# Instrument Preamplifier / EQ / DI
# Owner's Manual Rev. C

GRACE design

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# 1 Welcome

Like its big brother FELiX, the ALiX you hold in your hand is designed to make you sound better, play better and have more fun in the process. From Banjo, bass to bouzouki, if it has strings and a pickup, ALiX will make its tone shine through.

While ALiX is not the most complicated piece of gear you've ever operated, it does afford a good bit of flexibility and setup options, which means we highly recommend you have a good look at this owner's manual to familiarize yourself with its finer points. Once you overcome the learning curve (easy, we promise), you'll find AliX to be intuitive and user friendly.

It is our sincere hope that our gear helps you do better work. You are why we do this. Please drop us a line or a message and let us know what you think.

And by all means if you ever have any questions about using your ALiX or anything else we make, call us at 1-303-823-8100, 9-5 MST.

Have fun!

- The Grace Design Team

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# 2 Safety Information

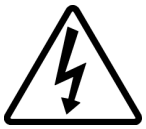
- Indoor use only
- Ordinary Protection: This equipment should not be exposed to dripping or splashing.
- Avoid placing objects filled with liquids, such as vases or glasses, on this equipment.
- Class I Equipment (grounded type)
- Electrical rating: 100-240V~ 50-60Hz 10W
- Mains supply voltage fluctuations are not to exceed ±10% of the nominal supply voltage.
- Pollution Degree 2
- Installation (Over voltage) Category II for transient overvoltages.
- Maximum Relative Humidity: <80%
- Operation temperature range: 10 °C to 40 °C
- Storage and transportation temperature range –40 °C to 70 °C
- Maximum altitude: 3000m (9843 ft)
- Equipment suitable for continuous operation
- Weight: 2.2lbs

# 3 Safety Marking Symbols

### Caution: Read Accompanying Documents

This symbol, located on the equipment and in this manual, refers to important instructions. Read this manual thoroughly before operating this equipment.

### Warning: Electrical Shock Hazard



This symbol, located on the equipment and in this manual, indicates the potential for electrical shock hazard.

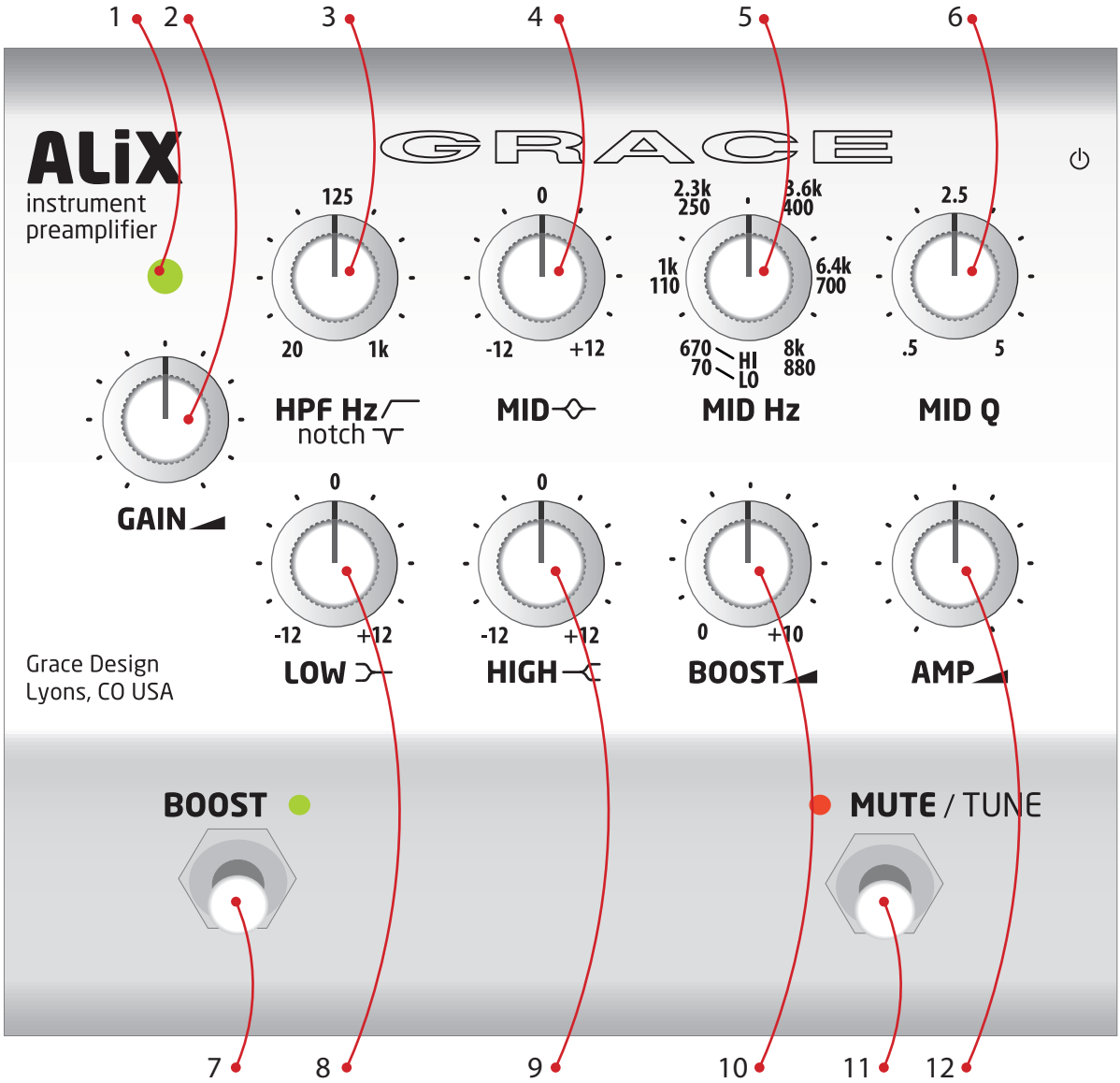
### Service Information

The Grace Design ALiX contains no user serviceable components. Contact Grace Design for repair and upgrade information. In the event that your Grace Design Felix needs to be returned to the factory, contact us for a return authorization number.

# 4 Features

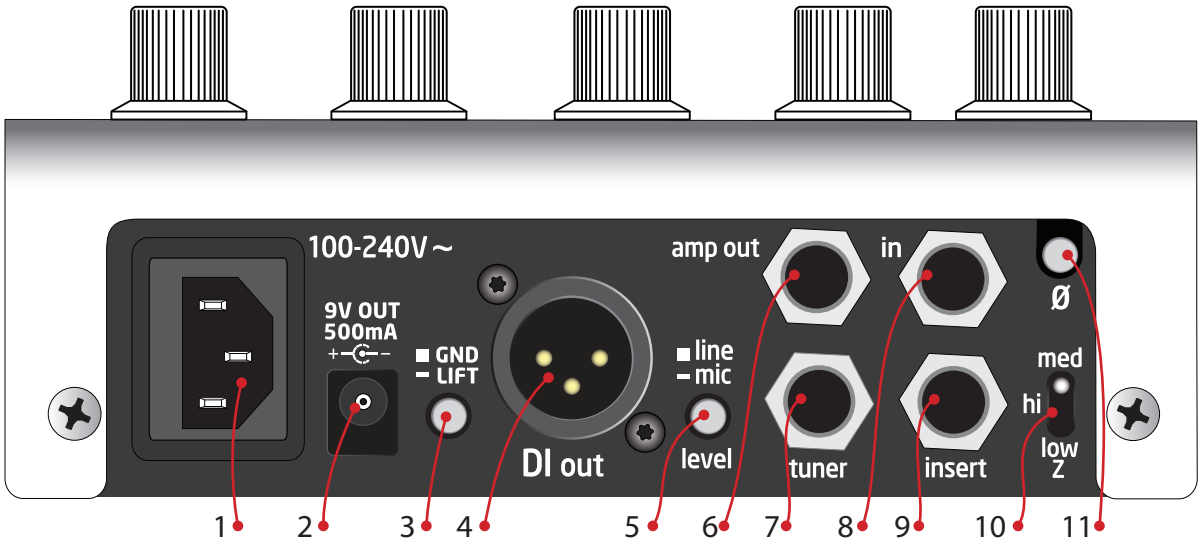
- Open, musical and detailed instrument preamplification for discerning artists and engineers like yourself
- Ultra precision 0.5% thin film resistors used in the signal path
- Careful power supply design and grounding for an ultra-quiet signal path and professional level headroom and line driving ability
- Fully ground isolated DI output with high quality, low distortion, fully shielded transformer
- Super rugged 1/4" connectors with heavy duty metal bushings
- Powerful, independent EQ – hi and low shelving and full parametric midrange
- Mid frequency control has two ranges 70-880Hz / 670 - 8kHz
- 20Hz-1kHz sweepable HPF on both channels, can also be set as notch filter
- Mute/ tune footswitch mutes all outputs except dedicated tuner out and headphone output
- 12V mic input power
- 9VDC @ 500mA (2.1mm BOSS™ standard center negative) power output for powering other pedals from the ALiX
- Boost footswitch for variable 10dB level boost
- Dedicated level controlled stage amp output
- Dedicated tuner out, remains active when unit is muted
- Side panel switches for mid Hz range select, HPF/notch select, 12V microphone power enable
- Phase reverse switch
- 3 input impedance settings – 330KΩ, 1MEGΩ, 10MEGΩ accommodating a wide range of pickup types
- TRS effects insert jack
- Universal 100-240 AC power supply with standard IEC cable – no wall wart - take ALiX anywhere in the world!
- Full 5 year transferable warranty / built for a long, happy life on the road
- Designed and built by us in Lyons, CO, USA

# 5 Top Panel Controls and Features



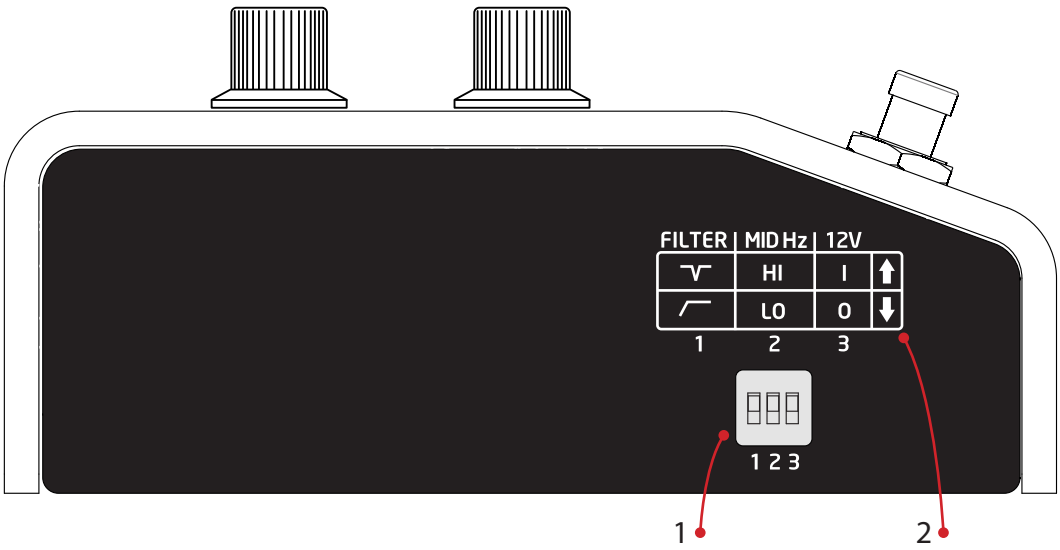

1. Signal / clip LED indicator
2. Gain control
3. High Pass / Notch filter frequency select
4. Parametric Midrange cut and boost
5. Parametric Midrange frequency select
6. Parametric Midrange Q factor
7. BOOST footswitch
8. Low frequency shelving cut and boost
9. High frequency shelving cut and boost
10. Boost level
11. MUTE / TUNE footswitch
12. Amp / Tuner output level

# 6 Back Panel Controls and Features




1. Universal input100-240VAC power supply input module
2. 9VDC @ 500mA auxiliary power output
3. Ground lift switch
4. DI output
5. DI output line / mic level select
6. Amp Output
7. Tuner Output
8. Instrument line input
9. Effects Insert
10. Input impedance select
11. Phase reverse switch

# 7 Side Panel Controls and Features




1. DIP switch controls:
   1) HPF or Notch select
   2) MID EQ range LO or HI
   3) 12V power on and off
2. Dip Switch location diagram

# 8 Connecting ALiX to Stuff

## 8.1 1/4" INSTRUMENT INPUT

This is for connecting any instrument with a pickup, electret mic or line out jack to ALIX. The connector is a standard 1/4" jack wired tip signal, sleeve ground. The ring is used only for 12V mic power if needed.

## 8.2 INSERT (FX LOOP)

The insert connection is a buffered, unbalanced insert point (pre boost) for connecting outboard effects to ALiX. This allows mono outboard signal processing to be placed in series with the signal, while still utilizing all of ALiX's output capabilities. It is a 1/4" TRS connection, wired tip to send, ring to return and sleeve to ground. The insert send has an adjustable pad if you are using an effect pedal with lower headroom. The pad has 3 settings (off, -6dB and -16dB) that can be set via internal jumpers.

**SEE JUMPER DIAGRAM page 13**

## 8.3 AMP OUT

This output is for sending an unbalanced, non-transformer isolated output to a stage amp or anywhere else you may need an additional unbalanced signal. This output has the added benefit of a level control, which is situated on the right side, bottom row of controls on the top panel. This output is muted when the MUTE / tune footswitch is activated.

## 8.4 TUNER OUTPUT

This is another unbalanced output which is always active – provided as a dedicated stage tuner out. When the MUTE is activated, your stage tuner will continue to receive signal, allowing you to tune silently. The tuner output level follows the Amp Out level control.

## 8.5 DI OUTPUT

This outputs is a balanced and transformer isolated, for sending signal to a front of house, monitor console, or any mixer or interface where balanced, isolated signal needs to be sent. XLR pinout is: pin 2 positive, pin 3 negative and pin 1 ground.

This output has an adjacent level setting switch – line and mic, depending on what input this source will be feeding. In the 'mic' setting, the output is padded down -26dB to interface properly with mic inputs at the console, the 'line' setting is not padded for better level matching with line level inputs at the console or interface.

## 8.6 100-240VAC POWER INPUT

ALiX is powered by a universal AC power supply. This means that no matter where your musical wanderings take you, ALiX can plug into the wall and it will work. And it also means one less wall wart you'll own in your life. All units are shipped with a standard AC cable suitable for the country where it is going. This is a standard, off-the-shelf IEC power cable, so in the event you misplace the one that came with your ALiX, you can just borrow one from the soundperson and go. Tell them we said so.

## 8.7 9V @ 500mA DC POWER OUTPUT

This output jack will power other 9VDC pedals you may have at your feet. The jack is a standard 2.1mm BOSS™ style, with the center *negative*. Maximum output current is 500mA, which means you need to add up the current draw of all the pedals you wish to power to ensure they don't exceed that. To connect multiple pedals, you'll need an off the shelf multi-plug daisy chain cable.

# 9 Operation

## 9.1 WHERE TO PUT ALIX?

Great question. We recommend you put it wherever you want. It will look very pretty when you first pull it out of his box, but trust us, it's built to stand up to just about any kind of stage shenanigans you might encounter. All the pots have metal shafts and are well mounted to the top panel. All the 1/4" jacks have heavy duty metal bushings. The top panel is 1/4" extruded aluminum, and the bottom chassis is appropriately heavy duty. As you may have surmised by now, the main inspiration for this product was to have studio-grade audio hardware, properly ruggedized to live on the stage floor or mounted to a pedal board. Velcro is fine. The installed rubber feet will thread out so your Velcro mount will be flush. Hang on to those rubber feet, though, they're pretty nice.

## 9.2 INSTRUMENT / LINE INPUT

This is the input you will use for connecting your instrument to ALiX. There is a wide array of different pickup types in the world: active electronics in an electric bass, passive under bridge plate transducers, contact mics, soundhole magnetics, etc..

### Setting the Gain

The first control on the left side of the top panel is the GAIN control. With your instrument connected to the input and signal flowing, turn the GAIN knob clockwise until the signal / clip LED indicator is on and lit solid green. This will represent a good operating level. The indicator will start to flash red when your signal is 13dB before clipping, so occasional red flash is ok, but mostly red means you should turn the gain control down / counterclockwise.

### Input Impedance Selection

The instrument input has 3 different impedance settings:

med - 1MΩ / hi -10MΩ / low – 330kΩ

In general, most passive pickups will want to connect to a

higher impedance setting, while active pickups probably a lower. Passive pickups generally will have more sensitivity to input impedance, but there are no hard and fast rules. Check with the manufacturer of your particular pickup system to see if they recommend a specific input impedance for their device. Ultimately, as is with so many things like this, the final judge of this setting should be your ears. Impedance mismatches at this stage may not even be audible, or very subtle, or totally apparent. But trust yourself here – nothing will break if you have the wrong setting – just audition the 3 positions of the impedance switch and if one sounds better over the other 2, then that's the correct setting.

### Phase Reverse

ALiX has a phase reverse switch, located on the rear panel, top right (facing the rearpanel), directly above the input impedance switch. Use this to toggle the polarity of audio signal.

Phase relationships can be very complicated, and discrepancies can result in highly accentuated or de-accentuated bass response of an out of phase signal. Or it can sound hollowed out and thin, or just downright weird. Again, the rule of thumb here is whatever sounds right is probably right.

There may be setup scenarios where the front of house or monitor engineer requires you to try flipping the phase to achieve better phase coherency with other signals in the mix. At the very least, it's good for you to know how to operate this controls and hear it in use with your instrument.

## 9.3 FILTERING AND EQ

One of the defining features of our ALiX is the very powerful, EQ / filter controls. If you haven't used EQ's or filters much, we will provide a basic overview here. But the full science of this process is more than we can cover here, so we strongly recommend some adjunct reading:

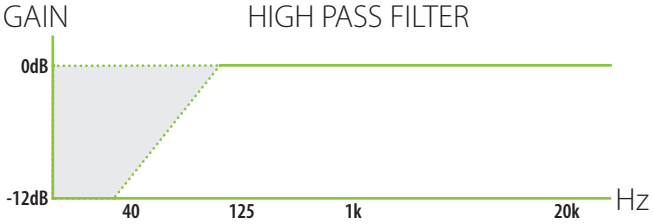
http://en.wikipedia.org/wiki/Equalization

As with all audio processing techniques, the more you know, the better you will sound.

### HPF / Notch

This is the upper control to the right of the GAIN knob. To select between HPF and Notch, adjust the left side DIP switch locations # 1.

HPF: A High Pass Filter will only allow signal information above its set frequency to pass downstream to the output. This filter employs 12dB per octave roll off and uses a Thomson – Butterworth response for the best combination of passband flatness and time domain response. Yes, that will be on the quiz.

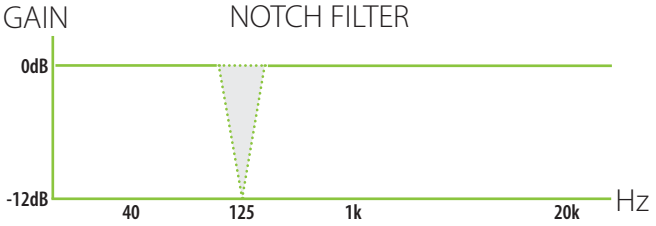



Simply put, use the high pass filter to cut unwanted bass frequencies out of a signal. Usually a HPF is used to eliminate rumble or non-musical low frequency information out of a signal. But this HPF range is from 20Hz to 1.0kHz, so you can make very dramatic filter settings.

Some instruments won't have any information below a certain frequency. Fiddle for example only extends its lowest fundamental down to 200Hz. So if you are amplifying a fiddle, you could safely set the HPF at 150 – 200 Hz without hearing much effect in the tonality of the instrument. Whereas a bass can have a low fundamental down around 30Hz, so setting the HPF any higher than that could affect its tonality.

If you are on a stage with an acoustic guitar, and there is lots of low end making you sound bad, or feeding back or both, the HPF might be your first stop to try to control those problems.

Notch: A notch filter is a very sharp and deep cut of a specific frequency. This is used predominantly to find and remove a specific problem frequency that may be feeding back through stage monitors or amps, or to simply cut out a very specific, narrow unwanted part of an instrument's frequency range. This notch uses the same frequency sweep range of 20Hz – 1.0kHz.




### Parametric Mid Controls

The mid range section of ALiX's equalizer is fully parametric, which enables you control the mid range gain, frequency and Q independently. The range of these controls are:

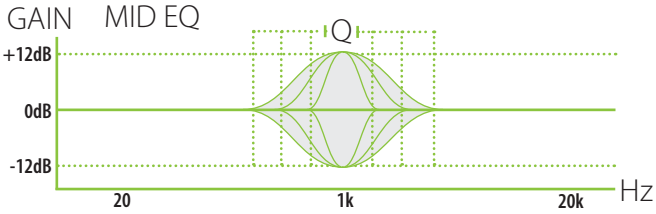
**Gain** = +/- 12dB,

**Freq range LO setting** = 70Hz – 880Hz

**Freq range HI setting** = 670Hz – 8.0kHz

**Q** = .5 – 5

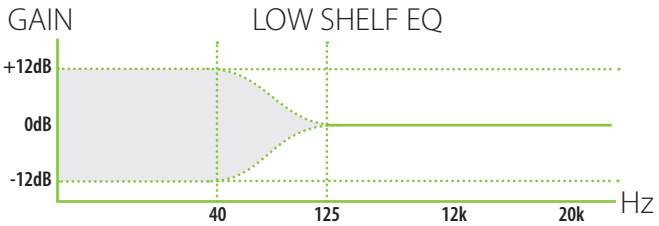
The frequency range can be switched between the LO and HI settings via the left side panel DIP switch locations # 2. With these two available ranges, the over all range of the mid controls is very wide, which enables targeting of specific sonic areas of a multitude of instrument or pickup types.




Q factor determines the sharpness of the bandwidth of the frequency being adjusted. A higher Q factor setting – turning the Q knob further clockwise - creates a sharper bandwidth and thus a more targeted, surgical EQ adjustment. Alternately, a lower Q factor - turning the Q knob further counter clockwise - creates a broader tonal adjustment.

### Low Control

The Low control of the ALiX preamplifier is fixed at 125Hz corner frequency / 40Hz peak, with a gain range of -12 to +12dB. This is a fixed shelving type control, which means everything below the 125Hz is boosted or cut. Use this control for cutting and boosting bass frequencies. It's all about the bass.

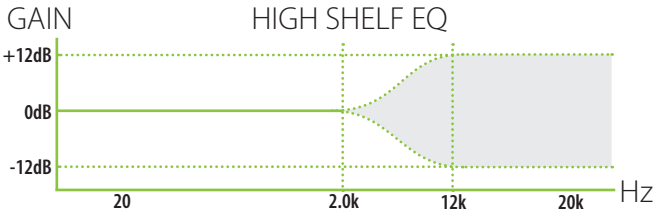



Also, because certain acoustic instruments (banjo, fiddle, plinkly little whathaveyous) may react better to a higher corner / peak frequency, we have added a Low control range jumper on the main PCB. Moving this jumper shifts the Low frequency up to 250Hz (+/-3dB) corner frequency / 80Hz peak. *This is easy to do!* We specifically designed ALiX's chassis to make it easy to access internal jumpers. Please refer to the jumper diagram and access procedure on pages 12 and 13. Bravo to you for reading this manual. You get an A.

***WARNING Make sure to disconnect the power mains before opening removing the ALiX top panel to make jumper adjustments.***

### High Control

The High control of the ALiX preamplifier is set with a 2kHz (+/-3dB) corner frequency/ 12kHz peak, with a gain range of -12 to +12dB. This is a fixed shelving type control, which means everything above the 2kHz is boosted or cut. Simply put, this is a treble control. If you think your banjo may be too bright, turn this knob counterclockwise. If you think your guitar needs a little more bite, turn this knob clockwise. If you're not sure, then get down there and start turning it one way or the other until it sounds better.




## 9.4 OUTPUT CONTROLS

### Boost

Want ALiX to go to eleven? How about twenty? This knob sets the amount your signal is boosted when you activate the 'BOOST' footswitch. Fully counter-clockwise is zero boost added, fully clockwise adds +10dB of boost. The boost is after the FX loop and affects both the DI and amp outputs.

As you can probably imagine, if you are using a microphone or a particularly feedback prone pickup system, adding boost might easily send you in to feedback territory. So start small. If you need to boost your output, start with a gentle boost amount and work your way upwards. If you start to hear stage feedback or are overloading the input at the console, then you'll need to back it off.

ALiX is not responsible for disgruntled soundpeople you may encounter during the operation of the boost circuit, especially those you have already borrowed your misplaced IEC power cable from. Keep those people happy, they control the suck knob.

### Amp Output Level

This knob sets the output level of the unbalanced Amp and tuner outputs on the rearpanel. If you are using a stage amp, use this control as your master level. Correct input gain settings for your sources, with the signal LED showing mostly green, should not be adjusted to alter your stage amp level. Rather, use this control to make master level changes.

*Troubleshooting advice:* if you stage tuner is connected to the 'tuner' jack but not working, make sure your Amp out knob is turned up sufficiently.

## 9.5 FOOTSWITCH CONTROLS

### Boost

You guessed it. This switch activates the Boost circuit, at whatever level you set with the boost knob. This circuit is global, so the boosted signal will be coming out of every output. For those about to rock, you'll need to activate this switch first before we can solute you. The LED will light up GREEN for go.

### Mute / Tune

This switch mutes the DI and AMP output, but not the tuner output. This enables you to quickly and easily cut your signal to the FOH or stage amp and tune or unplug your instrument without having to have the soundperson mute your channel. When MUTE / tune is active, the adjacent LED illuminates RED.

## 9.6 SIDE PANEL CONTROLS

ALiX has a lot going on, more than we could fit on the rear and top panels alone. So there are a few features to be familiar with on the side panel.

### DIP Switches

This is a bank of 3 DIP switches, used to activate various modes or settings. Switch 1 selects between the HPF or notch setting. Switch 3 selects between the mid EQ's frequency range, LO or HI. Switch 3 activates 12V power on the instrument input.

DIP switches are hard to adjust, which is good because they probably won't get inadvertently changed, but bad when you actually want to change them. Use the edge of a fingernail, a guitar pic or a toothpick. Whatever you chose, take care not to dig into the plastic too hard. You'll get the hang of it.

### 12V Power

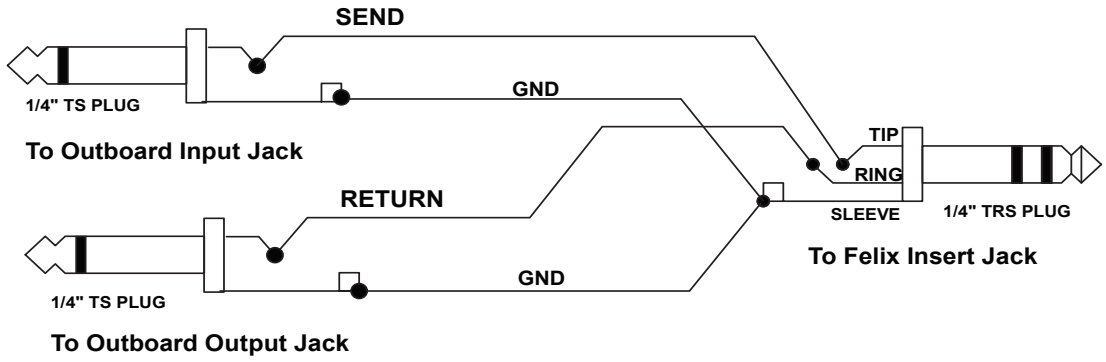
The instrument input can be used to amplify an electret capacitor microphone. These are common for applications where a small microphone is mounted inside acoustic instruments, or lavalier style microphone used somewhere on the outside of the instrument. Normally these microphones will contain very small integrated preamps which require a voltage to power. So the ALiX can send 12V phantom power out on this input. This is activated via DIP switch # 3 on the side panel.

12V power can be applied to the tip or ring of the instrument input jack. Configuration is done via internal jumpers, described in detail on pages 12 & 13.

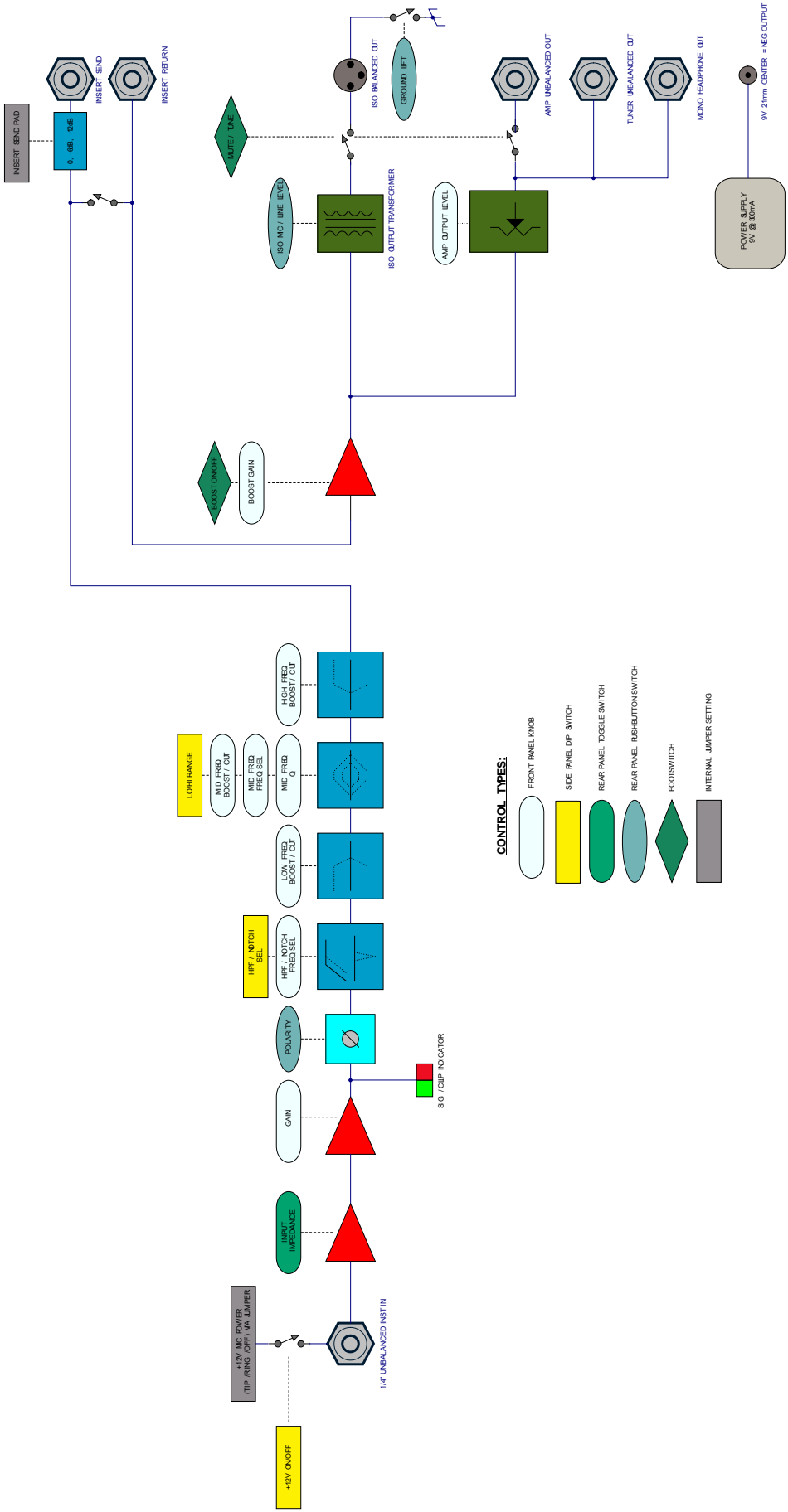
*NOTE: this power supply charges up slowly, so you may need to wait a few seconds before signal from your electret mic is present at the input of ALiX. It is always best to make your input connections before applying power at the DIP switch, and power OFF the 12V at the DIP switch before disconnecting your source.*

# 10 Diagrams

## 10.1 INSERT CABLE WIRING

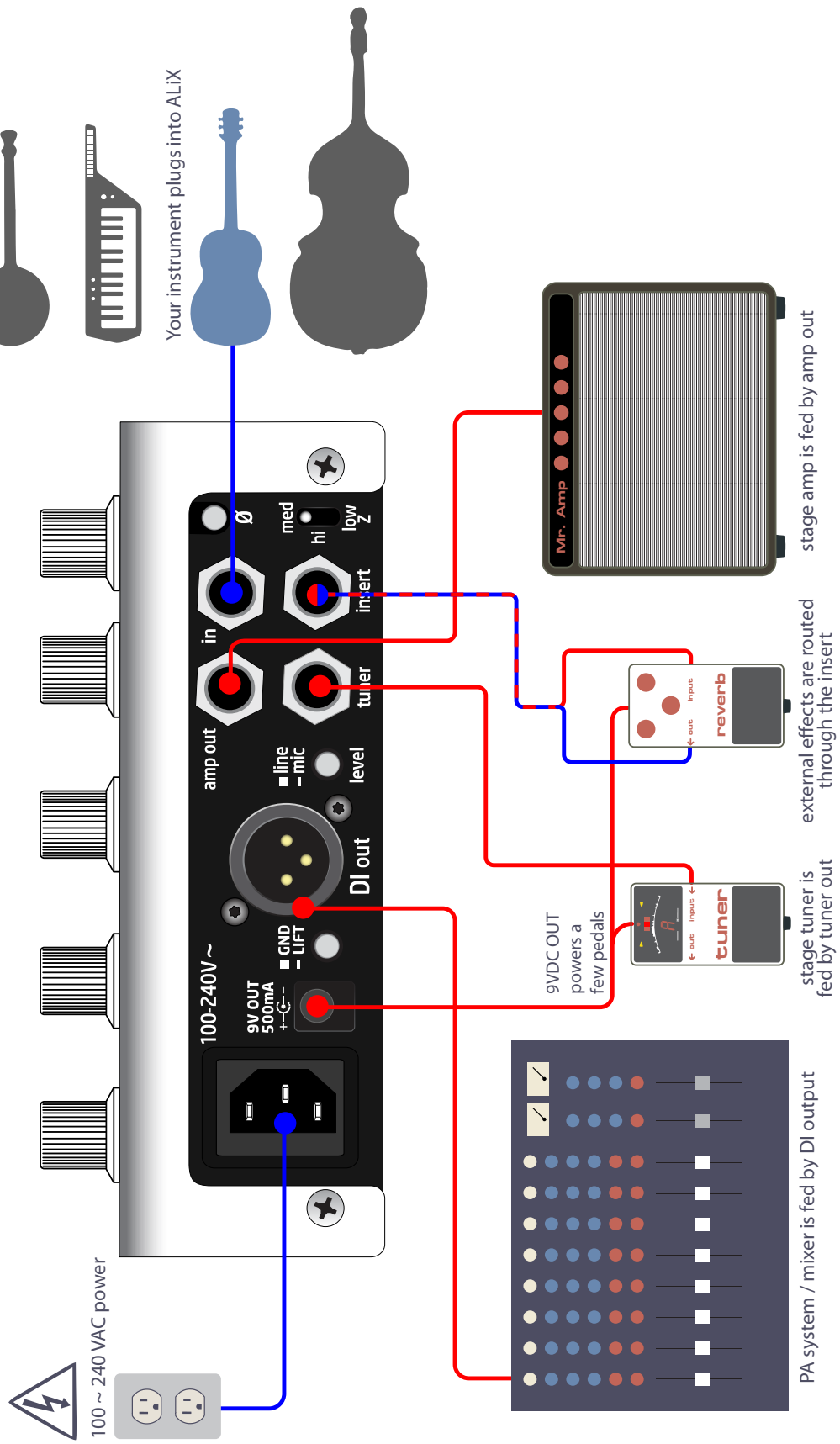


# 10.2 BLOCK DIAGRAM



# ALiX connections

Nothing too terribly hard and fast here - just the basics about how to plug stuff in and out of your preamp. INPUT paths are shown in blue. OUTPUT paths are shown in red.
There are many ways to setup your preamp, so if you aren't sure about how something works, please have a look at your owner's manual, check out our website - www.gracedesign.com - or feel free to call us. We are always glad to help out in any way we can. 1.303.823.8100, M-F, 9-5 MST



## 10.4 ADJUSTING INTERNAL JUMPERS

Several ALiX settings can be adjusted via internal jumpers. While it's not trivial to do, if you are handy with a screwdriver and tweezers, you'll be fine. *This is not something you should attempt to do on a dark stage or in the back of the tour van.* Directions for disassembling the chassis and accessing the jumpers is as follows:

*IMPORTANT: Before you do anything, disconnect ALiX from the AC power, disconnect all cables and place ALiX on a flat stable surface with good lighting.*

1. **DOUBLE CHECK:** Did you completely disconnect the power supply? Ok then.
2. With a #2 phillips screwdriver, remove the 4 chassis screws, located on the outer edges of the front bottom and rear bottom of the aluminum top chassis (figure 1) .
3. Orient the unit so the rearpanel is facing forward towards you. Carefully pull up on the top chassis and flip it up and over the bottom chassis (figure 2). This will reveal the top and bottom circuit boards. Do not pull them apart any further than the ribbon cables that connect them will allow. The top should rest easily on the work surface flipped over and behind the bottom chassis (figure 3).
4. Now refer to the jumper location diagram on the following page to move any jumpers you wish (closeup - figure 4).
5. To move a jumper, use tweezers or your fingernails to gently pull the jumper off of its header pins. To reposition the jumper, double check the diagram, then gently press the jumper back down in the correct location.
6. J10 resides on a 2-pin header. If you wish to set this to a non-jumpered setting, simply push one side of the jumper down onto one pin, so that the two pins are not connected.
7. When you are finished adjusting the jumpers, make sure there are no loose jumpers or any other junk lying around inside your ALiX.
8. Then carefully reassemble the top and bottom chassis, making sure to let the ribbon cable fold easily back in place. If there is any tension or something isn't fitting properly, carefully pull the top and bottom back apart and inspect for interference.
9. Once you have put the unit back together, replace the 4 screws, making sure they go in straight and true. You may need to nudge the top panel back and forth a bit to ensure the holes in the top panel chassis line up evenly with the inner threaded holes.
10. Do not tighten the screws until all 4 are cleanly started in the threads. Take your time and remember, cross-threading is a crime.

figure 1

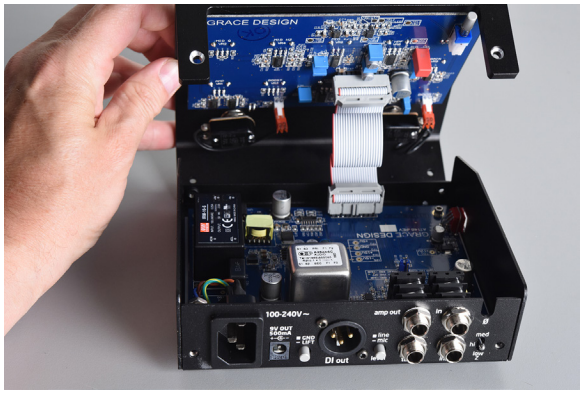


figure 2

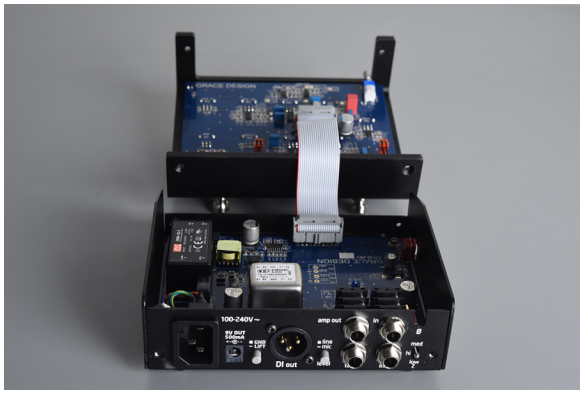


figure 3

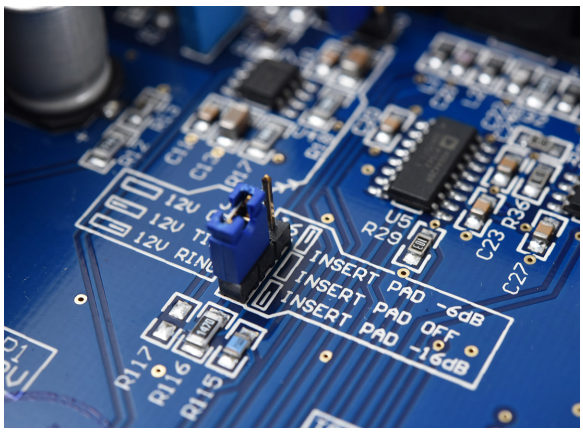
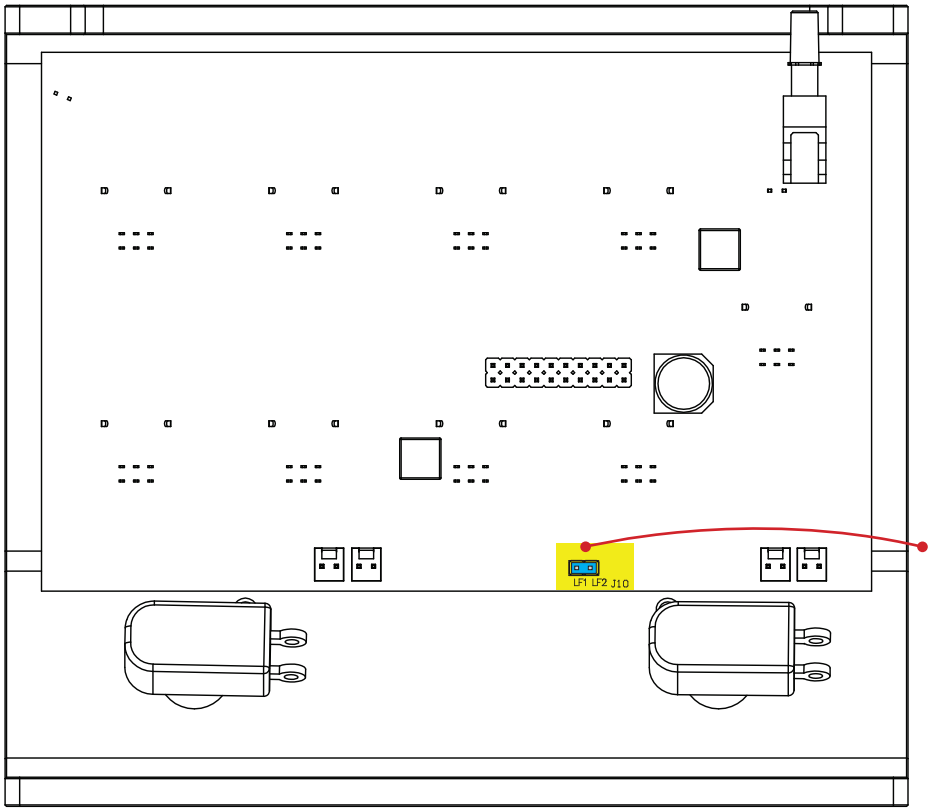


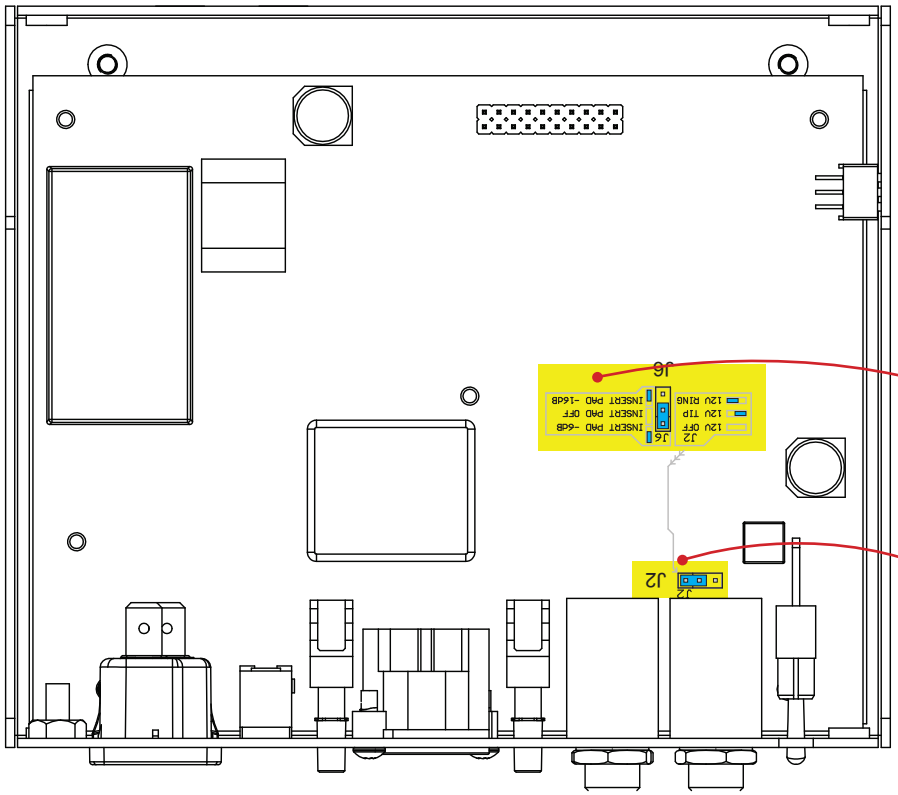
figure 4

## 10.5 INTERNAL JUMPER LOCATIONS




J10 configures the LOW EQ corner frequency. It is set to LF1 at the factory (125Hz corner frequency) with the jumper only connected to one pin.

To set to LF2 (250Hz corner frequency), simply push the jumper down onto both pins, so they are connected by the jumper.




J6 sets the pad settings for the INSERT send. Levels are -6dB, -16dB, or off. Set to off at the factory

J2 configures 12V power, which can be applied to tip, ring, or set to off. Set these according to how your microphone / instrument is wired. Set to off at the factory

# 11 Specifications

| GAIN RANGE (Instrument Input to DI Output) | |
|---|---|
| DI Output, Level: Line | -2dB - 36dB |
| Amp Output | 0dB-39dB |
| Boost | 0dB-10dB |
| **THD+N 22Hz-22kHz BW** | |
| 1kHz @ 0dB Gain +10dBu out | <0.0070% |
| 1kHz @ 20dB Gain +10dBu out | <0.0045% |
| 1kHz @ 36dB Gain +10dBu out | <0.0080% |
| **INTERMODULATION DISTORTION - SMPTE/DIN 4:1 7kHz/50Hz** | |
| @ 40dB Gain +10dBu out | <0.05% |
| **FREQUENCY RESPONSE** | |
| Inst input @ 20dB Gain -3dB | 20Hz – 65kHz |
| **I/O IMPEDANCE** | |
| Instrument Input | HI: 10MΩ / MED: 1MΩ / LOW: 330kΩ |
| Insert Input | 10kΩ |
| Insert Output, No Pad | 750Ω |
| Insert Output, -6dB Pad | 375Ω |
| Insert Output, -16dB Pad | 122Ω |
| DI Output | 150Ω |
| Amp Output | 150Ω |
| Tuner Output | 150Ω |
| **SIGNAL / PEAK LED METER** | |
| Green threshold | -16dBu |
| Red threshold | +8dBu |
| **MAXIMUM INPUT LEVEL** | |
| Instrument Input | +20dBu |
| Insert Return (0dB Boost) | +20dBu |
| **MAXIMUM OUTPUT LEVEL - 100k Ohm load, 0.1% THD** | |
| DI Output (Line) | +19dBu |
| DI Output (Mic) | -7dBu |
| Amp, Tuner, Insert Outputs | +21dBu |
| Insert Output, No Pad | +21dBu |
| Insert Output, -6dB Pad | +15dBu |
| Insert Output, -16dB Pad | +5dBu |
| **HIGH PASS FILTER / NOTCH FILTER** | |
| High Pass Filter | 20Hz – 1kHz @ -12dB/octave |
| Notch Filter | 20Hz – 1kHz, >-35dB, Q>1.0 |
| **EQ** | |
| Gain | +/- 12dB |
| Low Frequency | Low Range: 125Hz Shelving / High Range: 250Hz Shelving |
| Mid Frequency | Low Range: 70Hz – 880Hz / High Range: 670Hz – 8kHz |
| Mid Frequency Q | 0.5 – 5 |
| High Frequency | 2kHz Shelving |
| **DYNAMIC RANGE 22Hz-22kHz BW** | |
| Minimum Gain, DI Out | 118dB |
| **OUTPUT NOISE 22Hz-22kHz BW** | |
| Minimum Gain, DI Output | -99dBu |
| Minimum Gain, Amp Out | -96dBu |
| Maximun Gain, DI Out | -77dBu |
| Maximum Gain, Amp Out | -74dBu |
| **POWER CONSUMPTION** | |
| 100-240VAC 50/60Hz | 10 Watts Max |
| **POWER OUTPUT** | |
| 2.1mm BOSS™ style power jack, center negative | 9VDC, 500mA Max |
| **WEIGHT and DIMENSIONS** | |
| 2.2lbs (1kg) | H3.0" x W6.2" x D5.5" (H7.6cm x W15.7cm x D14.0cm) |

# 12 Cleaning and Maintenance

Your ALiX is chassis is constructed out of high quality aluminum and steel. Under normal circumstances, very little maintenance is required to keep it looking good. However, if you find it getting more dirty or dusty than you like, here are some cleaning tips: We recommend using a little shot of Windex™, applied to a clean, dry, lint free cloth. Gently wipe all surfaces, taking care not to allow the cleaning product to build up around or under the knobs.

# 13 Warranty

- Grace Design warrants this product to be free of defective parts and workmanship for a period of five years. This warranty period begins at the original date of purchase and is transferable to any person who may subsequently purchase the product during this time.
- This warranty excludes the following conditions: normal wear and tear, misuse, customer negligence, accidental damage, unauthorized repair or modification, cosmetic damage and damage incurred during shipment.
- During the time of this warranty, Grace Design will repair or replace, at its option, any defective parts or repair defective workmanship without charge, provided the customer has appropriate proof of purchase and that the product has its original factory serial number.
- In order for Grace Design to provide efficient and timely warranty service, it is important that you mail the completed warranty registration card enclosed with all of our products within 10 days of the original date of purchase. You may also register your product directly with Grace Design by telephone (303-823-8100 Monday-Friday 9:00am to 5:00pm MST), or you can register your product online at www.gracedesign.com.
- This warranty is in lieu of all other warranties whether written, expressed, or implied, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
- In no event will Grace Design be liable for lost profits or any other incidental, consequential or Exemplary damages, even if Grace Design is aware of the possibility of such damages. In no event will Grace Design's liability exceed the purchase price of the product.
- This warranty gives the customer specific legal rights. The customer may also have other rights, which vary from state to state. Some states do not allow limitations on implied warranties or consequential damages, so some of the limitations of the above may not apply to a particular customer.

# 14 Manual Revisions

| Revision | Page | Change | Date | Initials |
|---|---|---|---|---|
| A | all | Initial release | 06/08/2016 | edg |
| B | 3,6,14 | Added info about 9V 500mA DC power output jack | 07/08/2016 | edg |
| B | 3,6,14 | Corrected input impedance values | 7/11/2016 | edg |
| C | 13 | Corrected wrong jumper placement info | 11/16/2016 | edg |
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