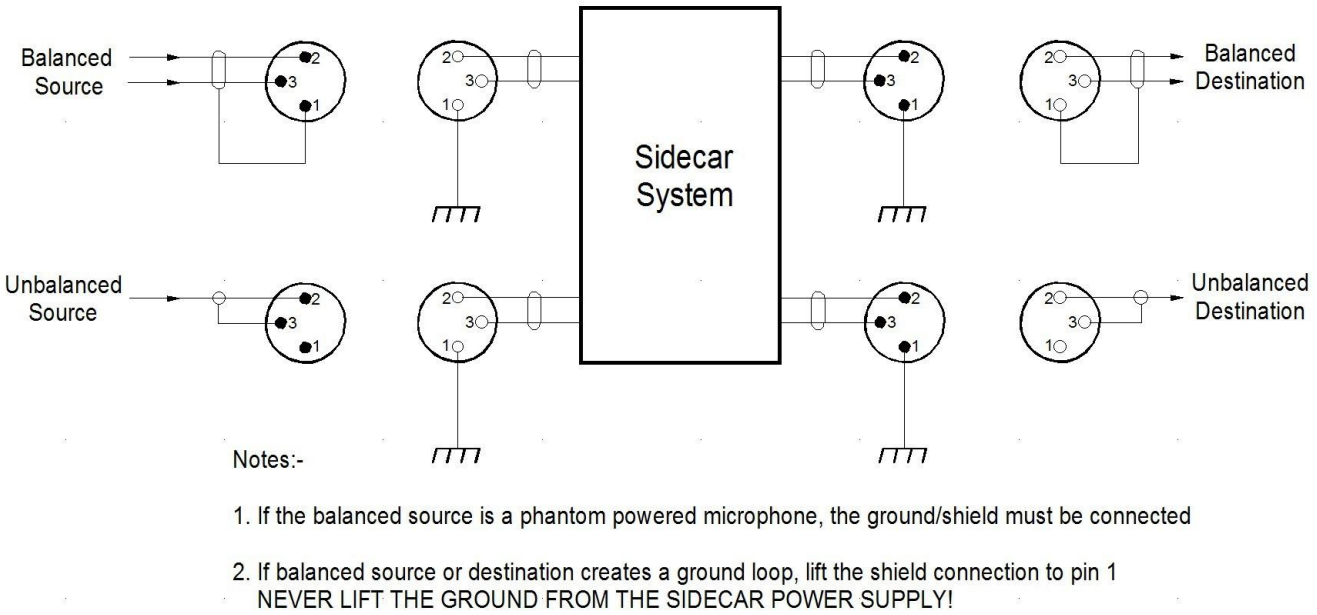
Aurora Sidecar Block Diagram:



Connecting Your Equipment To The Aurora Sidecar:

As you can see from the block diagram, all rear panel inputs and outputs are XLR connections and are transformer balanced and floating. It is important to take advantage of the transformer's isolation from grounds as the transformer could not care less whether it connected to a balanced or unbalanced source or destination!

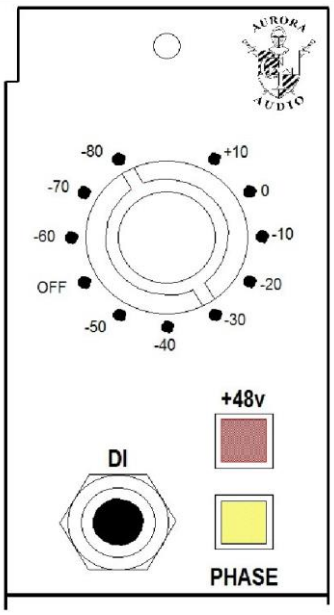
Balanced cables and connections are configured the normal way with pin 2 = hot phase, pin 3 = cold phase and pin 1 = ground. Pin 1 should not be any part of an audio signal and, if connecting to an unbalanced source or destination, connect the signal to pin 2 and the shield to pin 3, as shown below.



As detailed above, ground loops may occur if the studio equipment is sourced from multiple power outlets (which may even be on different phases or lacking the earth connection altogether), sourced from multiple power distribution strips (all plugged into one another) or from double insulated devices that use a 2 pin power connection.

If all the studio devices are at the same ground potential, there is no potential difference between them so no ground loop, caused by equalizing currents between the devices, will be created. It is better to keep all the equipment at the same ground potential so that the lifting of pin 1's in the XLR's will not be necessary.

The D.I Input On The Front Of The Channel Modules:



If you plug a mono source, like a guitar, bass, or synthesizer into the 1/4” jack on an Aurora Sidecar channel, it will cut the XLR source to the channel and select this DI source automatically. The XLR source can remain connected, but it will not be in circuit until the jack is removed from the DI input.

The input impedance to the DI input is 10MΩ, that is ten million ohms. To the device plugged into that input it may just as well be an open circuit, like the guitar cable is unplugged and laying on the floor, because the pick up will so lightly loaded that every single nuance of sound gathered by that pick-up will be caught and amplified by the Aurora Sidecar channel module.

The channel has a gain range of 90dB with signals from +10dBu to -80dBu and has over 26dB headroom on correctly set gains.

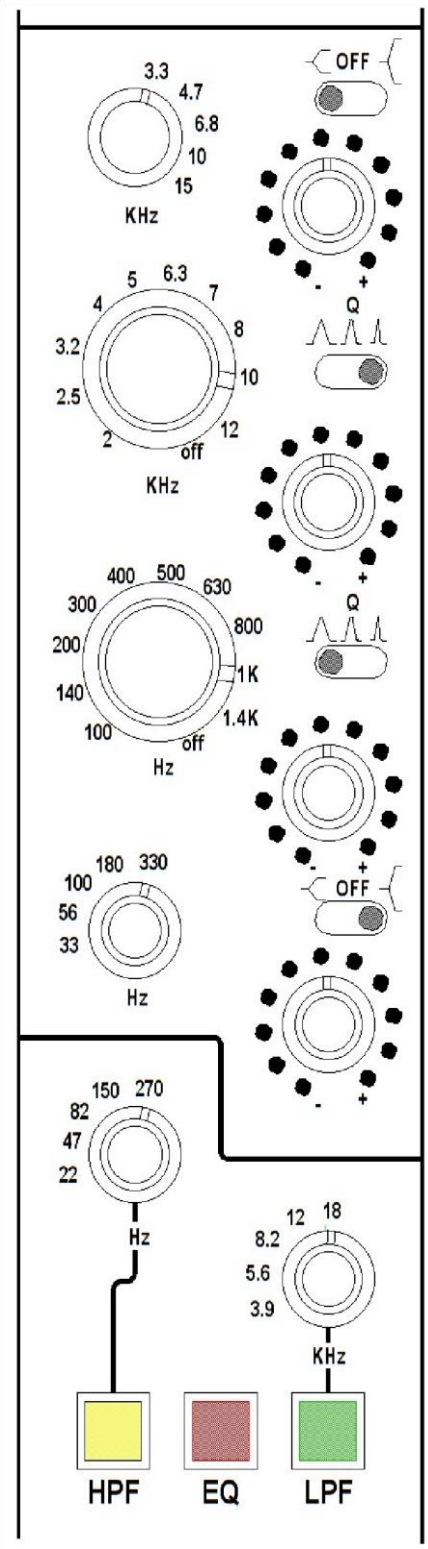
Setting Up The Channel For The Correct Gain Structure:

At the top of each channel is an illuminated VU meter that reads the post fader channel output level. With the channel fader set to 0dB and the equalizer switched out, the red gain knob can be turned clockwise from the +10dB position while a microphone or DI input is connected and spoken/played at the anticipated level. Continue to turn the red gain knob until the VU meter needle is just above or below the red 0VU to +3VU region.

The Penny + Giles (P&G) fader has 10dB gain at the top of its travel to fine tune any levels that fall between the 10dB gain steps. The channel gain is now correctly set for that source.

For maximum headroom, this procedure of matching gain to input level is traditionally seen as a proper way to set levels. To overdrive the channel, (for guitar like effects), increase the gain on the red gain knob and lower the fader to desired recording levels. This procedure will not hurt the circuitry of the Aurora Sidecar preamp.

The Four-Band Equalizer:



The four-band equalizer, like the rest of the Aurora Sidecar, is all discrete transistor Class A circuitry.

The equalizer is selected by pressing the red “EQ” button at the bottom of the channel. With the pots in the center detent position the gain should not change significantly when the equalizer is selected or deselected.

Starting from the high frequency control at the top, there is a three position switch that varies the boost and cut to allow very fine tuning of the EQ. With the switch to the left the variance is +/- 6dB and with it to the right the variance is +/-16dB.

The high and low mid frequency controls underneath have a three position switch that provides three alternatives of “Q” (bandwidth). The mid controls in the widest “Q” can have almost 20dB boost/cut.

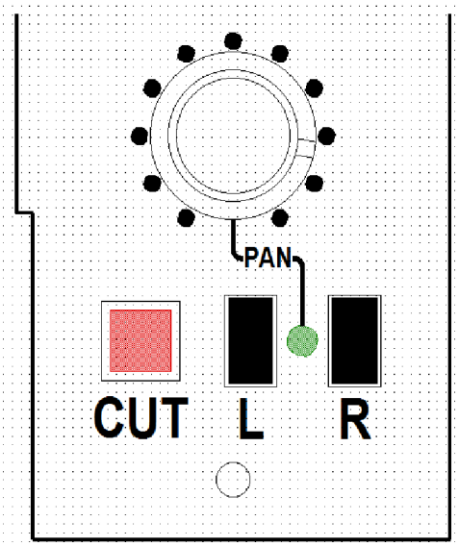
The low frequency control is similar to the high frequency in that two choices of boost/cut can be selected, +/-6dB and +/-16dB. Note that there is considerable overlap in frequency choices between the HF and LF and the two mid frequency controls.

To select either high pass or low pass filter, the red “EQ” button must be selected, then press either yellow or green button to select the 18dB per octave filter required.

The potentiometers at center position will effectively turn that signal path to unity gain.

I recommend starting with the HF and LF witches set to the right and the two mid frequency switches set to the left. This way you will have maximum signal range when starting.

Bus Sends, Pan-Pot Controls, And Cut Switch:

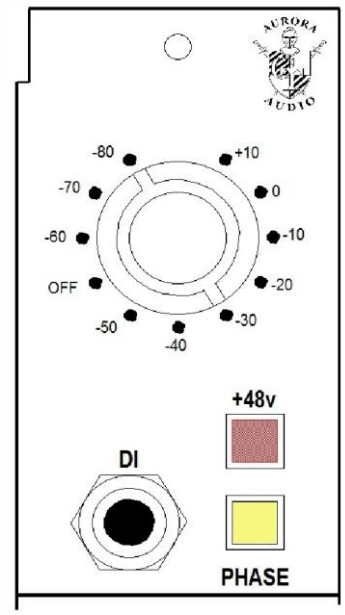


The pan-pot is only in line when both Left and Right bus assign buttons are pressed. The green "Pan" LED will illuminate to confirm that the pan-pot is in line and the pan control can now be turned to place the sound in the required stereo image.

Either the Left and Right bus assign buttons can be pressed individually to positively connect to either mix bus-bar.

The "Cut" control mutes both the bus assigns and the channel outputs completely from the audio path.

Phase And Phantom Power Controls:



The yellow "Phase" button works on both the channel output and the bus assigns and flips the phase 180º when pressed.

The red "+48v" button switches on the phantom power for condenser microphones.

Mixing To The Stereo Mix Busses:

The channel signals are sent, via the bus assign buttons, to mix resistors that voltage sum the channel signals onto the left and right mix busses. The mix bus uses the traditional process of using a transformer to couple the bus signal into the mix amp preamplifier stage. This gives the Aurora Sidecar the extra "iron" in the mix circuit path to produce a sound unobtainable with a virtual earth, current mix into an IC operational amplifier.

The mix amp preamplifier drives the P&G conductive plastic output faders, which feed the Aurora Audio classic output stage and transformer. A VU meter is wired across the stereo output XLR's to provide level indication.

On the subject of VU meters, both the channel output and stereo output VU meters read +4dBu for 0VU on the meter. This is a voltage of 1.228v ac and you will see a small hole below each VU meter that gives access to a trim potentiomer that allows the user to finely adjust the 0VU reference point.

International dBFS Levels:

On a technical note, 0dBm (an old telephone and early broadcast system of reference) is the voltage required to dissipate 1mW into 600 ohms = 0.775v ac. 0dBu (also 0.775v ac) just means that the impedance of the circuit is not specified. These, set in granite actual voltage levels, rather go out of the window when referred to dBFS figures associated with digital converters! (dBFS = **d**eci**B**els **R**elative to **F**ull **S**cale... i.e the clipping point of the system)

There is no single standard for setting where the 0dBFS point is...!!!

For example...

1. EBU R68 is used in most European countries, specifying +18 dBu at 0 dBFS
2. In Europe, the EBU recommend that -18 dBFS equates to the Alignment Level
3. European & UK calibration for Post & Film is −18 dBFS = 0 VU
4. UK broadcasters, Alignment Level is taken as 0 dBu (PPM4 or -4VU)
5. US installations use +24 dBu for 0 dBFS
6. The American SMPTE standard defines -20 dBFS as the Alignment Level
7. In Japan, France and some other countries, converters may be calibrated for +22 dBu at 0 dBFS.
8. BBC spec: −18 dBFS = PPM "4" = 0 dBu
9. German ARD & studio PPM +6 dBu = −10 (−9) dBFS. +16 (+15)dBu = 0 dBFS. No VU.
10. Belgium VRT: 0dB (VRT Ref.) = +6dBu ; -9dBFS = 0dB (VRT Ref.) ; 0dBFS = +15dBu.

0VU on the Aurora Sidecar VU meters is +4dBu (1.228v ac) and normally -18dBFS on the meters of the digital converters.

Aurora Sidecar Maintenance:

The channel section of the Aurora Sidecar is modular and modules can be easily removed and replaced.....

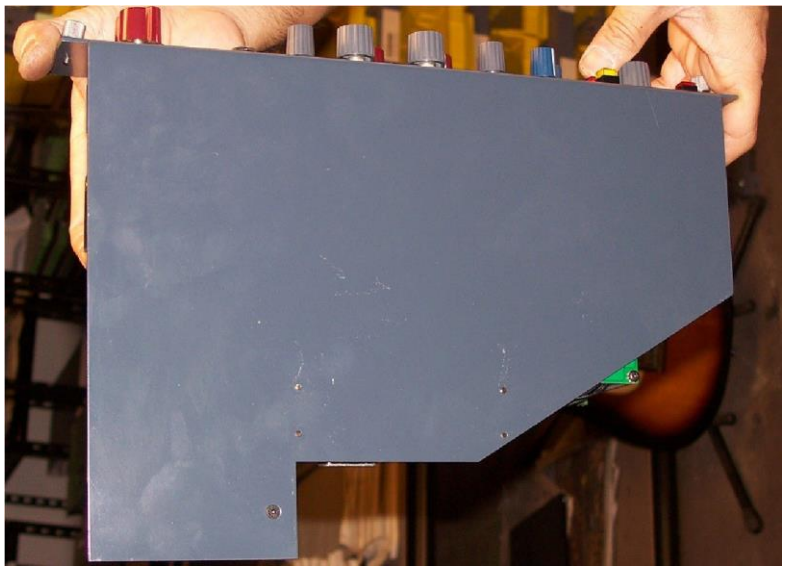
To remove the module, undo the two captive thrumb-screws and use them to pull the channel module from its connector and out of the Sidecar frame.

To replace the module, hold it by the captive thumb-screws and insert the top, longer side, into the upper steel guide rail.

Gently lower the module and engage the lower part of the module into the lower steel guide rail, lowering the module until the front face of the module is almost level with the neighboring channels. Move the channel module gently from side to side until you feel its connector engaging with the connector in the sidecar frame. Then push fully down.

Tighten the captive thumb-screws to secure the channel module firmly into the Sidecar frame.

Under no circumstances should the module be allowed to drop into the frame as it will most likely damage the module connectors!



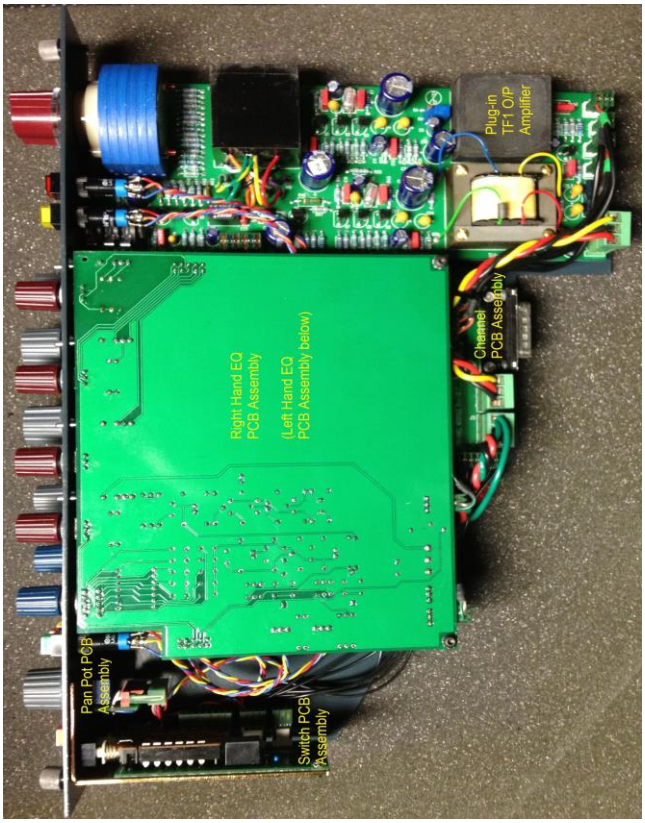
The Aurora Sidecar channel is allsteel construction and the rear of the module forms a shield to prevent cross-talk between adjacent channels. The open frame construction also allows heat from the Class A circuitry to circulate and dissipate.

The combination of steel thumbscrews and steel full-length guide rails hold the modules very firmly in position and the Sidecar can be moved with the modules in situ.

The Aurora Sidecar is robustly built out of all steel frame components and well engineered electronic circuitry.

The Aurora Sidecar can operate with channels removed but the bus level will rise marginally as there will be less loading on the mix busses. An increase in 0.5dB with one module removed and 1.0dB with two modules removed shows the small margin involved.

Aurora Audio, or your local distributor, can provide replacement channel modules in return for the damaged or broken channel. For the benefit of experienced technicians, this photo shows the layout of the Sidecar channel.



At the top of the module is the Pre-amplifier assembly. This comprises the input and output transformers, the plug-in TF1 Output amplifier, and the discrete circuitry. It can be removed by pulling off the knobs, removing the nut on the gain switch and DI jack socket, and removing the M3 screw, nut, and spacer retaining the rear of the PCB.

Unplugging the various connections allows the PCB to be removed. Make notes of which connector went to where.

The plug-in TF1 output amplifier is retained by an M3 nut below the PCB. When replacing, ensure all five gold pins are aligned with their sockets.

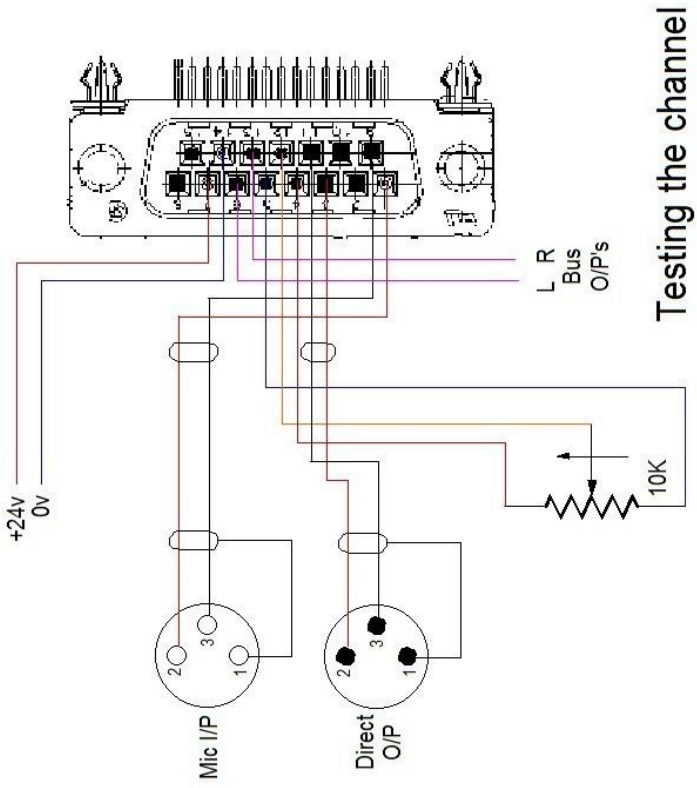
To check its operation, the voltage on the yellow and blue pins of the output transformer should be approximately 1.5v dc if functioning correctly.

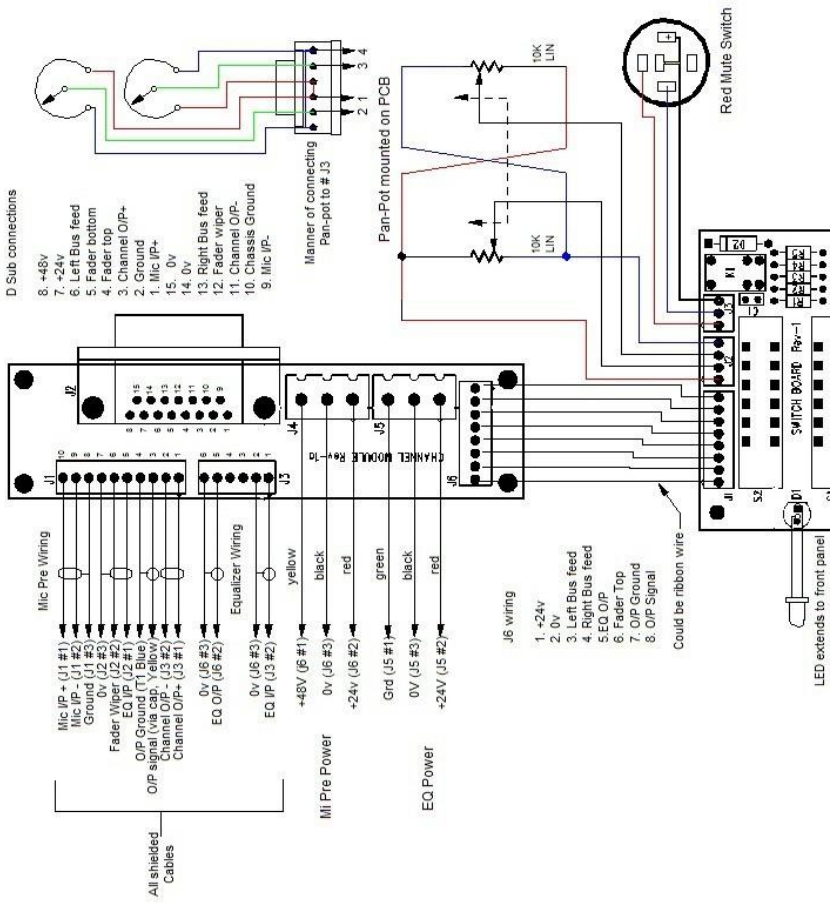
The equalizer circuit boards are removed as a single assembly by pulling off the knobs and removing the nuts beneath. Make a note of the connector wiring before unplugging.

If in doubt, use the diagram on the following page to confirm which connector goes where.

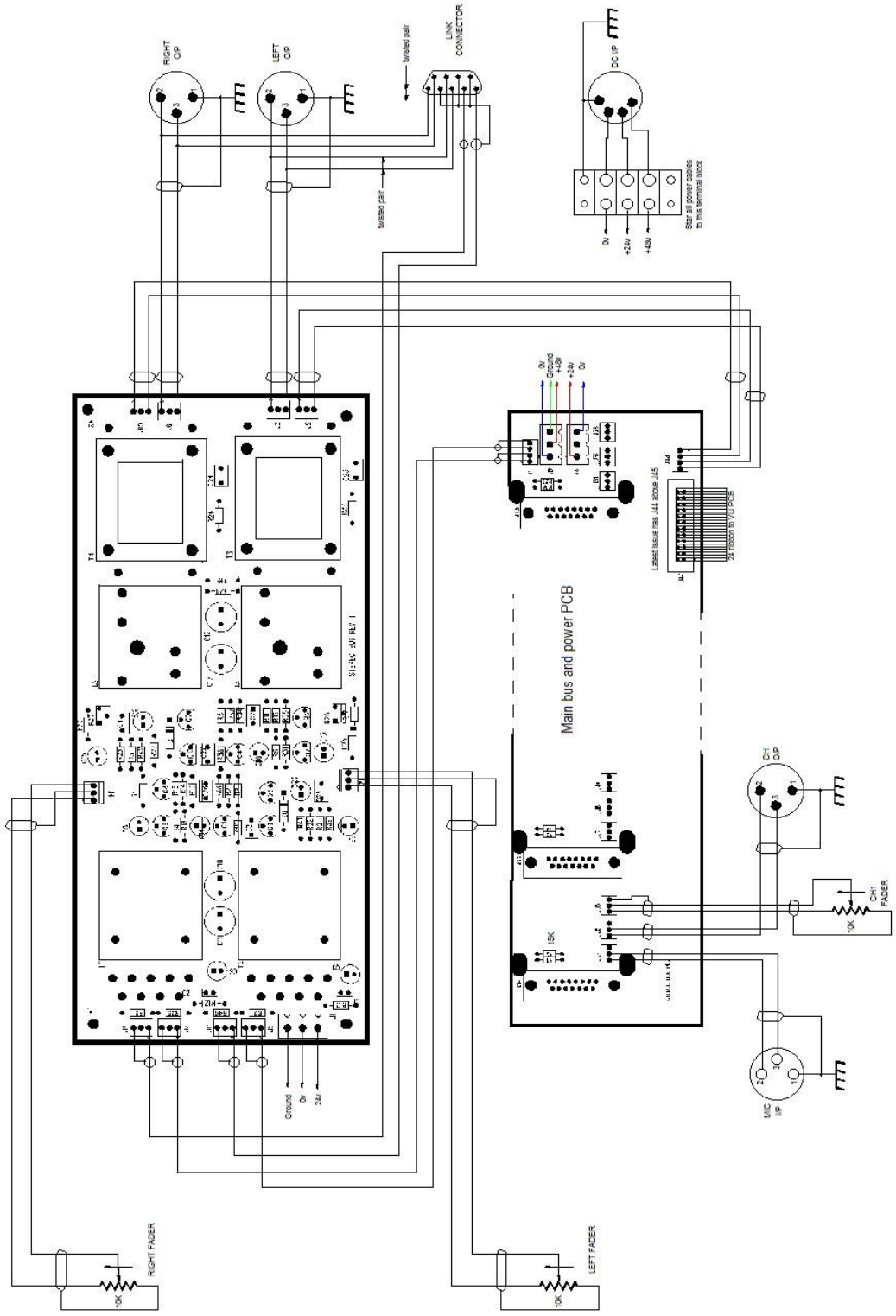
We recommend the use of **Electrolube EML 200F switch cleaner/lubricator spray** for the cleaning and servicing of switches on the channel module.

Aurora Sidecar Channel Wiring Diagram:





Aurora Sidecar Bus and Stereo O/P Wiring:



The 9 pin D connector provides transformer isolated direct inputs to the Stereo Mix Amp
This can be connected to another console, or balanced/unbalanced source

Specifications:

Channels

Gain :- -10dB to +80dB on the input sensitivity switch plus another 10dB in the fader.

Input Impedance :- 1.2Kohm (XLR I/P), 10Mohm (DI I/P)

Output Impedance :- < 50 ohms balanced

VU Meter range :- Standard VU points from -20VU to +3VU where 0VU = +4dBu = 1.228 vac. Front panel trimpot to align the 0VU point.

Input headroom :- 26dB

Outputs :-

Gain :- Stereo outputs are unity gain

Output Impedance :- < 50 ohms balanced

Frequency response :-< +/- 0.5dB at 20Hz and 20KHz ref. 0dBu @ 1KHz

Noise :- Unity Gain = < -85dBu, +80dB Gain = < -45dBu (Typically -47dBu)

Equivalent I/P Noise :- <-125dB, typical <-127dB

Crosstalk :- < -70dB @ 1KHz

Headroom :- Maximum outputs all > +26dBu

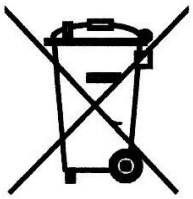
Distortion :- < 0.075% @ 1KHz (Typically 0.025%)

Warranty: ONE YEAR PARTS AND LABOR LIMITED WARRANTY

Aurora Audio LLC warrants this Aurora Sidecar unit against defects in workmanship for a period of one year and parts for a period of one year from receipt by the original end user. This warranty shall not apply to damage resulting from misuse including water damage, in-transit damage, fire damage, improper maintenance, dropping the unit and operation or storage outside the environmental specification for the product.

Only skilled technicians should repair the Aurora Sidecar. Please contact Aurora Audio for technical advice. Aurora Audio is committed to helping you get best use out of the Aurora Sidecar.

ROHS Directives



The RoHS Directive stands for "the restriction of the use of certain hazardous substances in electrical and electronic equipment". This Directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.

The restrictions took effect in the E.U from 1st July 2006.

It is very important that the owner of any piece of equipment that contains even microscopic amounts of the listed hazardous substances (in relation to the weight of the unit) realize that the responsibility of its disposal rests with them. The unit should not just be thrown away at the end of its lifetime, whether that's 10, 20 or 30 years hence.

Please contact us and Aurora Audio will provide the necessary information for proper disposal.

Addendum #1 :- Using Channel and Output Pre-fade insertions.

An optional feature for the Audio Sidecar, which can be factory or distributor retro fitted, is line level and balance pre fade insertions for the channels and 2T bus outputs.

These involve fitting a new, hinged, rear panel that contains the insert circuit boards. A new bottom panel is needed to give clearance to the rear panel as it swings down, and a special bus circuit board is used with connections to the insertion circuit boards. This information is only relevant if a non-insert Aurora Sidecar needs to be retro converted to the insert option.

The pre fade insertion consists of two 1/4” TRS jack sockets, both carrying a balanced line level signal, with the upper jack the pre fade insertion send and the lower jack the pre fade insertion return.

Between the two TRS jack sockets is a toggle switch which, if set to the left, totally bypasses the insert circuitry (the TRS jacks are non functioning) while, if set to the right, engages the insertion circuitry. This enables a user to switch in or out a device permanently connected to the insertion jacks and, in the very rare likelihood of a component failure, allows the circuitry to be totally bypassed.

Above and below the input and output XLR connectors are small holes allowing access to trim potentiometers that adjust the gain of the amplifiers connected to the TRS jack sockets. The upper trimpot sets the insertion send level while the lower trimpot sets the insertion return level.

Connecting the TRS jacks to unbalanced devices :-

All audio paths entering or exiting the TRS jack sockets are electronically balanced and unity gain. If the channel input gain is set at 0dB, the channel fader set at 0dB and the input signal is +4dBu, the insert send and return levels will be +4dBu as will the channel output.

Balanced circuitry is used in professional audio because of the noise canceling it provides on long cable runs, especially cables that run alongside ac power cables whose magnetic fields can be induced into the audio cable. **Unbalanced cabling does not provide this protection.**

When connecting unbalanced equipment, special care has to be taken to avoid ground loops because ground is part of the signal path.

Important... always use stereo TRS jack plugs with the TRS panel mounted jack sockets...

Never plug mono jack plugs into the TRS panel mounted jack sockets.

For best results, always use balanced devices and wiring.

The pre fade insertion return circuitry is electronically balanced and acts similar to a transformer, accepting balanced or unbalanced signals to the tip and ring contacts of the panel mounted jack sockets without signal loss or degradation.

Alternatively, the cable mounted TRS plug can be wired unbalanced with hot on the tip and shield to the shield connection. Don't wire anything to the ring contact of the plug.

The pre fade insertion send circuitry is also electronically balanced and only intended to drive a balanced load. It has protection against shorting an output to ground but this is not recommended as a long term application of a short circuit could damage the amplifier.

Again, the cable mounted TRS plug can be wired unbalanced with hot on the tip and shield to the shield connection. Don't wire anything to the ring contact of the plug.

Checking alignment levels :-

Channel path -

1. Switch the insertion selector switch to the bypass position.
2. Align the channel gain switch to the 0dB position and adjust the fader such that the channel is unity gain from the input XLR to the output XLR. An input level of +4dBu enables the VU meters to be simultaneously checked that they read 0VU. The fader knob should be very close to the 0dB point on its scale.
3. Switch the insertion selector switch to the in position and plug a TRS stereo jack plug cable (to male XLR) into the pre-fade insertion send jack socket.
4. Adjust the upper trim potentiometer to give a +4dBu signal out of the pre-fade insertion jack to the male cable XLR.
5. Plug a TRS stereo jack plug cable (to female XLR) into the pre-fade insertion return jack socket.
6. Applying a +4dBu input balanced signal to that cable XLR, adjust the lower trim potentiometer to achieve a +4dBu level coming out of the channel output XLR.
7. If both TRS jack to XLR cables are removed, the Sidecar should still be unity gain from channel input XLR to channel output XLR.

Stereo Bus Output Path :-

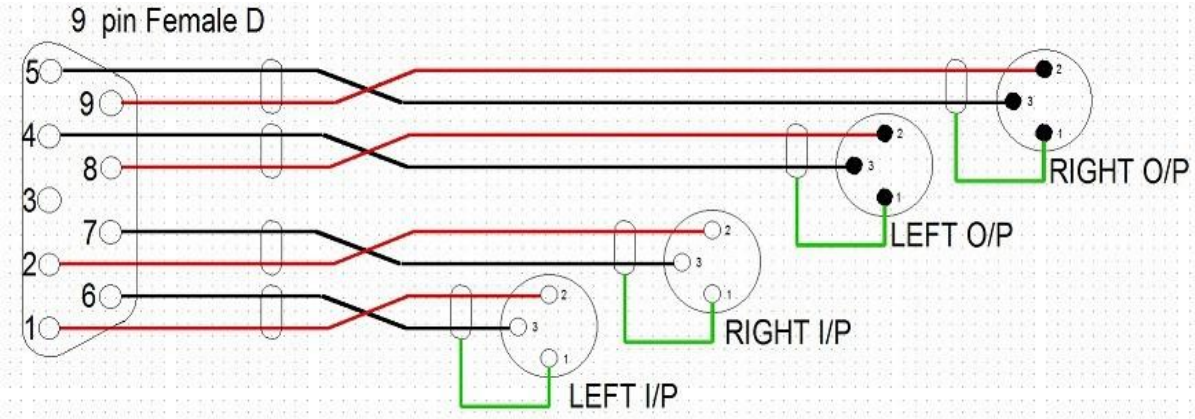
This is very similar to the channel path procedure. The +4dBu signal present on the channel input and output should be assigned to one bus at a time. Do not press both Left and Right bus buttons at once as this engages the pan pot and can introduce level variation due to the 3dB insertion loss. Do the procedure to the Left bus first then disengage the Left send button and engage the Right send button.

Left Output Path -

1. Switch the insertion selector switch to the bypass position.
2. Send the +4dBu signal from the channel to the Left output. Ensure that the output fader is at maximum (0dB) and check that the 2T Output level is +4dBu.
3. Switch the insertion selector switch to the in position and plug a TRS stereo jack plug cable (to male XLR) into the pre-fade insertion send jack socket.
4. Adjust the upper trim potentiometer to give a +4dBu signal out of the pre-fade insertion jack to the male cable XLR.
5. Plug a TRS stereo jack plug cable (to female XLR) into the pre-fade insertion return jack socket.
6. Applying a +4dBu input signal to that cable XLR, adjust the lower trim potentiometer to achieve a +4dBu level coming out of the Stereo Output XLR.
7. If both TRS jack to XLR cables are removed, the Sidecar should still be unity gain from channel input XLR to Stereo output left XLR.

The Right Output path is a repeat of the Left Output Path detailed above.

Below is shown the wiring to the 9 pin D-Sub connector :-



Addendum #2 :- Using the Monitor Panel.

An optional feature for the Audio Sidecar, which can be factory or distributor retro fitted, is the new monitor panel that turns the Sidecar into a small Console.

These involve fitting a new, hinged, rear panel that contains the insert circuit boards and the XLRs for Playback Inputs and Monitor Outputs. This option is only available with the Channel and Bus Pre fade insertion option so basic Sidecars must be converted to adopt both options.

The source selector can switch between four stereo sources and the 2T VU meters, the Monitor outputs and Headset outputs follow the the source selected.

The Sources are 2T O/P, Playback 1, Playback 2 and Aux which, because its input is a TRS jack socket, can also serve as an input from a smartphone or similar device.

While the first three inputs are +4dBu balanced/floating inputs for 0VU on the VU meters and a +10dBu monitor output (i.e. 6dBu level “in hand”), the Aux input is unbalanced (actually it's quazi balanced) and has 6dB additional gain for low output devices (i.e 12dB level “in hand”).

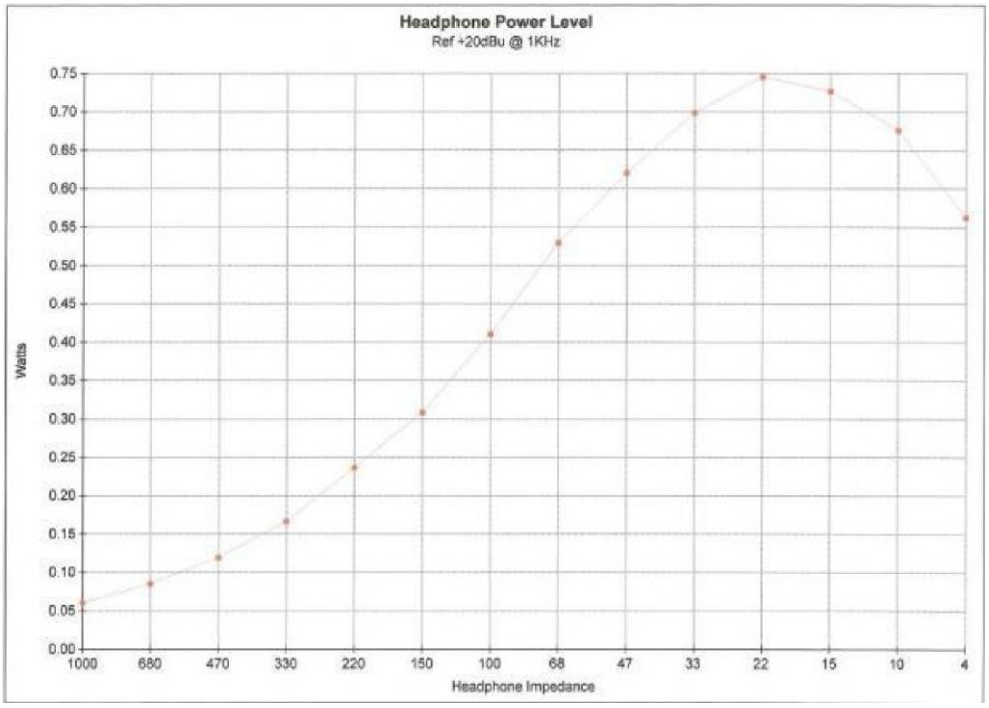
The Monitor level control is detented to provide a degree of repetition of favorite output level.

The Headset output is independent of the Monitor Level control enabling the monitor speakers to be turned off and monitoring be done via the headset output. Alternatively the headset output could be used as a cue source for the artist being recorded.

As headphones come in a wide range of impedances the driver amplifiers are two 25 watt output devices that enable the output signal to swing high enough for high impedance

headphones. At the lower impedance end, protection is provided to prevent damage to both headphones and users ears!

See graph below for output levels versus headphone impedance.



Three illumination push buttons are provided for monitor options :-

1. Cut (Red switch) fully mutes both stereo paths so no signal reaches the monitor speakers.

2. Alt LS (Green switch) switches between two sets of monitor outputs.

3. Mono (Yellow switch) combines the two stereo signals such that both left and right outputs are identical.