

MESA/BOOGIE[®]

Royal Atlantic[™]

Owner's Manual

Hello from the Tone Farm

Congratulations on your choice of the Royal Atlantic™ RA-100 and Welcome to the Mesa/Boogie Family! Our 40 year commitment to excellence along with our solemn promise to musicians - to treat each of them as we ourselves would wish to be treated - guarantees you an experience that will make you feel truly justified in your choice. We're confident your new amplifier will have you smiling and inspired within minutes of plugging in for the first time. However, what's really gratifying is that you will be finding new and inspiring sounds years after the price of admission has faded from memory and the ROYAL ATLANTIC continues to unveil its true worth.

It's with our sincere thanks for trusting us with your TONE and our best wishes for all your musical endeavors that we welcome you home. Should you ever need assistance or guidance we're here to help. You now have in your hands an instrument of limitless expression. Our hope is that it takes you and your playing to new and unimagined places throughout your musical journey. From all of us here at MESA...Enjoy!

Every fleet has its premier vessel, its big guns, the top of the line... and the MESA Atlantic Fleet is no exception. The ROYAL ATLANTIC commands this armada with three foot-switchable sounds, one hundred watts of heavy-artillery EL34 power and an innovative first; Multi-Soak™ Channel Assignable Power Soaks. This Atlantic takes all the critically acclaimed, award winning Tone and performance of the TransAtlantic™ TA-15 and TA-30 and delivers it in a simple Retro-inspired platform that covers everything from home to studio to concert stage with finesse and always... the perfect power/volume combination.

While Multi-Soak™ is definitely the biggest news in guitar amplification to happen in quite a while, we'll get to the RA-100 engine room momentarily. First though, let's go up to the Bridge and look around - for the Royal Atlantic preamp is a mighty command center all its own.

PRECAUTIONS & WARNINGS

Your MESA/Boogie Amplifier is a professional instrument. Please treat it with respect and operate it properly.

USE COMMON SENSE AND ALWAYS OBSERVE THESE PRECAUTIONS:

WARNING: EU: permission from the Supply Authority is needed before connection.

WARNING: Vacuum tube amplifiers generate heat. To insure proper ventilation always make certain there is at least four inches (100mm) of space behind the rear of the amplifier cabinet. Keep away from curtains or any flammable objects.

WARNING: Do not block any ventilation openings on the rear or top of the amplifier. Do not impede ventilation by placing objects on top of the amplifier which extend past the rear edge of its cabinet.

WARNING: Do not expose the amplifier to rain, moisture, dripping or splashing water. Do not place objects filled with liquids on or nearby the amplifier.

WARNING: Always make certain proper load is connected before operating the amplifier. Failure to do so could pose a shock hazard and may result in damage to the amplifier.

Do not expose amplifier to direct sunlight or extremely high temperatures.

Always insure that amplifier is properly grounded. Always unplug AC power cord before changing fuse or any tubes. When replacing fuse, use only same type and rating.

Avoid direct contact with heated tubes. Keep amplifier away from children.

Be sure to connect to an AC power supply that meets the power supply specifications listed on the rear of the unit. Remove the power plug from the AC mains socket if the unit is to be stored for an extended period of time. If there is any danger of lightning occurring nearby, remove the power plug from the wall socket in advance.

To avoid damaging your speakers and other playback equipment, turn off the power of all related equipment before making the connections.

Do not use excessive force in handling control buttons, switches and controls. Do not use solvents such as benzene or paint thinner to clean the unit. Wipe off the exterior with soft cloth.

YOUR AMPLIFIER IS LOUD! EXPOSURE TO HIGH SOUND VOLUMES MAY CAUSE PERMANENT HEARING DAMAGE !

No user serviceable parts inside. Refer service to qualified personnel. Always unplug AC power before removing chassis.

EXPORT MODELS: Always insure that unit is wired for proper voltage. Make certain grounding conforms with local standards.

READ AND FOLLOW INSTRUCTIONS OF PROPER USAGE.

Royal Atlantic™

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Royal Atlantic™

Operating Instructions

OVERVIEW:

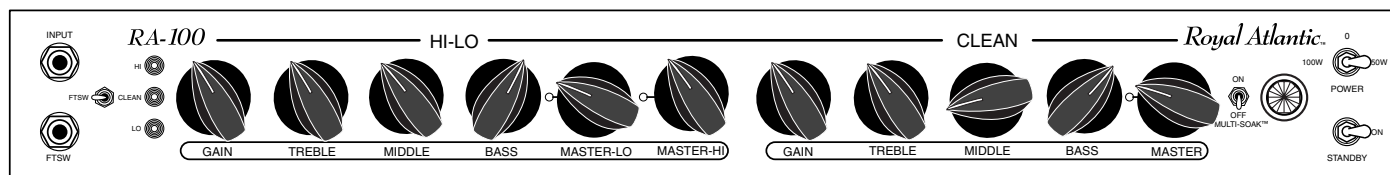
Two Channels house the three distinctively different footswitchable Modes in the RA-100, each dedicated to a region of musically useful gain and capable of iconic sounds. These are comprised of CLEAN, LO and HI and they cover the continents with inspiring soulfulness, conviction and authority... you need but plot the course and this vessel will take you there.

Channel 1 offers CLEAN, a decidedly American circuit, that chimes with bell-like clarity on the top and is filled out with bouncy, tight low-end that's warm and rich, but doesn't get tubby. CLEAN produces angelic clean chording sounds, but because of its tucked bass frequencies, also clips beautifully when used with its dedicated Soak for either pushed bluesy rhythm or old-school overdriven solo sounds.

Channel 2 pays tribute to both classic and modified British sounds, and though the two Modes in this Channel share Tone controls, they are adept at delivering amazing, no-compromise footswitchable performance. LO focuses on that touch-sensitive region of gain produced by classic Brit circuits and will have you knee-deep in hit-making sounds instantly. The undeniable beauty of this gain region lies in the ability to dictate the sound based upon your picking technique, now further enhanced by the addition of Multi-Soak™. Pick softly and she'll purr through stormy seas of Blue or, lay into it and deliver the classic Brit gut-punch... tight and thumping - with enough gain to crunch – yet with dynamic attack and not too saturated. HI covers the widest spectrum of gain in the RA-100 and though its moniker suggests “over-the-top”, some of its best attributes are to be found at settings in the middle of the evening watch. HI transforms from a sweet sea of lower-gain, English-Blues bliss at the shallow end of the GAIN control - to an angry, raging tempest with fathoms of harmonics riding just below the surface as you taunt its furthest reaches. And don't worry, if your style takes you right up the middle – where you need enough gain to saturate, but you need your attack intact and not mush – some of the Royal Atlantic's best sounds reside in the heat of the noonday sun. Around 12:00 on Channel 2's GAIN control, the Royal rocks like a classic, but sings like a modified. Tight and percussive with harmonics that leap to the surface as if chased by a predator.

These two Modes in Channel 2 interact with the one set of Tone controls virtually seamlessly and deliver their respective characters with surprising accuracy and detail. This enables you to switch across styles with a minimum of tweaking and a level of compromise that is well worth the trade in simplicity.

FRONT VIEW: Royal Atlantic RA-100 Combo



REAR VIEW: Royal Atlantic RA-100 Combo



OVERVIEW: (Continued)

And now back to the news you've been waiting for... Multi-Soak™ Channel Assignable Power Soaks. Your ship has come in!

While almost everyone loves the raw power, headroom and bold authority of a 100 watt power section pumping away beneath the deck, most of us have trouble finding a venue for all that muscle. For many of us (regardless of age) few and far between are the gigs of yesteryear - where we fondly remember cranking away on a big-bore head – punishing both the engineers and patrons of our favorite haunts to hit that place where we could ride the wave of high volume “inspiration” and go off. These days if you need to rely on that - most likely you will find yourself unemployed, or at least strongly reprimanded. And while you can use the Front Panel 100/50 watt Half Power switch to berth two of the 4 power tubes for some cool applications, it's not the ultimate solution.

Introducing Multi-Soak™. At last you can have whatever amount of power amp drive you need to deliver your personal form of magic – in every Mode - at any volume level you desire. Let's say that again; now your Tone doesn't have to be directly tied to your volume. And one last time; you can dial-in the perfect amount of power-clip for every footswitchable sound in your amp.

Okay, yeah this intro might be a little over the top... but damn! How long have we all struggled with that? And though Power Soaks of many persuasions are nothing new... ones that don't rob your Tone are much harder to find. And definitely - the ability to have a Soak that gives you a separate one for each sound and individual control over their different volumes in one built-in package... well you've just sailed off the edge of the map... and into a New World of Power Expression.

On the Rear Panel, Multi-Soak™ appears as a row of 3 rotary controls – each assigned to one of the footswitchable Modes – that give you a choice of Bypass (no power reduction) and four popular levels of power soak volume attenuation. A master Bypass/Engage Soaks switch resides on the Front Panel allowing you to remove the Multi-Soak Attenuators from the signal path completely should you decide to unleash the full fury of the beast. Whether you end up relying on the Multi-Soak feature for all your sounds or you only use it for specific Modes and applications, the versatility it creates is extremely powerful in both recording and live environments and makes the RA-100 unique in the world of big-displacement heads. **NOTE: ! High Master Volume settings (on any tube amplifier) will cause the power tubes to wear at an accelerated rate.** Like the tires on a car driven at the limit much of the time, continual excessive use of the Multi-Soak Attenuators to reduce a MASTER setting that is too high to use without the Soak engaged will cause decreased tube life. This will not cause damage to the amplifier, but it will increase your maintenance costs. **NOTE: ! We recommend using the HIGH FAN setting when using Multi-Soak to attenuate the power.**

The Royal's got Reverb. Lush all-tube Reverb drenches the RA-100's three Modes with a beautiful 3-D halo and provides you with assignable choices on where to use it for the best footswitchable results. A 3-position Reverb MODE DEFEAT mini toggle in the REVERB section of the Rear Panel lets you have the Reverb active in all Modes “ON” (toggle center), Defeated in HI (on in CLEAN and LO) or Defeated in HI and LO. (on in CLEAN only). The RA-100 also provides a master REVERB BYPASS switch that enables you to remove the REVERB and all associated tubes and circuitry from the signal path for a more true-to-(at least Brit)vintage response. And if you still need more control than this sophisticated approach to applying REVERB offers... we've provided a “hidden Reverb kill” jack on the tube side of the chassis giving those who “don't mind the dance” total control.

An old favorite, we've included our handy BIAS SWITCH that allows you to swap the stock compliment of EL34 with the fatter, rounder sounding 6L6... for those who want to lean heavily on American citizenship when it comes to crunch time (and even more so in CLEAN). **NOTE: ! Make Sure Bias Switch Setting Matches The Tubes In Use !**

Keeping a cool head is always a good idea, but for those times when passion gets the better of you (or you just have to play real quiet) we've fitted the Royal with a 2-speed fan switch. We recommend keeping it set to HIGH for the longest tube life and trouble-free operation, but the LOW (quieter) setting is there for recording sessions (and late-night serenades on the deck). **NOTE: ! The Multi-Soak™ Attenuation Feature Generates Additional Heat. This heat increases as the amplifiers MASTER Volume Controls are increased while the Multi-Soak Attenuator's are dialed to reduce volume output to the Speaker. We highly recommend using the FAN on the HIGH setting anytime the Multi-Soak Attenuators are used to reduce an otherwise extreme output signal.**

OVERVIEW: (Continued)

A transparent Series EFFECTS LOOP handles outboard signal processing aboard the RA-100 and provides a seamless interface for units that don't want to be "in front of the preamp" such as Delay, Chorus, Flange and Pitch Shifting based effects. The Loop Send is derived from a source at the end of the preamp and the RETURN is inserted back into the signal path near the input to the power section. The Loop is basically a patch point at the junction of preamp and power amp and this delivers the best signal to noise ratio and the least degradation of signal for most outboard devices. Overdrive pedals or Gain Boosting devices will usually want to see the guitar's output signal as a "Send" and the front end (Front Panel Input) of the RA-100 as the "Return". Using gain pedals in the EFFECTS LOOP may cause noise problems, a "mushy" attack or even feedback. Wah pedals also tend to work best in front of the amp for they are really a foot sweepable guitar Tone control. The RA-100 EFFECTS LOOP incorporates switching-type jacks and when there are no patch cords and/or devices connected, the LOOP is HARD BYPASSED and all associated circuitry is removed from the signal path.

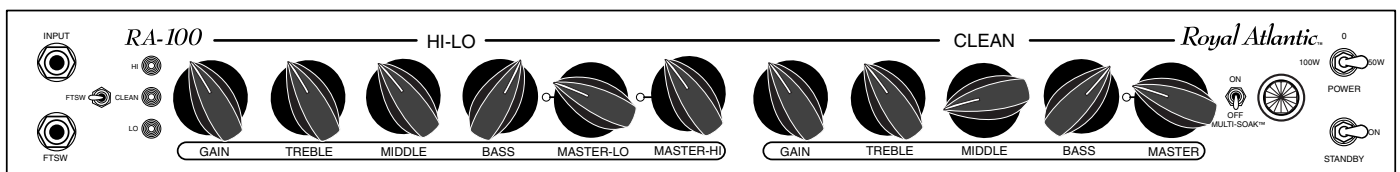
Speaker impedance is an important part of not only power and headroom, but Tone and response (feel) as well. The Royal Atlantic Speaker Output jacks are switchable and handle most speaker impedances well however, they are optimized for either 4 or 8 Ohm loads – which we feel delivers the best overall performance. We prefer the sound of an 8 Ohm cabinet loading the 8 ohm Output Impedance Setting whenever possible citing a more authoritative and responsive attack and tighter-tracking bass frequencies. The majority of MESA Speaker cabinets come wired to 8 Ohms as the standard configuration. Options are available but must be special ordered.

A duplicate Footswitch Input is located on the Rear Panel to accommodate racking of the RA-100 into large format rack systems where all switching is handled by a master (usually midi) switcher. The jacks (Front and Rear) respond to simple "tip to ground" logic and this is commonplace on most all master switching devices. It is usually preferable to have all wiring originate from the rear of these bigger rack systems and the Rear Panel Footswitch jack supports this "pro" wiring scheme.

And finally, a MESA time honored tradition... the SLAVE OUTPUT and LEVEL control. This handy output enables capture of the entire sound of the RA-100 – both preamp and power – to be captured and fed to an external power source (another RA-100 perhaps) for big venue reinforcement. Another common application is to feed a rack of external processing for the purist who doesn't trust Effects Loops or prefers a "dry (center), wet (left), wet (right) Stereo rig. The Multi-Soak feature broadens the spectrum of applications for the SLAVE OUTPUT and makes it a little easier to handle "volume-wise" in a live environment.

Well that's about it for the features of the Royal Atlantic™... now it's about taking her out for a cruise and seeing what she'll do in the wide open sea of your creativity. Thanks so much for your interest and support... all of us here at MESA/Boogie value it above all. We know we work for you... and as we focus each day to hand-build the very best instruments possible and earn your respect. Our most precious reward is the trust you put in us to be your voice and your amplifier company. Cheers and Enjoy!

SAMPLE SETTING:



Here's a quick setting that will give you a quick tour of the basic sound of the Modes in the *Royal Atlantic*.

BEFORE YOU START:

HELPFUL HINTS:

1. Cut the cable tie that holds the AC Power Cord to the Rear Tube Cover and connect it to a Grounded AC wall socket.
2. Connect the Stereo ¼" Footswitch Cable to the Front Panel ¼" jack labeled FOOTSWITCH using the supplied Stereo Cable.
3. Set the amplifier (and at least one speaker cabinet) on the floor you will be standing (or sitting on) while playing to complete the coupling circle that occurs. This will make the amplifier sound better, as well as feel better to play, because the sympathetic loop created by the transmission from your hands to the guitar to the amp to your guitar to your hands remains unbroken.
4. Using the Multi-Soak™ Power Attenuators at the maximum (last two) attenuation settings with the Channel MASTER volume controls set high (to achieve highest blend of power tube clipping) will wear your power tubes down at an accelerated rate. If you do use the Multi-Soak feature extensively as part of your everyday sound palette, don't be surprised if you start noticing power tube wear and compromised (dull, flat and lifeless) tone within a couple months or even sooner.
5. Use the 50 Watt POWER setting on the Front Panel POWER switch to achieve clipped sounds at the top end of the VOLUME control in the CLEAN Mode.
6. The TREBLE control is effective at adding additional gain to clipped sounds in CLEAN with the VOLUME cranked (5:30). Try setting the TREBLE higher (2:00 – 3:00) and reduce the MID to achieve more warmth.
7. There is substantial top end carried in the MID control along with the midrange frequencies it adjusts. Some like to run the MID higher and then reduce top end at the TREBLE control.
8. **Our suggestion in the HI Mode is to use the Soak with tone in mind and follow this obvious and simple scheme; If you want to add power section overdrive to an already gained-out sound with the Multi-Watt Soak – Reduce the setting of the GAIN control accordingly.** In this way you stand a better chance of arriving at a sound that is a beautiful blend of preamp saturation and power amp overdrive.

IMPORTANT: Using the Multi-Soak Attenuators frequently will cause increased power tube wear and shorten their Toneful life. This wear is more rapid if the attenuation is extreme – as it is in the two most attenuated positions (-12db and -16db) of the rotary control. If you use the Multi-Soak as an integral part of your daily Tone palette, you can expect a relatively short life-span (2-4 months) from your power tubes. In comparison, someone using the Multi-Soaks as a strategically applied effect for recording or small venue inspiration would likely get 6 months to a year or even more from a set of tubes before they noticed any degradation in the sound.

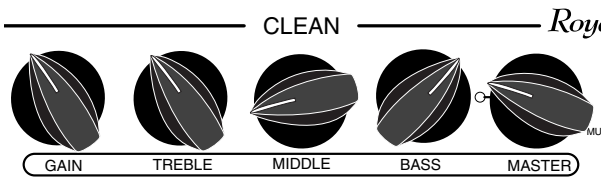
Now that you have an overview of the features of your *Royal Atlantic*, let's get specific with the modes and controls to help you better understand how to get the sounds you are looking for and apply them to your music.

FRONT PANEL: CONTROLS & FEATURES

THE CHANNELS / MODES:

CLEAN CHANNEL:

This is the lowest gain of the three Modes in the *Royal Atlantic* and is based on the classic California “black face” era circuits. It also draws heavily from our MARK I and MARK V Boogie clean modes - where it inherits the sweetness and springy, bouncy attack characteristics. This Mode is aimed at vintage-inspired clean rhythm playing and produces sparkling top end harmonics, articulate - but never harsh - mids and deep fundamental low end that breathes with three-dimensional air.



Lower settings of the VOLUME control (10:30 – 1:30) will allow more of the top end harmonics to slip through the circuit and produce a stripped, skinny sound that is perfect for R&B and Country styles. As the VOLUME is increased past this range, more rich low mids and bass will start to appear, rounding out and filling in the sound. This range is great for Rock clean rhythm sounds where more punch and attitude are in order. With the VOLUME maxed (5:30) the sound is fat with low mid girth and, depending on the pickups being used, headroom is minimal and you are most likely going to experience some tube clip in the preamp. If the amp is being played loud you may be clipping both the preamp and the power section. If you wish to emphasize this clip characteristic and really get things breaking up in the CLEAN Mode, switch the Front Panel POWER switch down to 50 watts and you will attain more clip at a lower overall volume level.

The taper of the pot used for the VOLUME control in the CLEAN Mode is very slow and gain is increased very gradually from the bottom of the pot (7:30) throughout the first 2/3 of its taper (2:00). Above this range (2:30 – 5:30) gain starts to increase more rapidly and there is somewhat less resolution available as the gain fills in the sound.

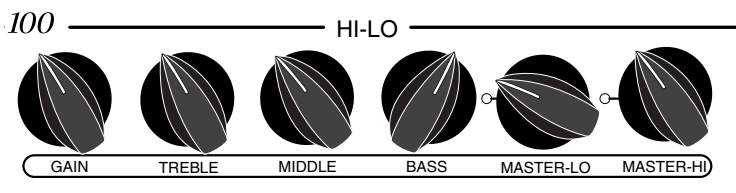
The CLEAN Channel works especially well with the Multi-Soak™ feature to achieve clipped solo and old school crunch rhythm sounds. By switching in the CLEAN Attenuator and increasing the MASTER control, you can add power section overdrive in varying degrees to the clip available in the higher region of the preamp. This scheme works great when you want to retain the urgent character and dynamic response of a more vintage gain structure, but need to add some power section overdrive and keep the volume level reasonable.

NOTE: Using the Multi-Soak Attenuators frequently will cause increased power tube wear and shorten their Toneful life. This wear is more rapid if the attenuation is extreme – as it is in the two most attenuated positions (-12db and -16db) of the rotary control. If you use the Multi-Soak as an integral part of your daily Tone palette, you can expect a relatively short life-span (2-4 months) from your power tubes. In comparison, someone using the Multi-Soaks as a strategically applied effect for recording or small venue inspiration would likely get 6 months to a year or even more from a set of tubes before they noticed any degradation in the sound.

HI / LO CHANNEL:

This Channel contains two Modes of operation and roams the mid to high regions of gain with a smooth – and extremely useful – overlap between LO and HI at the upper end of the Classic Rock gain-o-sphere. Both the Modes in this Channel

lean heavily on the British side of the Atlantic and between them they deliver everything from the classic gut-punching break-up for crunch rhythm work on up to soaring, saturated single note sounds with virtually infinite sustain.



FRONT PANEL: CONTROLS & FEATURES (Continued)

LO: LO delivers the classic Brit character and response and is all about versatility. With a gain spectrum that begins with a vintage-inspired clean range (7:00 – 10:30), transitions through a dial friendly zone of tight, percussive, open and dynamic crunch sounds (10:30 – 2:00) and ends with a broad spectrum of more saturated – but not too compressed – heavy rhythm or lead sounds (2:00 – 5:00), LO does it all. This range of gain and stylistic flexibility creates possibly the most useful Mode in the Royal and don't be surprised if LO becomes your go-to Mode for so many sounds. It rides the line between clean and dirty with subtle accuracy and astonishing conviction, delivering a huge palette of sounds.



This chameleon-like nature is further appreciated when you start exploring what the CLEAN Channel can do with the Multi-Soak™ feature. As you find clipped or overdriven sounds using the CLEAN Channel in conjunction with the Attenuators, the lower range of LO shows its value as an alternate clean sound. In this scenario run the GAIN low (10:00 – 11:00), the MID scooped (9:00) and the BASS higher (2:00 – 3:30) to achieve more sparkle, breath and dimension. LO works extremely well for Brit-Vintage rhythm work... where its percussive nature shines, keeping things exciting in the time domain while it delivers the right kind of top-end that chimes and chirps and yet remains warm enough to sound rich and soulful.

LO also really showcases the Royal's EL-34 power section and - whether or not the Multi-Soak Attenuator is used to enhance the clip – the preamps classic Brit mid- gain personality is perfectly matched to make the most of the EL34's skinnier, more stripped footprint.

Because the gain range of the LO Mode tops out before it gets too compressed and saturated, it is the more likely candidate (between LO and HI) for frequent applications of the Multi-Soak™ Attenuation feature. It will remain tighter and more focused as you dial in additional power section overdrive by increasing the MASTER and clamping down the output with the Soak. LO will handle (remain tight and focused) the most extreme Soak settings (-16db and -12db) but not quite as well as the CLEAN Channel because, especially at the upper end of the GAIN control, there is a substantial amount of preamp "squash" and natural tube compression. We have found the lower and middle ranges of the GAIN control in LO combined with the upper two Soak settings (-8db and -4db) seem to work best and retain the most musical blend of saturation and openness (uncompromised dynamic response).

You'll come to appreciate the accuracy, nuance and especially the urgency of LO as you find sounds across its gain spectrum becoming an integral part of your expression. It's a formidable ally for clean, pushed and crunch rhythms as well as tight-tracking single note sounds that will bring years of enjoyment and inspiration.

HI: This Mode is all about Modified. Modified Brit to be exact. HI adds another gain stage and thicker low-end, increased low-mid attack and layers of high harmonics to create a sound that is heavy and menacing, yet still retains its tight, percussive nature and fast tracking response. This Mode is great for throaty edge-of-clip blues and roots styles in the low region of the GAIN Control (8:30 – 11:00), giant, aggressive crunch rhythm and explosive, dynamic single note jabs in the middle range (11:30 – 1:30), then it transitions into molten, soaring lead sounds that offer near infinite sustain and ridiculous saturation at the top of the GAIN control (1:30 – 5:00). One surprising thing about HI is, that while the gain available at the upper region of this Mode is possible the highest ever found in a MESA, (that's saying a lot) it is quite well behaved in terms of noise and stability. Also HI tracks your playing accurately despite the complete and utter saturation of the notes that occurs here.



Because of the incredible amount of gain available here, HI is not as Soak friendly as CLEAN and LO and discretion must be used to achieve musical results. The lower range of the GAIN control works best with the Multi-Soak Attenuator and much above 12:00 noon the attack really begins to suffer, becoming mushy and indistinct. This is because the Soak is capable of adding substantially more gain to an already saturated signal and the HI mode, quite frankly, doesn't need more gain. In fact the fast, tight and percussive nature of the Royal running in Full Power with no power attenuation in place, seems to serve up HI in the best way possible. The added brightness of the EL34's running wide-open and unleashed keeps things articulate and clear. The slight darkening that can sometimes be a sideline quality as you start to clamp down the power lower and lower does not serve this super-charged gain machine as well as it slows things down and imparts mush. **Our suggestion in the HI Mode is to use the Soak with tone in mind**

FRONT PANEL: CONTROLS & FEATURES (Continued)

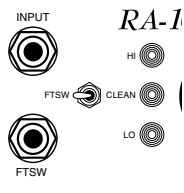
and follow this obvious and simple scheme:

If you want to add power section overdrive to an already gained-out sound with the Multi-Watt Soak – Reduce the setting of the GAIN control accordingly. In this way you stand a better chance of arriving at a sound that is a beautiful blend of preamp saturation and power amp overdrive. Virtually all the classic and identifiable guitar sounds have been created as a result of a perfect blend of these two types of amplification. Here in the Royal Atlantic – possibly for the first time ever – you have ultimate control over these two important stages and with finesse and taste applied, you should be able to craft truly amazing original - and classic - guitar sounds.

THE CONTROLS:

Though there are two separate Channels in the Royal Atlantic, the controls are virtually identical in their roles and how they operate. The only difference between the Channels is the obvious inclusion of a separate MASTER volume control that is dedicated to the LO Channel. Because of this similarity in the control layout of the Channels, we will discuss them together and where there are important settings information or differences, we'll point them out.

CHANNEL SELECT: This 3-position mini toggle switch determines which Channel/Mode is called up when the Footswitch is not connected. It triggers an LED indicator next to it and also, to assist you on stage, a small LED next to the MASTER of the Channel/Mode you are currently in.



NOTE: To use the Footswitch to select Channels/Modes, select the center CLEAN position of the Toggle and connect the stereo Footswitch Cable to the Footswitch Jack on the Front Panel. On the Footswitch, the Button on the Left toggles you between the Channels (CLEAN & HI/LO) and the button on the right Toggles you between the HI and LO Modes in the (overdrive) HI/LO Channel.

GAIN: This is, by far, the most powerful control in the Royal and its setting determines the style and personality of the Modes. It meters the gain in different tube stages depending on the Channel and Mode called up – and it sets Input Stage headroom - which determines whether the sound will be clean or overdriven. It also acts as a subtle Tone control as the tube stages' gain is increased and decreased and imparts its own "color" on the sound.



In all the Channels, there are three regions of the GAIN control – a low gain zone between 8:00 - 11:30, a warmer, more saturated zone from 11:00 - 2:00 and a higher gain zone from 2:30 – 5:00. Each of these zones can be used for many different applications and all can be used for both chording and single note solo work. As the GAIN control is swept throughout its range it imparts different textures and tonal characteristics.

Generally speaking, the lower end of the control (8:30 – 11:30) in both Channels and Modes produces a brighter, more open character that has more dynamic content available. This region is great for clean, sparkling chording in Channel 1, where the maximum headroom is available, the top end harmonics are bubbly and the attack is lightning fast. The HI and LO Modes in Channel 2 are tuned to deliver amazing threshold sounds in this zone where the gain is warm and furry, but there is still plenty of the guitar's personality intact. This zone is great for all the Channel 2 sounds when used for clipped chording, as there is plenty of dynamics intact that have not yet been compressed by too much saturation.

The middle region of the GAIN control (11:00 – 2:00) is where the most balanced sounds live and you will find this region delivers warm, full sound, detailed attack and good dynamics and the Tone controls still have a powerful effect on the signal. The Channel 1 CLEAN delivers great chording response and sound richer and have more body here. Depending on pickup style and strength you will have to watch for clipping as you are nearing the crossover point gain-wise. Some of Channel 2's best sounds are to be found here as things start smearing nicely as they start getting into delicious tube overdrive. As you approach 2:00 there will be plenty of

FRONT PANEL: CONTROLS

saturation to keep chords grinding and single notes hanging – but not too much to start compressing the life out of the sound. If you aren't getting great results in this region for your gain sounds in Channel 2, you may want to look at trying some pickups with a bit hotter output.

The highest region of the GAIN (2:00 – 5:00) is all about saturation. Up here the signal gets much fatter in the low end and the top end begins to recede to create a round, compressed sound. Dynamics become slower with lower peaks and a more legato, creamier feel is produced. In Channel 1 the high end of the GAIN control produces some great clipped clean sounds as the Input stage gives it up and starts to saturate. These sounds are further enhanced by the 50 Watt Power Mode and the Multi-Soak™ Attenuation feature, where you can add additional power clip to the preamp drive.

Channel 2 gets truly wild at the top end of the GAIN control and both Modes unveil their true potential as solo Modes. There is ample gain up here to rip into any style you wish with the HI Mode pumping out ridiculous levels of thick creamy overdrive for soloing. With the GAIN maxed in HI you can achieve virtually infinite sustain... if you can keep your guitar stable and from feeding back. The more midrange-prominent character of LO and HI allows you to still have good articulation up here even with amounts of saturation that would turn most circuits to useless mush.

At the highest GAIN settings you will notice the Tone controls have a diminished effect on the sound as the notes are so saturated and their character has been pre-determined by the way each Mode is voiced and how it reacts to this level of gain. May we humbly suggest using the GAIN in its middle range whenever possible to achieve the best balance of overdrive and still retain the full shaping power of the Tone Controls. Also, your attack will remain definitive and focused in the middle range and not get over-saturated and "slowed down" as it can in the highest region of GAIN settings.

TREBLE:

While the VOLUME is the most powerful control in the Royal Atlantic, the TREBLE comes in a close second. The TREBLE is responsible for shaping the character of the entire Mode/Channel. It can overpower the rest of the Tone controls easily and therefore its setting is crucial to a rich and balanced sound in all three Modes. In fact, the TREBLE feeds the signal to the MID and BASS controls and acts like a valve for their signal strength.



TREBLE

When the TREBLE is set in its higher regions (2:00 – 5:00) it is sending a smaller signal to the MID and BASS controls and they will be less active and the dominant character will be one of very bright, TREBLE-heavy frequencies. Conversely, a very low setting on the TREBLE will produce sounds that are perhaps a little BASS heavy and overly dark as a very large amount of signal is shoveled toward the MID and BASS controls. So you can see that setting the TREBLE with taste in mind and care is critical for the Tone control string to work in harmony.

In both Channels and their Modes the middle region of the TREBLE delivers the best balance and creates sounds that are plenty bright enough but still rich and warm. We suggest that you start with the TREBLE at 12:00 and adjust up or down slightly until the desired blend is achieved.

In the HI/LO Channel, the MID control carries frequencies that are somewhat close to the TREBLE, along with the upper mid and lower mid frequencies it is centered around. Use this idiosyncrasy of Brit style architecture to your advantage and experiment with setting the TREBLE lower than "normal" and running the MID up a bit and vice versa. Some very cool sounds can be found with the TREBLE lower and the MID higher. Be sure to check this interaction between these two powerful controls, as it will be critical in achieving the sounds you hear in your head.

FRONT PANEL: CONTROLS *(Continued)*

MID: The MID control in the Royal, while very powerful, acts a little more like a standard tone control and doesn't have quite the massive global shaping power of the VOLUME and TREBLE controls. However, its setting does impart a strong character on the sound of all three Modes. It brings in and out a broad band of midrange frequencies and - as we have mentioned earlier in the TREBLE section - along with these rides a fair amount of higher "low treble" range frequencies. These highs are lower than that of the TREBLE, but they are important for the punch and cut of the sound in a mix.



HI-L

MIDDLE

For rhythm playing in the CLEAN Mode, a lower MID setting (7:30 – 10:00) scoops some of this midrange attack and makes the bottom end breathe more. This range will also make things more resilient and create an easier to play, more elastic feel on the strings. Single coil guitars work very well here for the slinky, rubber band attack and bouncy bass character associated with Blues, R&B and Country clean styles.

The middle region (10:00 – 1:00) is where the punch and attack begin to come on with more urgency and this is where mahogany guitars really like to see the MID set for adding the cut and definition. Here the top end begins to show itself in the mix of the MID controls' spectrum and chording sounds start to chime and slash with a more forward - and very present - character.

From here on up (1:00 – 5:30) the MID introduces an aggressive range of sounds that are still full, but quite forward as the dominant frequencies become those present under control of the MID. In this range you will likely have to increase the BASS to add back in the richness and warmth that gets overshadowed when the MID control is set high. If you like the attack and urgency found in this range of the MID, all the other controls (except maybe the MASTER, which you may have to back down as the sound gets more forward) may have to be set higher to keep up with the MID dominant curve. This is fine, although there will reach a point of diminishing return as the headroom in the preamp gets eaten up by this tonal arms race and you begin to clip the preamp with the high signal from the Tone control string.

For gain sounds in the LO and HI Modes, a similar story unfolds as the MID is increased. Lower settings (7:30 – 10:30) will produce wider sounding, more elastic feeling chording sounds and the single notes will have a more creamy, smooth character. High harmonics created by the gain and controlled largely with the TREBLE, will put a patina of three-dimensional haze on things that smears nicely with vintage soul.

As the MID is increased past the 10:00 range, cut and bite begins to creep in along with the chesty midrange punch. This is where some classic Brit crunch is found in the middle range of the VOLUME control in the LO Mode. This MID kick is an integral part of the impact and tight-tracking accuracy of this iconic mid-gain sound that has been a Rock staple for the last four decades. In HI, the single notes leap forward with greater authority and speed and the warmer, juicier sound begins to give way to a fire-breathing blowtorch of gain... especially at high VOLUME settings.

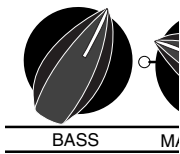
Passing the 1:00 mark unleashes the brash attitude pent up in the MID frequencies and top end joins the party in a big way. Here is where you look for the most forward and aggressive attack over a wider range than that of TREBLE control. The feel on the strings will become less forgiving and your playing will be put under a microscope in the time domain. This region is great for pushing Rock rhythm sounds to the forefront of a mix in LO, no matter how much gain you thicken it up with on the VOLUME control. Single note solo sounds in HI will be lightning fast and deadly accurate and certainly will be heard by all, as they will have a definite point of origin in the bar line.

One suggestion, or maybe more of a word of caution... the MID control contains frequencies that can be a little tough on the ears if not used with some discretion. Be sure to put your head down by the cabinet at some point and sample what you are dealing out to the audience and/or the microphone. You might be surprised how much impact - and possibly even pain - can be dialed in with higher settings of the MID. Unless you are out to hurt people, which is never a good idea, you may find the middle to lower range of the MID gives you plenty of attack and definition but still sounds balanced and warm and lets others enjoy your playing without wincing at every note.

FRONT PANEL: CONTROLS *(Continued)*

BASS: Much like the MID, the BASS control responds like a typical Tone control and blends in a fairly wide slice of rich bottom end to round out the sound. Internal switching that occurs when the different Modes are selected re-voices the frequency and amount of bass present for each circuit. This difference is crucial to the sounds and a big part of their character.

LO



The CLEAN Mode incorporates a much lower bass frequency that adds depth, dimension and air to the sound. Both LO and HI utilize a higher frequency of bass that produces a more resonant, thumping quality and keeps things tighter and more bouncy. This frequency can be used in greater proportions as compared with the lower – and possibly more tone-dangerous – frequency used in the CLEAN Mode. Therefore the need to be able to have different amounts of these two different frequencies is critical to both great sound and great footswitching compatibility between the Channels/Modes.

In the CLEAN Mode we like the balance of the BASS control when it is blending in warmth and body, but not overpowering the attack and sparkle in the mix. Depending on the setting of the VOLUME control this can be different, as the lower VOLUME settings can handle a little higher BASS settings. You will have to experiment with the exact spots and below is a rough guideline example, but basically, as VOLUME goes up - BASS should come down;

Example:

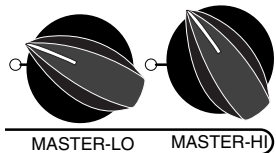
With the VOLUME at 12:00 – BASS at 1:00

With the VOLUME at 1:00 – BASS at 12:00

With the VOLUME at 2:00 – BASS at 11:00

The higher frequencies found on the BASS control in the LO and HI Modes are much more forgiving and can be used in higher amounts than the lower frequencies present in CLEAN. BASS settings between 12:00 and 3:00 will be commonplace - with lower VOLUME settings needing higher BASS settings and higher VOLUME settings calling for a more careful use of the BASS. As the gain goes down (VOLUME 9:30 – 12:00) and things get tighter, there is a need for the rich low-end air that is created by the BASS control. When the gain saturates things as it's cranked up (VOLUME 12:00 – 5:30), the notes thicken up and less bass is needed to create girth until - at a certain point - the bass frequencies start to slow things down and can even get in the way for some styles.

MASTER: This control determines the overall output level of each Channel and is located at the very end of the preamp. By using it in combination with the GAIN control, any amount of preamp signal strength – gain – (within a Modes' parameters) can be achieved at any playing volume. Once you have dedicated the Channels to their respective sounds with the Modes and Controls, you can then balance the volume levels of the Channels using the MASTER controls.



In addition to adjusting the playing loudness of the Channels/Modes, the MASTER functions as an EFFECTS RETURN control for the EFFECTS LOOP when the LOOP is activated (by connecting plugs to the LOOP SEND and RETURN jacks).

For general applications and to get the best performance out of all the Modes we recommend MASTER settings in the 9:00 – 12:00 range with most people settling in around 10:00 – 11:00 for average playing volumes. Of course, when using the Multi-Soak Feature to add additional power overdrive, you will switch in the desired amount of attenuation and probably use higher settings of the MASTER.

Some purists like to run the MASTER all the way up and raise the GAIN until they reach their desired sound – thinking that this achieves the purest sound. In theory, they believe this resembles removing the control altogether from the signal path, and in a way

FRONT PANEL: CONTROLS *(Continued)*

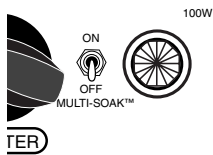
it does. However most all the “vintage non-master” amplifiers they are seeking to emulate have discrete resistors in that place in the circuit anyway to adjust or “tune” the output of the preamp to the power section sensitivity.

The MASTER is nothing more than a variable resistor that offers an infinite range of settings possibilities and makes the amplifier many times more versatile with no sonic penalty. If you prescribe to this old school approach, then by all means, use the Royal Atlantic this way... it won't hurt the amplifier. However you will be severely limiting the potential sounds you can achieve by removing the limitless great sounding combinations of GAIN and MASTER settings.

NOTE: Using the Multi-Soak Attenuators with the MASTER control cranked way up frequently will cause increased power tube wear and shorten their Toneful life. This wear is more rapid if the attenuation is extreme – as it is in the two most attenuated positions (-12db and -16db) of the rotary control. If you use the Multi-Soak as an integral part of your daily Tone palette, you can expect a relatively short life-span (2-4 months) from your power tubes. In comparison, someone using the Multi-Soaks as a strategically applied effect for recording or small venue inspiration would likely get 6 months to a year or even more from a set of tubes before they noticed any degradation in the sound.

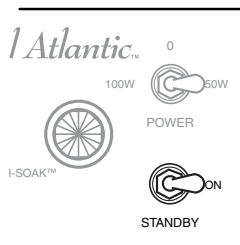
MULTI-SOAK ON/OFF: This mini toggle switch engages the Multi-Soak Power Attenuators and brings the three individual attenuation Rotary controls on the Rear Panel on-line. As mentioned in the OVERVIEW, there is one attenuator dedicated to each of the three Modes and to operate, this mini toggle must be set to the ON position.

Royal Atlantic



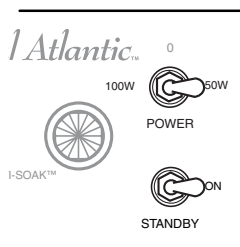
NOTE: If you ever find yourself turning on your amplifier to discover a low or weak output level, check the setting of this switch and the Rotary controls in the Multi-Soak section of the Rear Panel. It is possible you last used the amplifier with the soaks engaged and set low – thus creating a low volume scenario.

STANDBY: Perfect for set breaks...this toggle switch also serves an even more important purpose. In the **STANDBY** position (switch up), the tubes are at idle so that during power up they may warm up before being put to use.



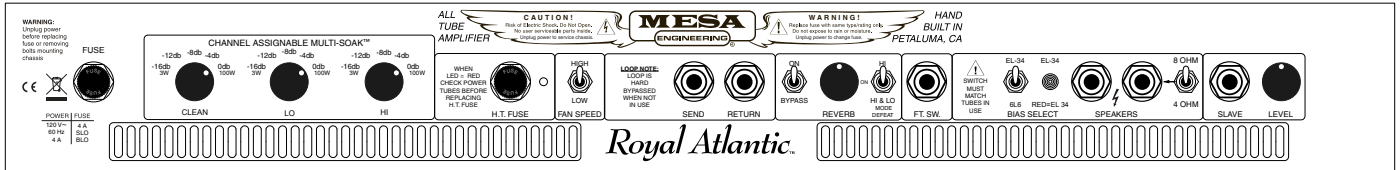
Before the power is switched on, make sure the STANDBY switch is in the STANDBY position. Wait at least 30 seconds and then flip the **STANDBY** switch to its **ON** position. Following this simple warm up procedure helps in preventing tube problems and increases their toneful life substantially.

POWER: 50W / 100W This 3-position switch is the AC MAINS Power switch and it does double duty; it supplies the AC main voltage and it also allows you to choose between two global power ratings, 50 watts 100 watts. The center position is the POWER OFF position and from there you can select either two tubes for 50 watts of power or 4 EL34's for 100 watts of headroom. When running the 50 watt position, two of the power tubes are put in a standby mode where there is still voltage on them to keep them warm, but they are effectively “off line”.



REAR PANEL: CONTROLS & FEATURES

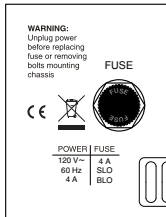
Royal Atlantic RA-100 Combo



Now that you have a grip on the controls and features of the Front Panel of your *Royal Atlantic*, let's get familiar with the Rear Panel and its features.

FUSE:

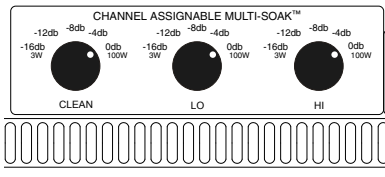
This is the A.C.'s (Alternating Current) main fuse and provides protection from outside A.C. fluctuations as well as power tube failure damage. Should the **FUSE** blow, replace it with the same rating in a Slo-Blo type package. The domestic U.S. version requires a 4 amp Slo-Blo **FUSE**. A power tube short or failure is often the cause of a blown **FUSE**...Follow the cold start procedure mentioned in the ON/STANDBY switch section and watch the power tubes as you flip the STANDBY to the ON position. If a power tube is going bad or is arcing you will see it! Flip the STANDBY switch to Standby immediately and replace the faulty power tube and the **FUSE** if necessary.



If you see nothing abnormal as you switch the STANDBY on, it is possible that a power tube shorted temporarily and blew the **FUSE**. If this is the case it may work again normally. To be safe, you might want to replace just the adjacent tube or all power tubes in the "shotgun" troubleshooting tradition and save the replaced set as spares. Spare fuses are a must for the fabled cord bag along with your spare tubes. Always carry both for they could be worth their weight in gold someday.

CHANNEL ASSIGNABLE MULTI-SOAK™:

These three rotary controls may just revolutionize the way you think of - and use - a guitar amplifier forever more. They allow you, for the first time in one amp, to dial in any amount of power section overdrive with the MASTER in each Channel/Mode and reduce the listening volume to one of four "more reasonable" volume levels. This ability to add the desired amount of power saturation - while at the same time "soak-up" the excessive volume (loudness) you can't use, opens up a whole new realm of control and expressiveness to you that was simply unavailable before the Royal Atlantic.



In effect, the CLEAN levels of attenuation offer nearly limitless power ratings across the usable spectrum of wattage. The levels are graduated evenly in 4 db increments once the SOAK is engaged, beginning with the 0db/100W "Bypass" position being "no attenuation" and delivering the full 100 watts of power. This fifth "BYPASS" position allows you to use the Soak(s) where you want them and leave other sounds unaffected. Once the SOAK is engaged you have a choice of -4db, -8db, -12db and -16db with the -16db position putting out the rough equivalent of 3 watts of output power. The wattage is not really relevant and only included as a rough pointer, while the volume reduction is big news... as this is what allows you to really use (hopefully not abuse) your power section.

This is probably the time to remind you once again, that the MULTI-SOAK™ feature allows you to run the power amp much louder than would otherwise be possible - or at least socially acceptable. Along with this power comes the responsibility not to abuse it.

The use of the more extreme attenuation settings (-12db and -16db) in combination with high MASTER settings puts additional stress on the power tubes and creates additional heat. This will reduce the Tone-full life of your power tubes and increase your maintenance costs as you will "burn through tubes" at an accelerated rate.

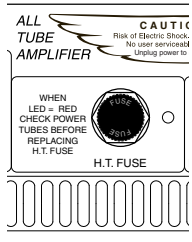
So may we suggest using the MULTI-SOAK feature "responsibly" and artistically - as a way to embellish the already great sounds of the Royal's incredible preamp, rather than relying on it as the center-point of your sonic palette.

NOTE: If you use the Multi-Soak as an integral part of your daily Tone palette, you can expect a relatively short life-span (2-4 months) from your power tubes. In comparison, someone using the Multi-Soaks as a strategically applied effect for recording or small venue inspiration would likely get 6 months to a year or even more from a set of tubes before they noticed any degradation in the sound.

REAR PANEL: CONTROLS & FEATURES (Continued)

NOTE: WARNING! Never grab the Power Tubes after playing with your bare fingers – especially when the MULTI-SOAK ATTENUATORS have been used! TUBES WILL BE EXTREMELY HOT AND CAN CAUSE SEVERE BURNS. THE CHASSIS AND SWITCHES CAN ALSO BECOME VERY HOT. USE CAUTION WHENEVER TOUCHING THE AMPLIFIER AFTER USE. USE GLOVES OR SOME OTHER FORM OF HAND PROTECTION WHEN GRABBING TUBES.

H.T. FUSE: This fuse and indication LED provide additional protection to the circuit should a power tube arc or fail. In an amplifier that has the ability to reduce the listening volume of extreme output settings, this level of protection is warranted and welcome. Should a power tube fail, it will first blow this High Tension fuse and reduce the likelihood of circuit /component damage. If you ever hear a strange hum or “shorting” noises, hit STANDBY right away, then look here to see if the Red LED is lit indicating a power tube failure and the H.T. Fuse going open. If it is lit, shut the amplifier off and replace this fuse with a 1 amp “Fast Blo” type fuse and the faulty power tube (you should see it glowing red hot in the center). Sometimes it may be necessary to replace the adjacent power tube as well, as it may have been damaged when its nearest neighbor shorted.



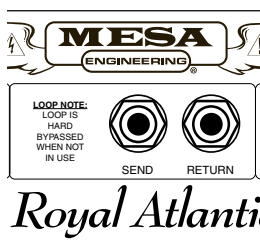
NOTE: See Troubleshooting Guide at the rear of this manual for more information on tube replacement.

FAN SPEED: This two-position switch allows the selection of two different Cooling Fan speeds. The choices are HIGH and LOW, with the preferred position being HIGH for the best cooling and tube life. We recommend leaving the FAN in the HIGH position for all applications that don't require physical silence in the room such as recording sessions or very low MASTER settings when practicing alone. It is important to keep the FAN on HIGH when the MULTI-SOAK ATTENUATORS are in use - as this feature can potentially create additional heat, especially at high MASTER settings.



NOTE: IMPORTANT! USE the HIGH setting of the Cooling Fan whenever possible, especially when MULTI-SOAK is in use to “clamp down” high MASTER settings. This will help avoid excess heat and reduce the likelihood of tube failure.

EFFECTS LOOP: The Series EFFECTS LOOP handles outboard signal processing aboard the RA-100 and provides a seamless interface for units that don't want to be “in front of the preamp” such as Delay, Chorus, Flange and Pitch based effects. The Loop SEND is derived from a source at the end of the preamp and the RETURN is inserted back into the signal path near the input to the power section. The Loop is basically a patch point at the junction of preamp and power amp and this scheme delivers the best signal to noise ratio and the least degradation of signal for most outboard devices. The SEND signal level is determined by the setting of the MASTER volume controls in the Channels and at “normal” volume levels the signal should be appropriate for most processor's input stage. At extreme levels of the RA-100 – either very high or very low – it may be necessary to adjust the Input of your processor to avoid distortion (set too high) or excessive noise (set too low).



Some rack processors have an Input pad that allows selection of both Line (+4db) or Instrument (-20db) level signals and the RA-100 EFFECTS LOOP SEND signal can fall – depending on MASTER settings – between these two regions. Experiment with your device(s) and use the Input meter (if available) and the Input attenuator to adjust Input levels until unity gain is reached. If you are unsure, simply yank the SEND and RETURN cables from the EFFECTS LOOP and if the signal gets louder – you'll need to increase either Input or Output or both at the processor and repeat until the level stays relatively the same as you remove and re-insert the processor cables in the Effects Loop.

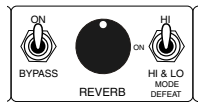
Overdrive pedals or Gain Boosting devices will usually want to see the guitar's output signal as a “Send” and the front (Front Panel Input) of the RA-100 as the “Return” as using them in the EFFECTS LOOP may cause noise problems, a “mushy” attack or even feedback. Wah pedals also tend to work best in front of the amp.

The RA-100 incorporates switching-type jacks and therefore, when there are no patch cords and/or devices connected to the SEND and RETURN jacks, the LOOP is BYPASSED.

REAR PANEL: CONTROLS & FEATURES *(Continued)*

REVERB:

This duo of switches allows engagement and control of the RA-100's lush all-tube Reverb circuitry. The Reverb section of the RA-100 features a True Bypass that routes the signal completely around the Reverb tube stages and all associated circuitry as well as a pre-selectable Reverb Defeat switch that enables you to assign the Reverb to specific Channels/Modes.



The BYPASS switch is just that and is included for all you vintage minded Tone aficionados, so that you can enjoy the RA-100 sounds in a worry-free state of mind... confident that there is nothing in the signal path that isn't pure Brit and vintage approved. Simply flip the switch to the BYPASS position and all Reverb circuitry is removed – including tubes – and the Royal can deliver it's urgent, touch sensitive sound in lightning fast detail and clarity.

The DEFEAT switch allows you to pre-select the REVERB DEFEAT feature and the choices are as follows;

HI – Defeats Reverb only in the HI Mode of the HI/LO Channel (CLEAN & LO Active)

ON – Reverb is Active in All Modes (CLEAN Channel, Both Modes in HI/LO Channel)

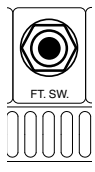
HI/LO – Reverb is Active in CLEAN, Defeated in HI/LO Channel

NOTE: The REVERB BYPASS switch must be set to REVERB (taken out of BYPASS) for the REVERB DEFEAT switch to operate.

FTSW (FOOTSWITCH):

This jack is a duplicate of the Front Panel FOOTSWTCH jack and is provided so that you can route cabling to the rear of a rack system should you ever rack mount the RA-100 in a large touring rig. It accepts the stereo Royal Atlantic Footswitch Cable and allows selection of the Channels and Modes.

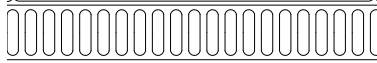
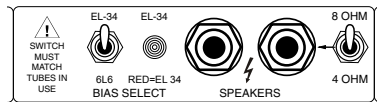
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BIAS SELECT:

This switch allows you to re-bias the output section to accommodate 6L6 power tubes for a fatter, smoother sound that has a more robust low-mid emphasis and less top-end harmonic edge. As stated on the Rear Panel, THE SETTING OF THE BIAS SWITCH MUST MATCH THE TUBE TYPE IN USE. Failure to adhere to this may result in damage to your amplifier. For safety there is a LED indicator that lights up when the switch is in the EL34 position. Make sure that when you swap out the stock compliment of EL34's for 6L6's, that you select the 6L6 position on the BIAS SELECT toggle and the light goes off.

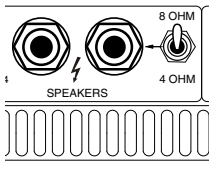
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REAR PANEL: CONTROLS & FEATURES *(Continued)*

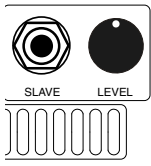
SPEAKERS / IMPEDANCE SELECT

These two ¼" female phono jacks and Impedance Select toggle switch are the SPEAKER OUTPUTS for the Royal 100. If you are familiar with our amplifiers, you will likely wonder why there is a switch to select either the 4 or 8 ohm speaker taps – as opposed to the tried-and-true sets of dedicated output jacks. Because of the switching matrix required to achieve the Multi-Soak™ Power Attenuation, the SPEAKER OUTPUTS needed to be on a switch, instead of the dedicated jacks. When using a single 8 Ohm cabinet, select the 8 OHM position of the switch. When using two 8 Ohm cabinets, connect the two cabinets to the Jacks and select the 4 Ohm position of the switch. To use one 4 Ohm cabinet, select the 4 Ohm Output. It is not recommended to use impedances lower than 4 Ohms. To Use a single 16 Ohm cabinet or two 16 Ohm cabinets, select the 8 Ohm position.



SLAVE OUTPUT / LEVEL

This 1/4" jack and its associated LEVEL Control capture the entire sound of the amplifier (preamp and power section) for use as a feed to either an effects processor(s) or additional power amps for big venue applications. The signal is derived from the Speaker Output and is padded down and wired to the SLAVE LEVEL Control so that you can adjust the signal strength to match your application.



There is no “speaker simulation” present at the SLAVE Output so this signal will not perform well as a “recording output”. Guitar speakers have a significant amount of roll-off of the top end and many have a “bump” in the bottom end as well and the effect of this shaping can’t be overlooked when recording guitar sounds. There will simply be too much top end present to use any of the overdriven sounds for direct recording applications. There is also a much larger amount of signal available at the SLAVE and these higher levels could overload and possibly damage the mixers Input section if the SLAVE is used with a high level setting. Use the SLAVE for adding additional power by feeding “slave” amplifiers or for a feed to your effects (rack).

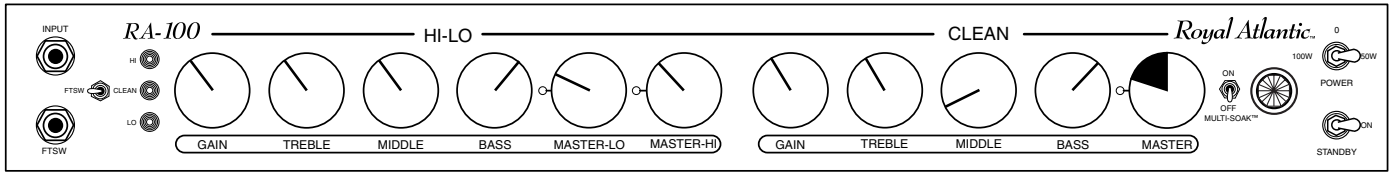
NOTE: Once you have taken a line out of the SLAVE you cannot go back into the EFFECTS RETURN or a feedback loop will occur and result in a high pitched squeal.

NOTE: ALWAYS BEGIN BY SETTING THE SLAVE LEVEL TO 7:30 (All the way off) WHEN PATCHING UP YOUR SYSTEM! The signal from the SLAVE can be quite high and an accidental high setting could cause damage to both your ears and other gear downstream in the signal path. Always zero the LEVEL out before you power up unless you have it marked for a safe setting. Check the setting every time you move your gear as the SLAVE LEVEL may have been moved during transport.

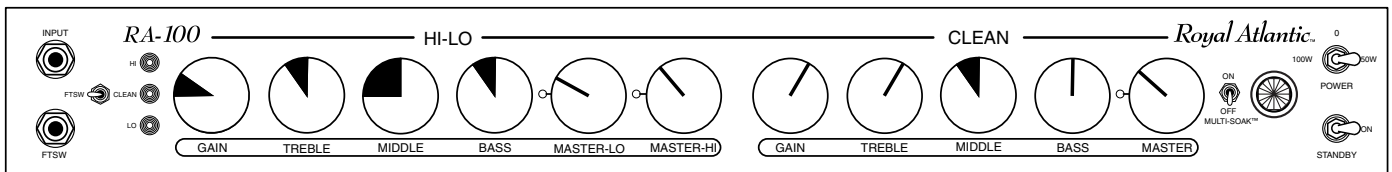
Now that we’ve covered the features and operation of your *Royal Atlantic* it’s time to enjoy the best part...the sound and feel! We wish you many years of inspiration, fulfillment and musical satisfaction from your new *Royal Atlantic*.

FOOTSWITCHABLE SAMPLE SETTINGS

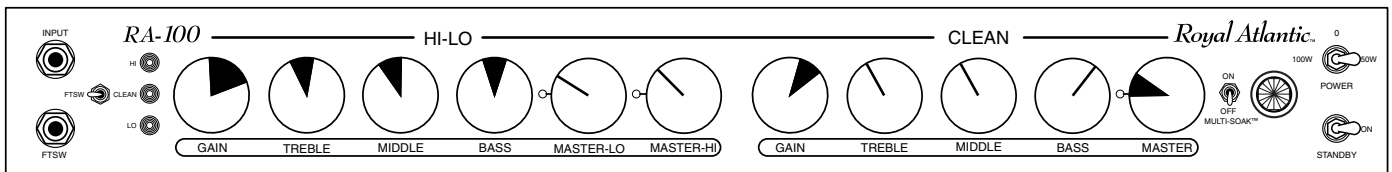
Bright Clean, Tight Crunch, Brit Lead



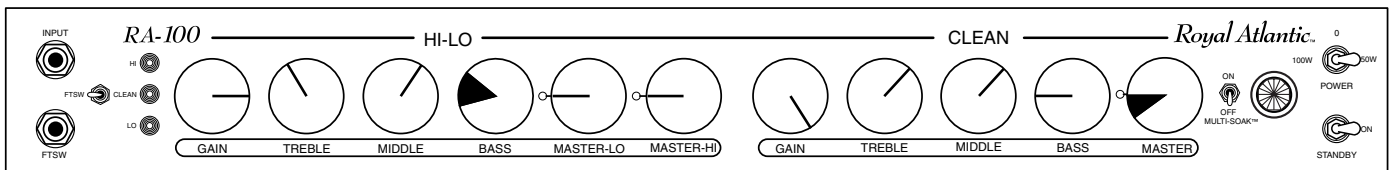
Punchy Clean, Edge, Urgent Lead



Fat Clean, Grind, Molten Solo

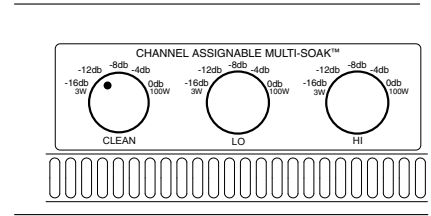
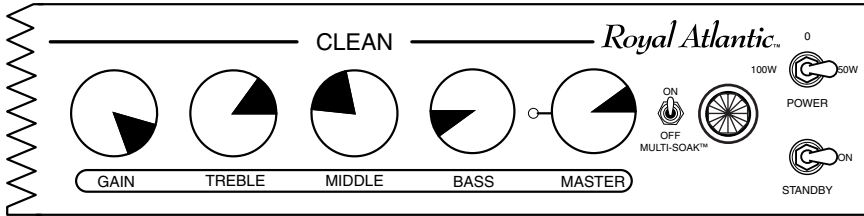


Clipped Clean, Rock Lead, Ridiculous Gain

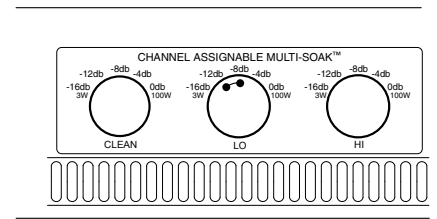
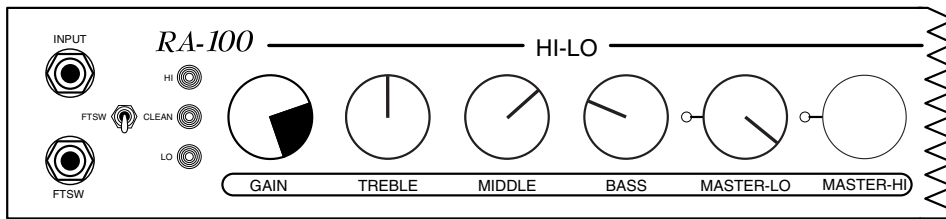


INDIVIDUAL MULTI-SOAK™ SAMPLE SETTINGS

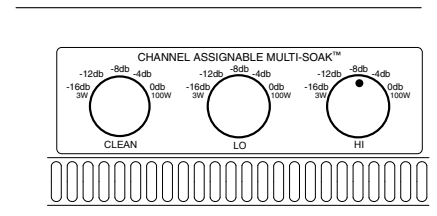
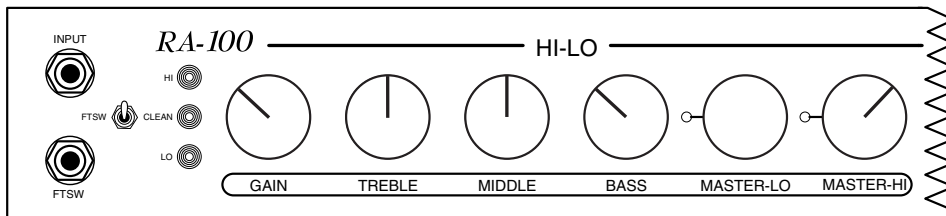
Power Drive Clean



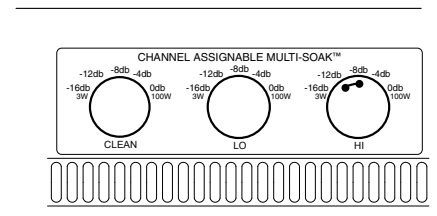
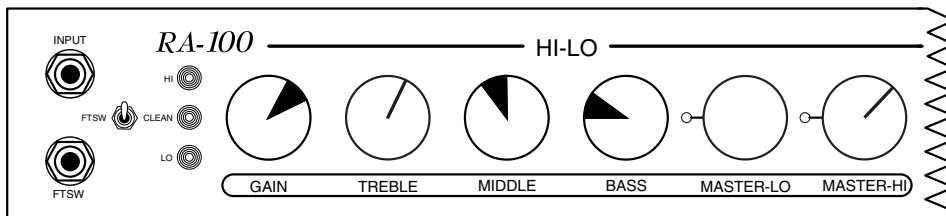
LO Power-Solo



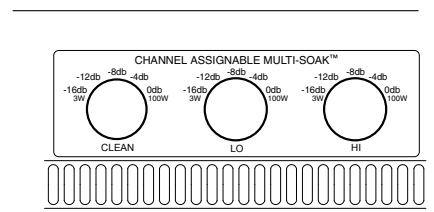
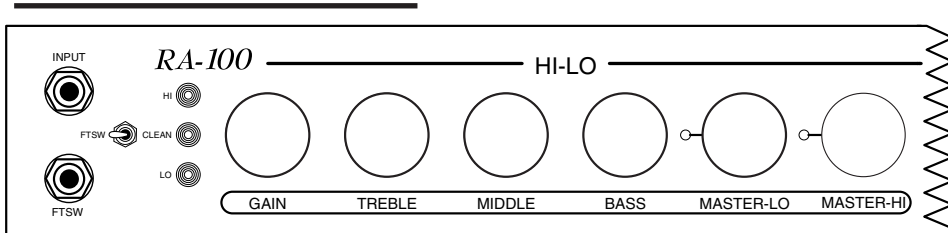
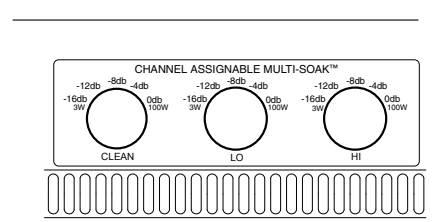
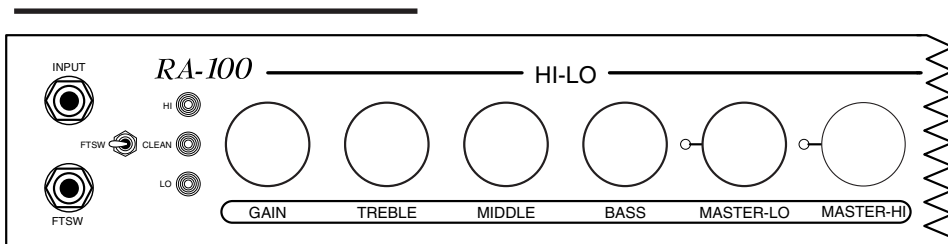
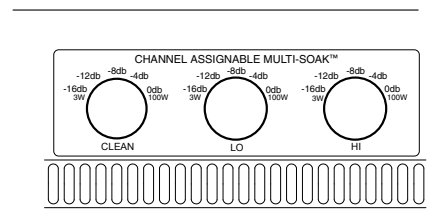
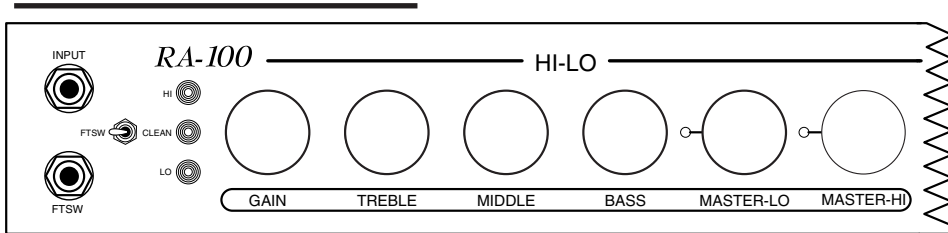
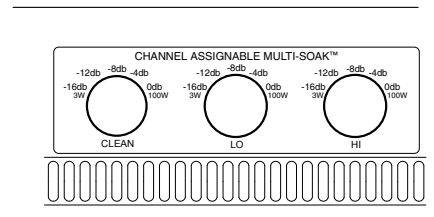
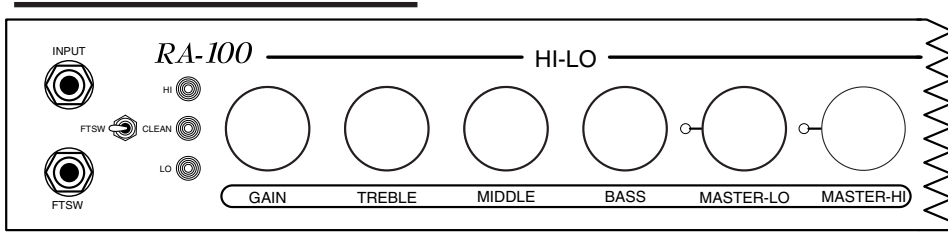
HI Power-Drive



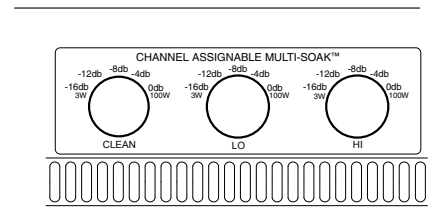
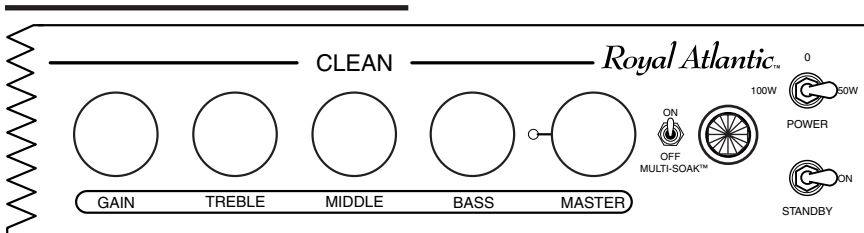
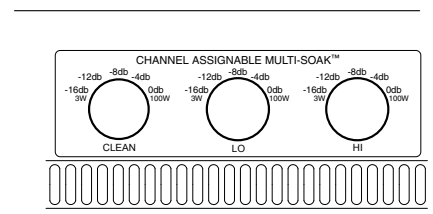
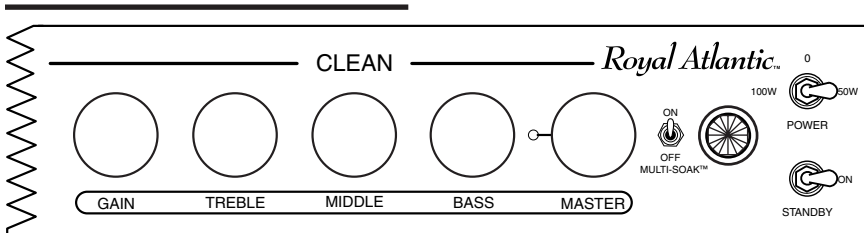
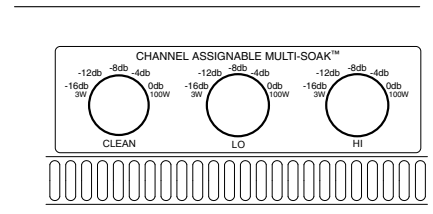
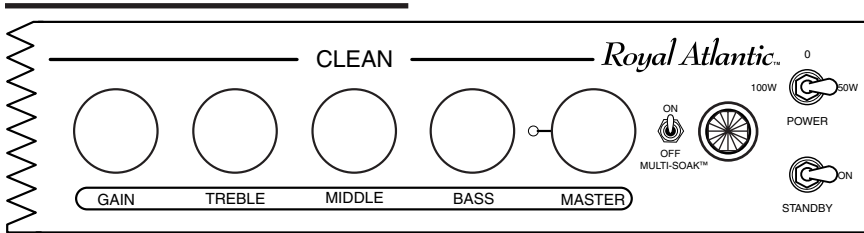
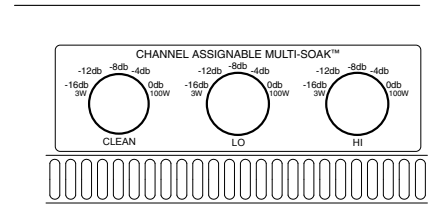
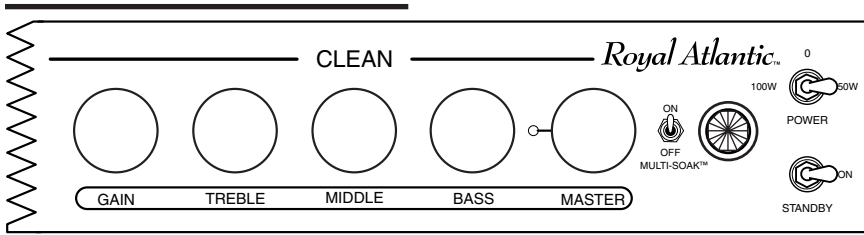
HI Liquid Gain



USER SETTINGS



USER SETTINGS



TUBE NOISE & MICROPHONICS:

You may occasionally experience some form of tube noise or microphonics. Certainly no cause for alarm, this quirky behavior comes with the territory and the Tone. Much like changing a light bulb, you don't need a technician to cure these types of minor user serviceable annoyances and in fact, you'll be amazed at how easy it is to cure tube problems...by simply swapping out a pre-amp or power tube!

First may we suggest that you set the amplifier up on something so that you can get to the tubes comfortably without having to bend down. It also helps to have adequate lighting as you will need to see the tube sockets clearly to swap tubes. **Use caution and common sense when touching the tubes after the amplifier has been on as they may be extremely hot!** If they are hot and you don't want to wait for them to cool off, try grasping them with a rag and also note that the glass down around the bulbous silvery tip is considerably less hot which makes it easier to handle. Gently rock the tube back and forth as you pull it away from its socket.

DIAGNOSING POWER TUBE FAILURE:

There are two main types of tube faults: shorts and noise. Both large and small tubes may fall prey to either of these problems but diagnosis and remedy is usually simple.

If a fuse blows, the problem is most likely a shorted power tube and shorts can either be mild or severe. In a mildly shorted tube the electron flow has overcome the control grid and excess current flows to the plate. You will usually hear the amp become distorted and begin to hum slightly. If this occurs, quickly look at the power tubes as you switch the amp to STANDBY and try to identify one as glowing red hot. It is likely that two of a pair will be glowing since the "shorted" tube will pull down the bias for its adjacent mates, but one tube may be glowing hotter — and that one is the culprit. The other two are often fine — unless they've been glowing bright red for several minutes.

Because there is no physical short inside the tube (just electrons rioting out of control) merely switching to STANDBY for a few moments then back to ON will usually cure the problem...at least temporarily. Watch the tubes carefully now. Should the problem recur, the intermittent tube will visibly start to over heat before the others and thus it can be identified. It should be replaced with one from the same color batch, shown on its label. Call us and we will send one out to you.

The severe short is not nearly so benign. In the worst cases, a major arcing short occurs between the plate and the cathode with visible lightning inside the glass and a major noise through the speaker. If this is seen to happen, IMMEDIATELY turn the amp to STANDBY. By this time the fuse probably will have blown. Such a short is usually caused by a physical breakdown inside the tube including contaminate coming loose or physical contact (or near contact) between the elements. Replace it and the fuse with the proper slo-blo type and power up the amp using the power up procedure as we described earlier in this manual.

TUBE NOISE:

Often caused by contamination within in a tube, the culprit can usually be identified, and by lightly tapping on the glass, you will probably hear the noise change. Hearing some noise through the speakers while tapping on the 12AX7's is normal however. And the one nearer the INPUT will always sound louder because its output is being further amplified by the second 12AX7.

The power tubes should be all but quiet when they are tapped. If crackling or hissing changes with the tapping, you have probably found the problem. To confirm a noisy power tube, merely put the amplifier on Standby, remove it from its socket and turn it back on. It will cause no damage to run the amplifier briefly with one power tube missing. You may notice a slight background hum, however, as the push-pull becomes unbalanced. Whenever you are trying to diagnose a suspect tube, keep your other hand on the POWER and STANDBY switches ready to shut them off instantly in the unlikely case you provoke a major short.

If you think you've located a problem tube but aren't sure, we recommend substituting the suspect with a new one just to be sure of your diagnoses. You will be doing yourself and us a big favor by just following the simple guidelines previously mentioned regarding tube replacement. You'll probably be successful with much less effort than is required to disconnect everything and haul the unit to a technician who will basically perform the same simple tests. If the tubes are still within their six-month warranty period, we will happily send you a replacement. Just note the color designation on the tube label so that we can send you the appropriate match.

DIAGNOSING PRE-AMP TUBE PROBLEMS:

Because your amplifier is an all tube design, it is quite possible that you will at some point experience minor pre-amp tube noise. Rest assured - this is no cause for alarm and you can take care of the problem yourself in a matter of minutes by simply swapping tubes.

Let us begin by saying; It is a "very good" idea to keep at least a couple of spare pre-amp tubes on hand at all times to insure uninterrupted performance. These minor pre-amp tube problems can take many forms but can generally be described in two categories: Noise and Microphonics. Noise can be in the form of crackling, sputtering, white noise/hiss and/or hum. Microphonic problems usually appear in the form of a ringing or high pitched squealing that gets worse as the gain or volume is increased thus are more noticeable in the higher gain "HI" modes. Microphonic problems are easily identified because the problem is still present even with the instruments' volume off or unplugged altogether - unlike pick-up feedback which ceases as the instrument is turned down. Microphonic noise is caused by mechanical vibration and shock: think of banging a microphone around and you'll understand where the word came from.

The best way to approach a pre-amp tube problem is to see if it occurs only in one specific mode or channel. This should lead you to the tube needing replacement. Then all that remains is to swap the suspect tube for a known good performer. If you cannot narrow down the trouble to a specific mode or channel, the problem may be the small tube that drives the power tubes which is operational in all modes and channels. Though rare, a problem with the driver tube would show up in all aspects of performance - so if you can't narrow the problem down to being mode or channel specific, you may want to try replacing the driver tube. Driver problems generally show themselves in the form of crackling or hum in all modes of performance and/or weak overall output from the amplifier. Occasionally an anemic driver tube will cause the amplifier to sound flat and lifeless, but this is somewhat uncommon, as worn power tubes are a more likely suspect for this type of problem.

Sometimes making the diagnosis is more trouble than it's worth and it's faster and easier to merely replace the small pre-amp tubes ONE AT A TIME with a replacement known to be good. But MAKE SURE you keep returning the tubes to their original socket until you hit the one that cures the problem. You'll notice that tubes located nearer to the INPUT jack always sound noisier...but this is because they are at the start of the chain and their noise gets amplified over and over by the tubes that follow. The tube that goes into this "input socket" (usually labeled V1) needs to be the least noisy of the bunch. The tube that goes at the end of the preamp chain - just ahead of the power tubes - can be quite noisy without causing any problem at all. The tubes in your amp have already been located in the most appropriate sockets and this is why you should NEVER pull them all out at once and ALWAYS swap them one at a time. ALWAYS return a perfectly good tube to its original socket. Also it's a good idea to put the amp on STANDBY when swapping tubes to reduce the heat build up in the tubes themselves and to prevent explosive noises (which can still occur even if you are pulling the tubes away from their sockets gently) from coming through the speaker.

Remember, take your time, be patient and chances are real good that you can fix your amp yourself by finding and replacing the bad tube. It kills us to see someone who has shipped their amp back to us...and all it needed was a simple tube replacement! If you must send back your amp, remove the chassis from the cabinet by unscrewing the four mounting bolts on the bottom top. The chassis then slides back like a drawer and comes out from the back. Remove the big power tubes and mark them according to their location from left to right 1, 2 etc. They need to be wrapped separately with plenty of wadded up newspaper around them and put in a smaller box within the larger carton. Remove the Rectifier tubes and wrap them also. You can leave the preamp tubes in or remove them and wrap them separately being sure to label their location. (See Tube Task Chart.)

To wrap the chassis, use plenty of tightly wadded up newspaper so there is at least six inches of "crush space" between the chassis and the cardboard box. Bubble wrap also works well, but please DON'T use styrene peanuts - they will shift during transit and get lodged inside your electronics as well as allowing your amp to end up at the bottom of the box unprotected and possibly damaged.

Pre-amp tubes don't normally wear out as a rule. Therefore, it is not a good idea to change them just for the sake of changing them. If there isn't a problem - don't fix it. If there is no result from your substitutions, it may be possible that you have more than one problematic tube. Though rare, this does happen and though it makes the troubleshooting process a little more intimidating, it is still possible to cure the problem yourself.

NOTE: *It is normal to hear a slight metallic ringing sound when tapping on the preamp tubes. As long as the tube does not break into oscillation or start crackling or any other form of bizarre noise, it is considered normal and functional.*

BIAS ADJUSTMENT: (Part of a continuing series)

An Article written by Randall Smith that we thought you might find interesting.

Here's a question we often hear:

"Why doesn't *Mesa* put bias adjustments in their amplifiers?"

Well, there's a short answer and a long answer to this question.

The short answer is that during my 12 years of repairing Fenders, one of the most frequent problems I saw was bias controls that were either set wrong or that had wandered out of adjustment due to vibration. As any honest tech will tell you, there's lot's of easy money to be made by sprinkling "holy water" on amplifiers ... uh, what I meant to say is "Your amp needed biasing." See what I mean? What customer is going to argue with that?

It only takes a moment and a volt meter: The Fender diagram shows how: "Adjust this trim pot for - 52 volts." That's it. Nothing more.

Now don't be fooled into thinking that tubes "draw" more or less bias, they don't. The way a bias supply is connected to a tube is akin to a dead end road, it just trails off to nowhere without really completing a circuit. It's a static voltage and regardless of what tube is in the socket — or even if the tubes aren't plugged in at all, it doesn't change the bias voltage a bit.

So the end of the short answer is this: Since a bias supply needs to put out the right voltage and never vary, I wanted to build amplifiers that were individually hard wired to the correct values and NEVER needed adjustment. And for 25 years, that's how *MESA/Boogies* have been built.

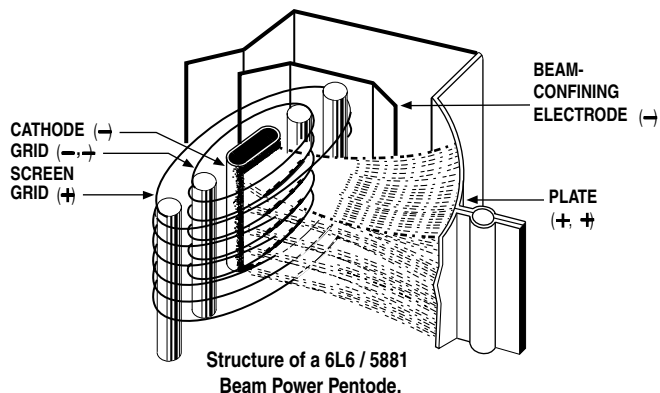
Time to change tubes? Just plug our tubes into any one of our amps and you're DONE. No tech needed. NO bills and no BS about biasing. And most important: The bias is RIGHT because it can't change!

Now, you want the long answer? Here's more information on how our hard-wired bias avoids trouble. Please read on.

But first, let's make an important distinction. Our business is designing and building high performance amplifiers. And for this we need tubes whose variance is within a narrow range. Our warehouse is full of rejects ...oh, they work — they just don't perform within our tolerance range. We have a very sophisticated computer - based tube testing system (nicknamed "Robotube") that matches and measures tubes over seven important parameters. It can even predict which tubes are likely to have a shortened lifetime — even though they work perfectly during the test.

Because our business is building quality amps, we can afford to reject a lot of wayward tubes. The guys you hear complaining because *Boogies* don't have bias adjusters are primarily in the business of selling tubes - not amps. They don't want to throw away 30 percent of their inventory, so they promote the idea that tubes outside our parameters can be used to "customize" amplifiers and they criticize us because our amps can't be adjusted to accommodate their out-of-*MESA* tolerance tubes.

Now you might be thinking, "But I thought you just said that tubes don't "draw" bias, therefore they don't effect the bias supply and thus it doesn't need to be adjustable." When you set the bias (whether it's by selecting the right resistors, as we do, or adjusting a trimmer — which is quicker) what you are doing is establishing the correct amount of idle CURRENT that flows through the power tubes. But you can't adjust the current directly, you can only change it by adjusting the amount of bias VOLTAGE that goes onto the tubes'



BIAS ADJUSTMENT: *(Continued)* control grids. Voltage and current are NOT the same. Current is the AMOUNT of electricity, the “quantity” — and is measured in amperes. Voltage is the degree of electric charge — like the “pressure” to use the old water analogy. Let me illustrate how different voltage and current are:

When you scrape your feet across a carpeted floor in dry, wintery conditions, your body can become charged with 50,000 to 100,000 volts of static electricity. And when you reach for the door knob, a spark jumps and you feel it! The voltage is super high but the current (measured in micro-amps) is tiny - otherwise you would die from electrocution.

Contrast this with your car battery, which puts out a mere 12 volts. You can lay your hands right across the terminals and not feel a thing. Yet the amount of current available can run to several hundred amperes .. enough to turn over a cold engine and get it started.

So current and voltage are two totally separate electrical parameters — though when you multiply them together, you get POWER, which is measured in watts.

When you set the bias of an amplifier, you are adjusting the static VOLTAGE at the control grid of the tube in order to produce a desired amount of idle CURRENT flowing to the tube’s plate. A small change in grid voltage, produces a large change in the amount of current flowing — and that’s basically how a tube works. Say that again because it’s super important: A small change in voltage at the grid causes a large change in current flowing to the plate. See, that’s the essence of amplification: A small change causing a large change. And here it’s a small voltage change causing a large current change.

The bias conditions are what determines how much current flows through the big power tubes when you’re not playing. And what drives your speakers is fluctuations in that current flow when you ARE playing. If the amount of current increases and decreases 440 times per second, then you’ll hear an A note. If the fluctuations in current flow are large and still at 440 per second, you’ll hear an A that is LOUD!

But for purposes of biasing, it’s the amount of “plate current” flowing with no signal applied that’s important. Unfortunately current is hard to measure because the circuit must be interrupted — as in “cut the wire” — and the meter spliced “in series” with the broken circuit. But measuring VOLTAGE is easy. It is not necessary to interrupt the circuit because a voltage reading can be taken in PARALLEL with the circuit intact.

Thus, as a matter of convenience, most bias settings are given in volts at the grid ... even though current through the plate is the important factor. In fact plate current is so inconvenient (and dangerous) to measure that Fender doesn’t even state what the correct value should be. They only give the grid voltage that will produce that current. (That’s the minus 52.) But that only happens if the tubes being used are “in spec.”

As long as the tubes ARE “in spec”, the right bias voltage will always give the correct plate “CURRENT” — but then there’s no need for the bias voltage to be adjustable!

If the tubes are NOT in spec, then the only proper way to re-set the bias is to cut the circuit and measure the current while adjusting the bias ... but no manufacturer I know even STATES the desired current value! Be that as it may, when the original bias voltage is altered far enough, it will compensate for the tube’s abnormal performance and the correct amount of idle current flow may then be restored. Clearly this is something most repair techs should not attempt.

Some newer amps have LED indicators connected to the circuit which will turn on when the right threshold of current flow has been reached. This is an improvement, and almost worthy if you’re willing to accept resistors and lights added into your amplifier’s audio path — which we aren’t.

The other “advantage” of this system is that it allows some amp manufacturers to avoid matching their power tubes. The thinking is that adjusting the bias to each tube separately eradicates the inherent differences between the tubes by insuring that the same current flows through each one.

BIAS ADJUSTMENT: *(Continued)* Again, this has some merit .. but it's still not as good as using tubes that are matched in the first place because compensating for the mismatch causes the push-pull circuit itself to become unbalanced. Two wrongs don't really make a right.

Some of the other recommended biasing, "methods" — such as -".. tubes running red hot, increase the bias .. sounds harsh and runs too cool, turn it down ..." are guesswork at best. Luckily, one of the great things about tube amps is that they can usually stand some abuse without causing any real harm ... at least not immediately. But don't these alterations imply that you are second-guessing the amp designer and that there's a better set of operating conditions that the designer missed but the tube sellers have discovered?

Now some players may like the sound of their amp altered by tubes with extreme characteristics and with the bias set to help compensate. But often it is the mere novelty of change that they're really responding to and when the amp goes back to the proper original way, we've seen them be far happier still!

Because every part in every one of our designs has been meticulously evaluated, compared and stressed over — no matter how seemingly insignificant it might be. And with every design we look for a "sweet spot" where all the parameters — including the bias — come together to give the best sonic performance, consistently and reliably. Every part and voltage is important — yet no one complains that these other parameters aren't available for tinkering.

Consider our patented *Simul-Class* circuitry where there are two different bias voltages used for separate pairs of power tubes ... and changing one voltage also changes the other. Great care goes into getting this just right and we think we'd be asking for trouble to have it adjustable for the world to play with ... unless you like paying to have your amp messed up. Sorry, I meant to say, "Uh, ... your amp needed biasing."

If that doesn't appeal to you, then merely plug a matched set of *MESA* tubes into one of our amps and you're ready for tone. Guaranteed. You'd be amazed at the number of service calls we field every day that lead to a diagnosis of out-of-tolerance, non-spec tube problems. To think these would be prevented by including a bias adjustment is something of an insult to you and us. If you put the wrong size tires on your car, do you think changing the pressure will make them right?

Please, don't think this is a blanket indictment of the other guys selling tubes — it isn't. And their tubes aren't all bad either. It just doesn't make sense to pay more of your hard earned cash for tubes that were probably made in the same Russian or Chinese factory and which have the possibility of being outside the performance window we select for your amp. And it pains us to hear the hype and mystique built up around biasing when twenty-five years of evidence affirms our decision to make bias circuits that "never need adjustment". How much money and trouble that has saved *MESA/Boogie* players you couldn't estimate.

Our rigorously tested and hand selected tubes are available at your nearest *MESA/Boogie* Pro Center or from us directly. Nobody offers better price, quality or warranty than we do ... so why swerve?

Next time we'll talk about our part in developing the great Sylvania STR 415 type 6L6 and how we're on the verge of seeing something fairly close reappear on the market. Remember, we still have some of these super rugged mondo-bottles available for older amps — *Boogies* only please! Until then, Relax, Breathe and Nourish your soul!

Cheers!

MESA/Boogie Ltd.

SPEAKER IMPEDANCE MATCHING & HOOK-UP GUIDE:

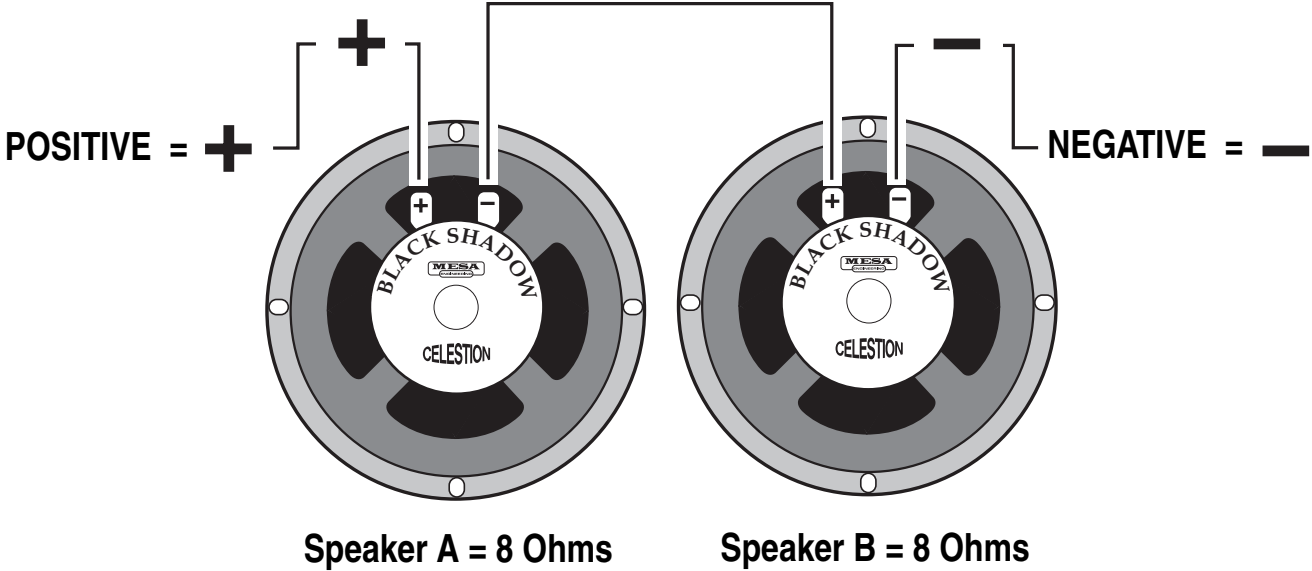
IMPEDANCE: Wiring up speakers to provide the most effective load and making sure that all of them are in phase will help in creating the best sound possible. This is not too difficult, as long as you understand a few things about loading and how to connect your speakers to provide an optimal resistive load.

MESA/Boogie amplifiers can handle 4 and 8 ohms effectively. Never run below 4 ohms in a tube amplifier unless you are absolutely certain that the system can handle it properly; this can cause damage to the Output transformer. A few amplifiers can handle 2 ohms effectively without damaging them (for example the *MESA'S Bass 400+*). You can always have a higher resistance (16 ohms, for example) without damaging results, but too low of a resistance will likely cause problems.

MIS-MATCHING: When running a higher resistance (for example: 8 ohm output into 16 ohm cabinet), a slightly different feel and response will be eminent. A slight mismatch can provide a darker smoother tone with a little less output and attack. This response is a result of the amplifier running a bit cooler. Sometimes when using more than one cabinet a mismatch will be the only option.

WHAT IS MY CABINETS IMPEDANCE: If you have only a single speaker, you just match that single speakers impedance to the amplifier, and you are done. In many cases, you will have a number of speakers, and then you must calculate the "load" that the amplifier will need to support. There are generally three ways to wire multiple speakers together. They are as follows:

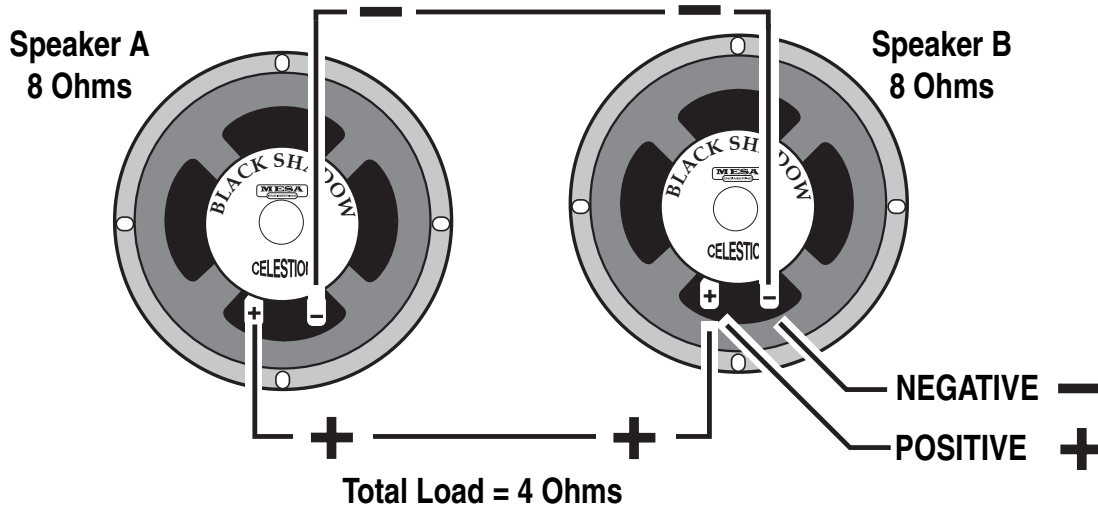
SERIES: When you wire (hook-up) speakers in Series, the speakers resistance (as measured in ohms) is additive - i.e. putting two 8 ohm speakers in Series results in a 16 ohm load.



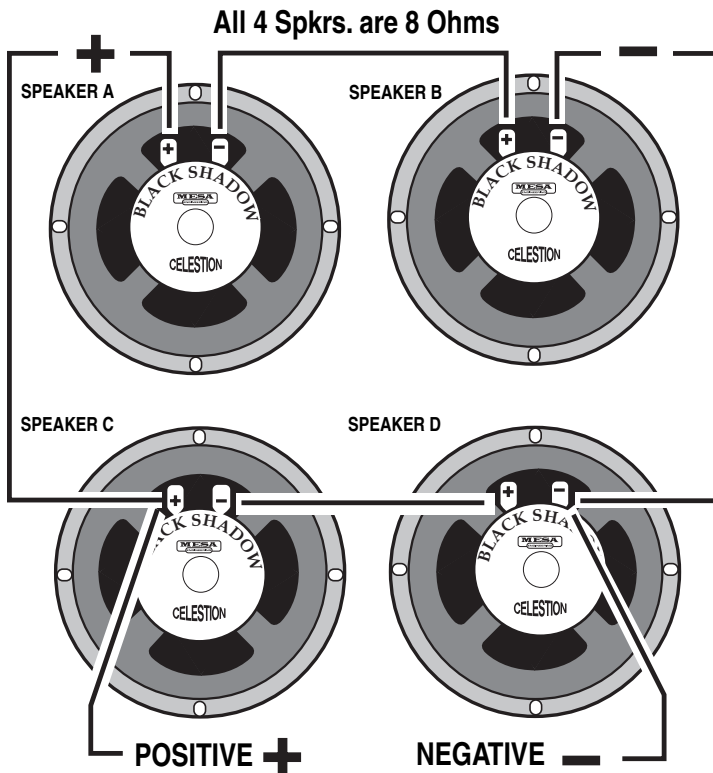
SERIES: Connect the Negative side of Speaker A to the Positive side of Speaker B

SPEAKER IMPEDANCE MATCHING & HOOK-UP GUIDE: (Continued)

PARALLEL: When wiring in parallel, the resistance of the speakers decreases. Two 8 ohm speakers wired in (hooked-up) Parallel results in a 4 ohm load. It's easy to calculate the effect of a resistive load when all the speakers are all the same resistance. It is really not suggested to wire different resistive load values in Parallel (8 and 4, 16 and 8 etc.) The formula for figuring the total impedance in Parallel is the multiplication of the two loads divided by the sum of the two loads - i.e. putting two 8 ohm speakers in Parallel results in a 4 ohm load. Connect the Positive side of Speaker A to the Positive side of Speaker B - Connect the Negative side of Speaker A to the Negative side of Speaker B.



COMBINATION OF SERIES & PARALLEL: This is really just two sets of Series wired speakers connected in Parallel. This is how you maintain a consistent load with multiple speakers. The importance of this is more evident when you have more than one cabinet to connect to your amplifier. This is when you need to figure out the loads and how to wire them up without applying too low of a resistance on the amplifier.



Simply connect the Positive side of Speaker A to the Positive side of Speaker C.

Connect the Negative side of Speaker A to the Positive side of Speaker B. Next, connect the Negative side of Speaker C to the Positive side of Speaker D.

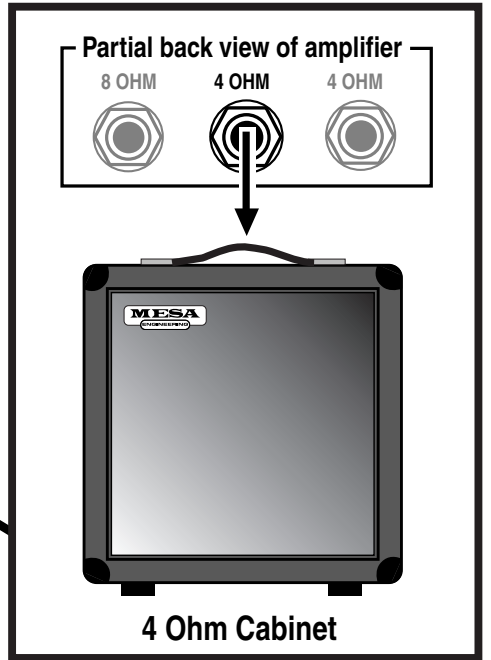
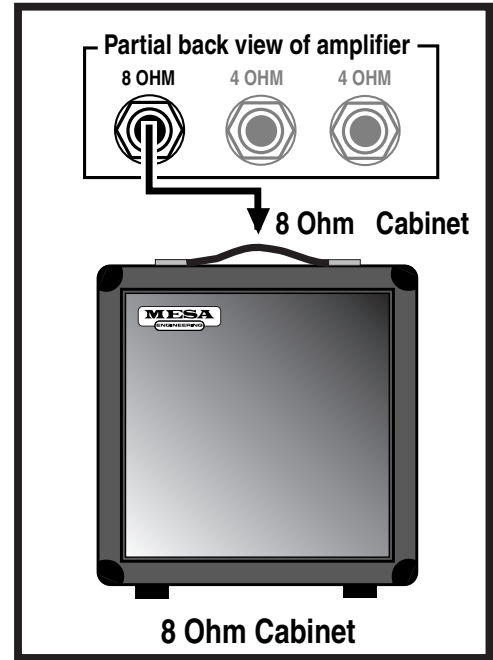
And lastly, connect the Negative side of Speaker B to the Negative side of Speaker D.

4 Eight (8) Ohm speakers wired in Series Parallel = a Total Load of 8 Ohms.

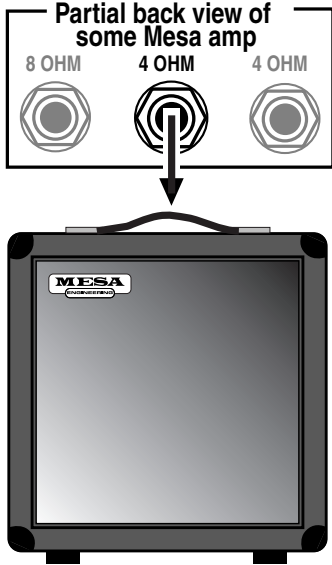
WIRING SCHEMES...Amplifier to Speaker Cabinets

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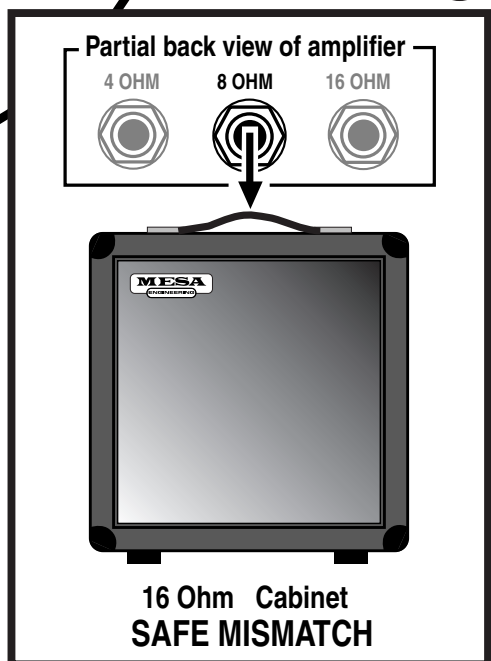
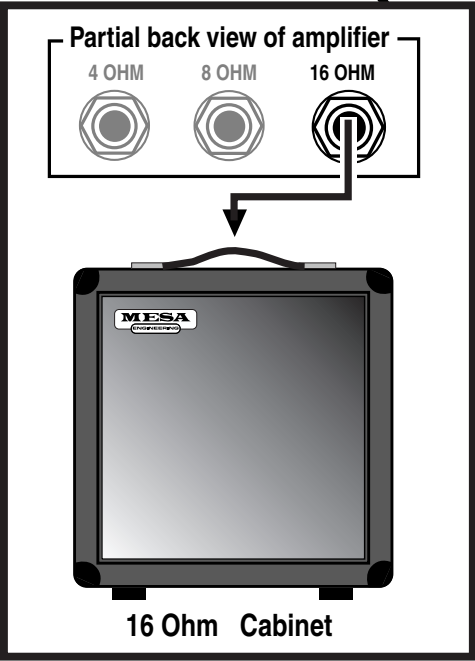


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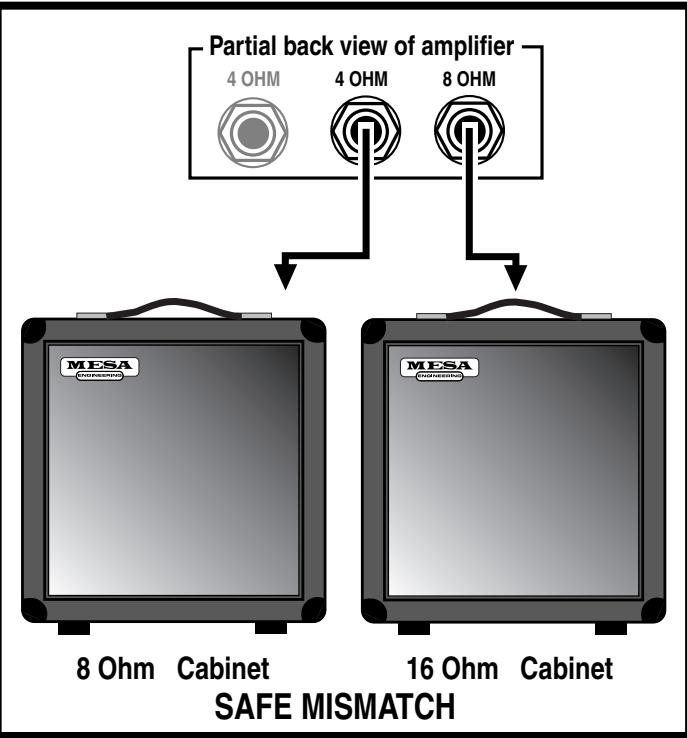
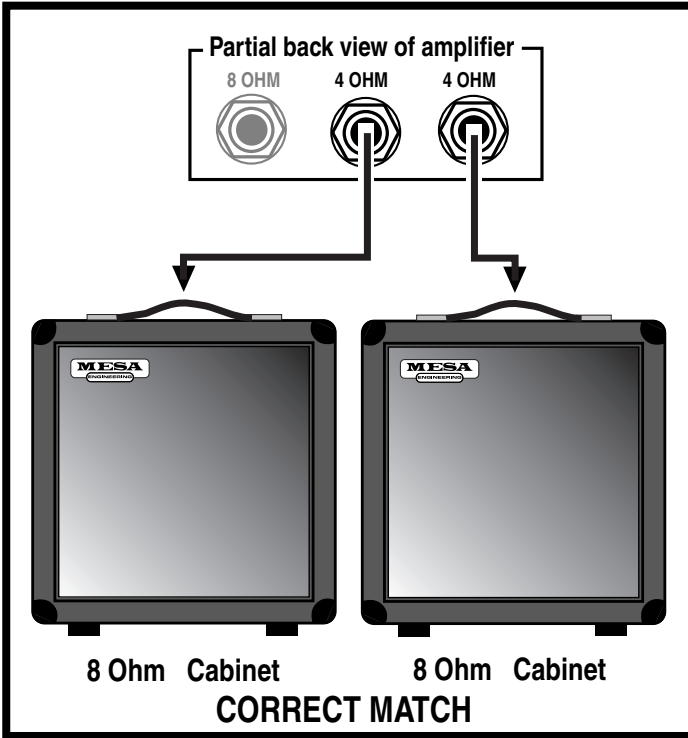
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WIRING SCHEMES...Amplifier to Speaker Cabinets

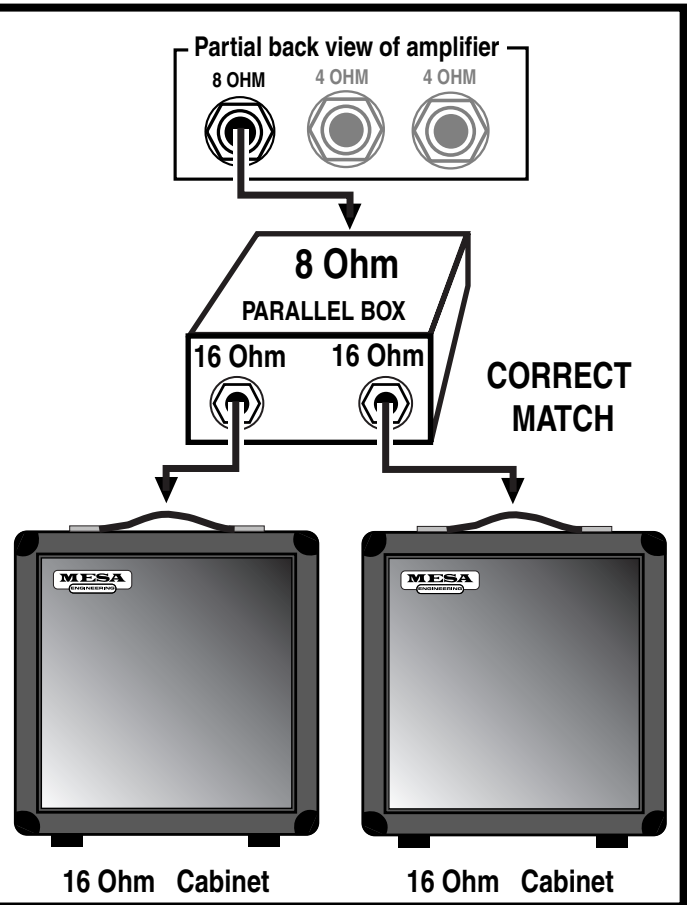
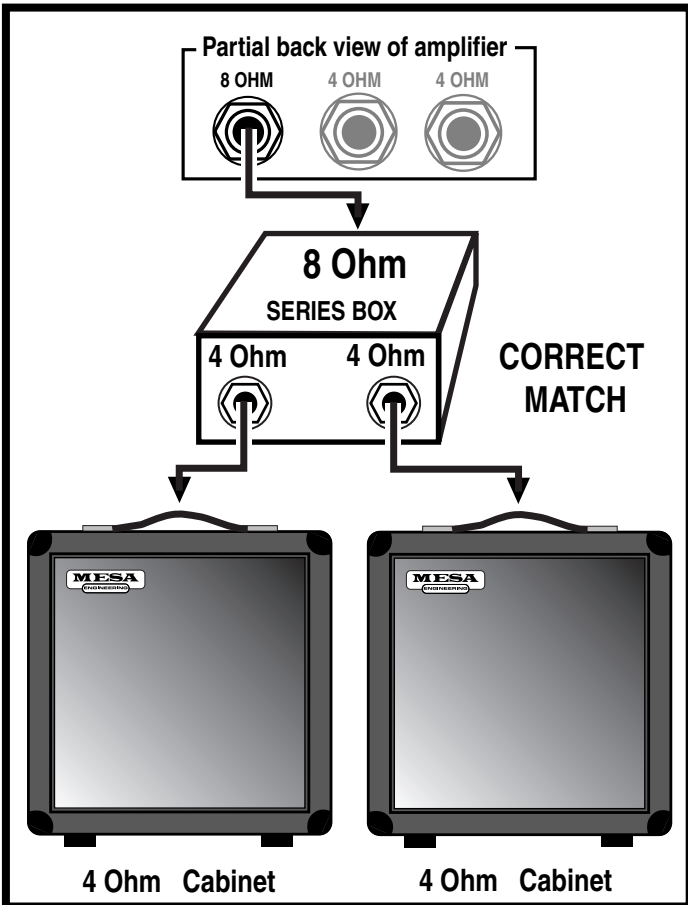
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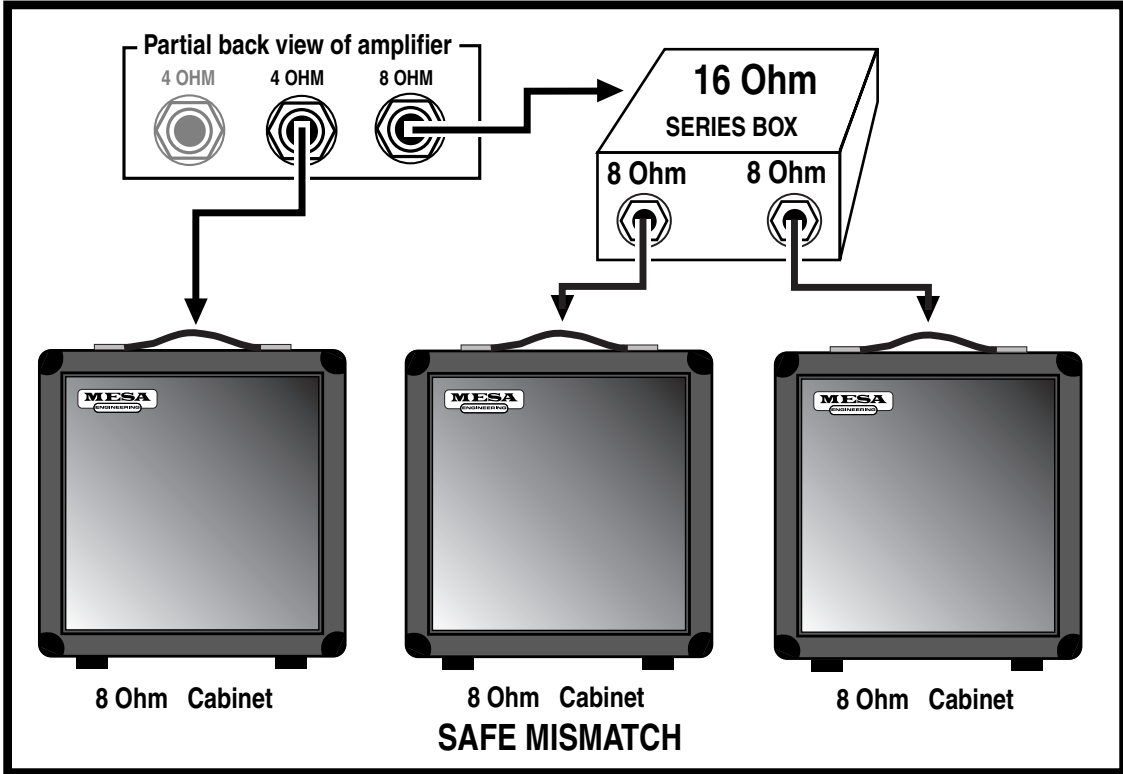
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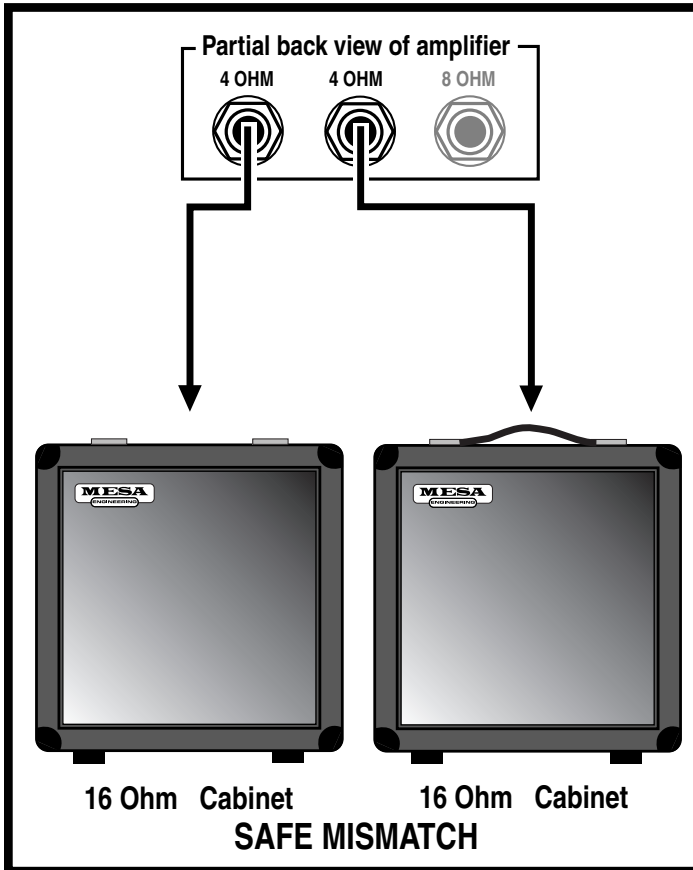


WIRING SCHEMES...Amplifier to Speaker Cabinets

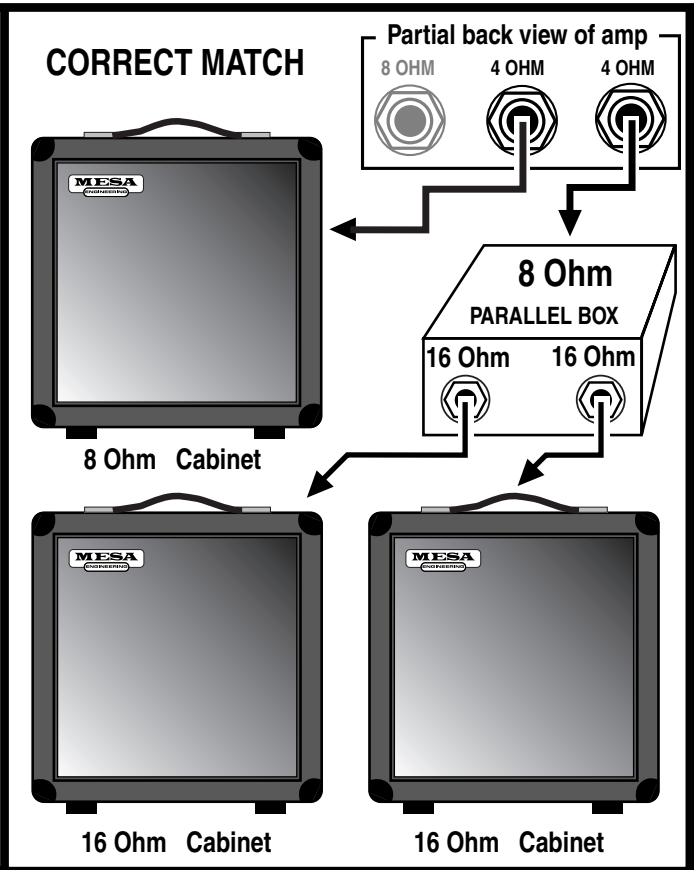
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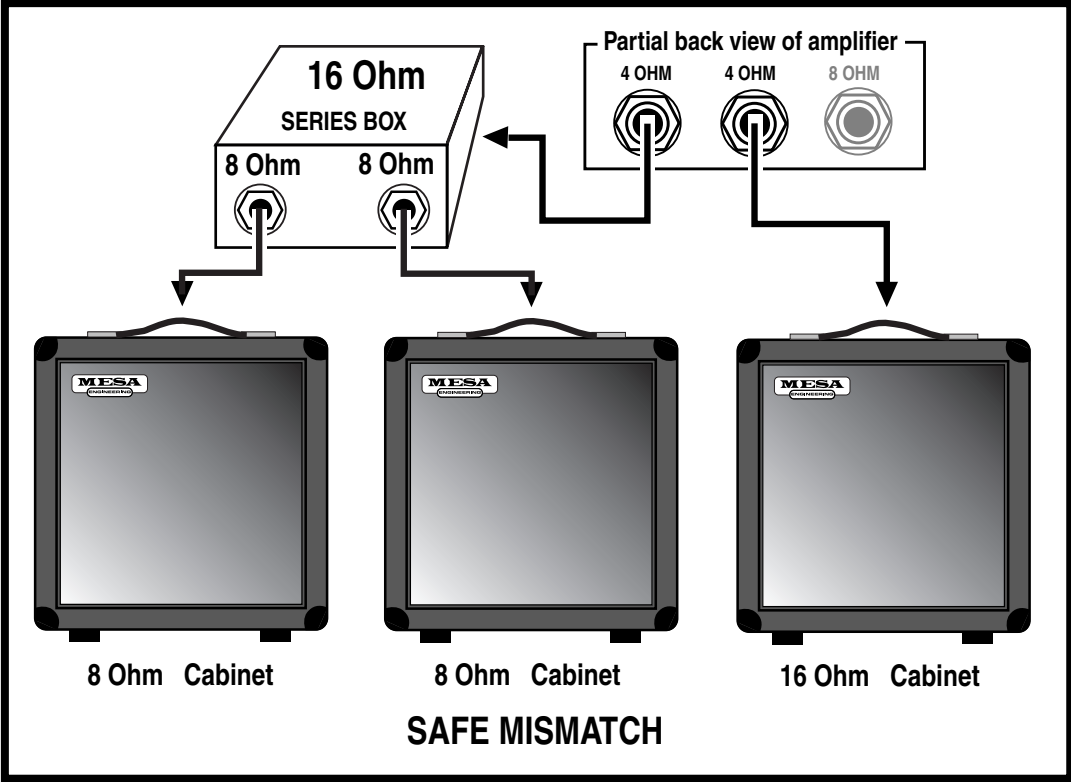


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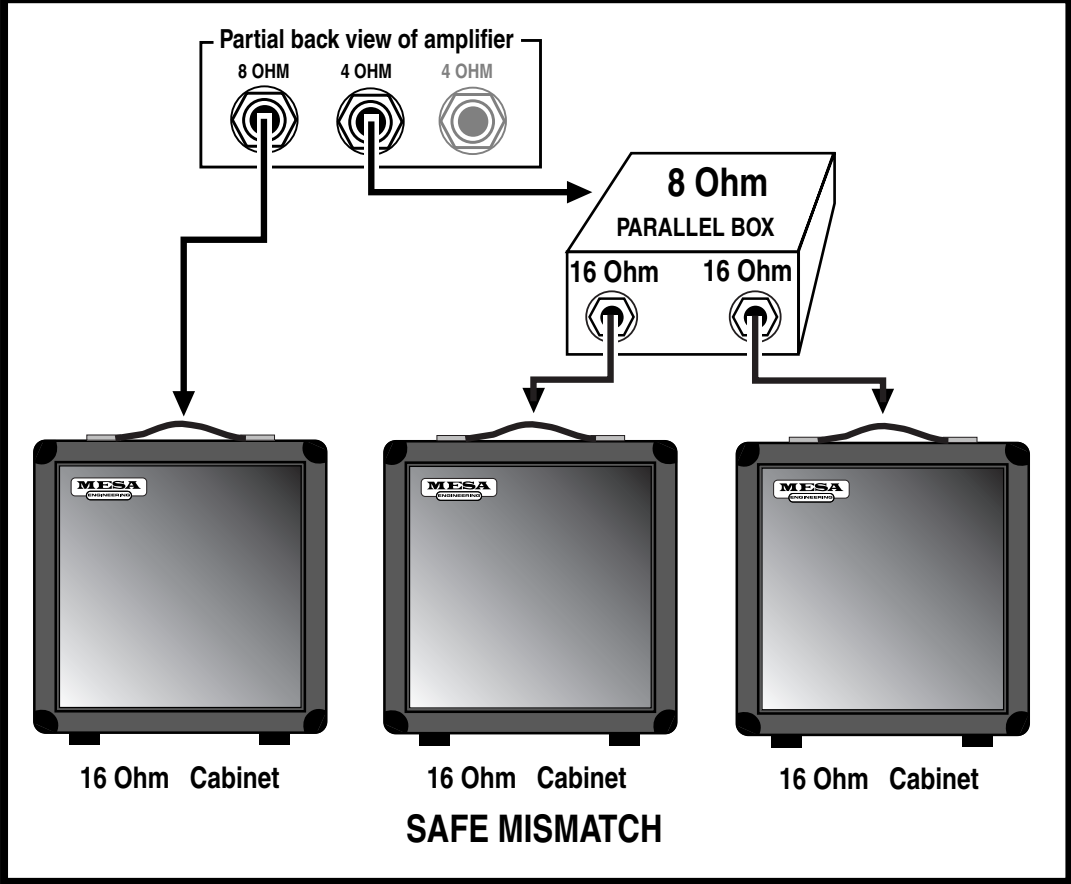


WIRING SCHEMES...Amplifier to Speaker Cabinets

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ON TRIODES, PENTODES & IRISHMEN:

With apologies to Friends and Relatives from the Emerald Isle - who will make their appearance soon enough - the humor which follows is dedicated to the memories of Spec McAuliff and Fae (Rafael) McNally, two of the True Greats.

As their numerical references suggest, the terms Diode, Triode and Pentode indicate the number of elements within the vacuum tube i.e. two, three or five. All tubes also require a filament or heater which is not included in the count. Its purpose is to excite electrons from the cathode coating by raising the temperature such that they are able to boil out of the electron-rich coating material and form a cloud of free electrons in the vacuum space surrounding the cathode.

Although the term filament and heater are often used interchangeably, there are specific differences: A filament is a directly heated cathode where cathode coating is applied directly to the heating element. Examples are 5U4 twin diode rectifier and 300B triode amplifier tubes. A heater, on the other hand, is a heating element which is separate from the cathode and is usually inserted within the tubular cathode sleeve. Examples are 12AX7 twin triode amplifier and 6V6 or EL84 beam power pentode tubes. In all cases this fundamental aspect of each tube's construction is clearly visible, especially when the heating element is glowing red hot.

The cathode, then, would be considered the first numbered element because it is the source of the electrons. The word itself is from the Greek literally meaning completely down, which implies a sense of central origin - like the center of the earth where Tone begins. It might be said that an ecstatic audiophile experiences a positive catharsis, his soul being purified when his system transports him to Audio Nirvana. The only trouble with taking this positive imagery too far is that the cathode is, unfortunately, negative... at least electrically speaking. However this is easily remembered since virtually all musicians and audiophiles have also experienced the more common negative catharsis when they emerge from the emotional rebirth kicking and screaming in rage and frustration.

Once heated, the intrinsically negative electrons are energetic little fellows of almost no mass. Thus they may be accelerated almost instantaneously and will travel through a vacuum a nearly the speed of light. Being of like, negative charge, they tend to repel one another and thus within the electron cloud surrounding the cathode, there is much jostling and elbowing as each one tries to maintain his distance from all the others... unless there is a strong and universal attraction from an outside influence.

Visualize, if you will, a group of sub-atomic Irishmen milling about and in a repellent, negative state of mind. All are scowling and none wants to have anything to do with the other. Now introduce a strong attraction say, a public bar, and you can easily picture an orderly, if rapid movement of the lot in a single direction. This is what happens when a positively charged element called the anode or plate is introduced into the vacuum.

The plate is the large metal element most prominently visible through the glass of an electron tube. It is the outermost element of a tube's structure and it surrounds all the others. The cathode is at the center radiating electrons outwards. As higher and higher positive voltage is applied to the plate, the attraction for the electrons surrounding the cathode is increased and with nothing standing in the way, full uninhibited flow to the plate occurs... sort of like removing the doors and offering free drinks to the crowd of surly Irishmen milling around outside. As electrons flow to the plate, the space charge will continually be replenished by further 'boiling' of the hot, electron-rich cathode as you can easily imagine other Irishmen impatiently taking up the places of those who've gone inside - until the entire village is deserted.

Now, where do they come from and how do they emerge? Well, a grand and elegant lady once showed me how to revive flat champagne: She dropped a raisin into the glass. There was a dramatic and immediate increase in effervescence with the introduction of a cathoding surface. Thousands of tiny bubbles suddenly appeared - and continued to flow from the raisin. Of course the bubbles were made up of gas dissolved in the beverage, but the analogy makes it easy to visualize the loosely bound electrons dissolved in the rich cathode coating as they effervesce from its heated surface.

But back to the electron flow. If the electrons are strongly attracted to a positively charged plate, then it follows that they are strongly repelled by a negatively charged plate and they are. Thus, if an alternating current - such as comes from a transformer - is applied to the plate, electrons will flow only during the times when the plate is positively charged. During periods of negative plate charge, electron flow is stopped and the space charge of electrons remains compressed in the area around the cathode.

ON TRIODES, PENTODES & IRISHMEN: (Continued)

Thus a diode tube - one with a cathode and an anode - is mostly used to rectify alternating current into direct current by passing it without restriction, but in one direction only. This also explains why closing time is strictly enforced at Irish pubs: During normal operation, the traffic flow is similarly unimpeded and uni-directional toward the bar and this process rectifies the work-day negativity. It goes without saying that no one leaves as long as the atmosphere around the bar remains positively charged.

TRIODES:

This section is a continuing technical treatise on the workings of Irish Pubs but to make it easier for the layman to understand, it is explained in terms of vacuum tube technology. Enter the original bar - free beer and no doors. Well, it turns out that some control over the flow can be a necessary and useful advantage. This led to the invention of those swinging louvered saloon doors which are open at the top and bottom. They are patterned after the control grid of the vacuum tube, which is a loosely wound coil of thin wire located between the cathode and the plate.

In a Triode the plate is always positively charged with high voltage D.C. and even though the grid is blocking the path, those negative electrons can still FEEL the strong attraction - just as the Irishmen can see in through the louvers of the bar doors. They know what pleasures lie beyond, but to get there requires overcoming the negative influences controlling the access. This negative influence is typically called a Bias. In electronic terms that means the grid is supplied with a voltage which is slightly MORE NEGATIVE than the already negative electrons. The more negative the Bias, the more it tends to neutralize the attraction of the plate and repel the electrons back toward the cathode.

The Irish can be similarly charged with Bias, but unless you are Irish yourself, this type of Biasing may be more difficult to understand. The effect is similar though: The more negative the Bias, the more it impedes forward progress. Generally speaking though, the electronic Bias of the grid is easiest to overcome, and for two main reasons: First, the Bias is set - like the bar doors - to allow some passage. Second, the grid is mostly NOT THERE, like the louvered doors which are mostly open spaces. Unlike the plate which is solid, the grid is like a coiled bed spring. It can create a repelling field but mostly it's empty space in between widely separated windings of wire. It's very easy to control the electrons as they pass through the grid's force field: Changing the grid voltage only slightly will have an enormous effect on how much current flows through... and that's what AMPLIFICATION is: a small change in voltage at the grid causing a large change in current flowing to the plate.

The purpose of the louvered bar doors is similar to that of the grid, namely, to give momentary pause while still revealing the promise within. Hesitation mostly gives way to temptation, but there are those few stalwart Irishmen who think twice and decide to come back later. Most just pause slightly then go on through. That is the purpose of the bar doors: to prevent everyone from crowding in all at once - and as the door is made less of a barrier, wider spaces between the louvers, more of the bar's attractive influence is felt outside thus amplifying the customer flow and increasing the crowd at the bar.

PENTODES:

Occasionally though, bar doors - even the louvered type - were found to be too effective, and too many customers turned away. Something further was needed to increase the attraction of the bar and overcome the resistance created by the door. Thus the cocktail waitress was invented.

Once again the idea was inspired by the vacuum tube. It had been discovered in some tubes, often large power types, that the distance to the plate was too great to attract enough electrons past the negative influence of the control grid. So another grid coil of fine wire was inserted between the first grid and the plate. This was called the screen grid and carrying a highly positive charge, it functioned as a "bait" for the plate.

In a properly designed power tube such as an EL84 or a 6V6, the windings of the screen grid are precisely aligned to fall in the shadow of the control grid. This way the electrons responding to the pull of the screen grid are lined up in sheets as they pass between windings of the inner control grid... only to find that they have been fooled! Once past the control grid and drawn toward the screen grid, they discover...there's almost nothing there. The path they're on has them aligned to zing straight through the spaces BETWEEN screen grid windings. So rather than a close and personal encounter, they just fly on past - and once they're out that far, there's no stopping them. The influence of the plate takes over and - being solid metal and of the highest positive attraction - it is at this final destination that the electrons congregate.

PENTODES: *(Continued)*

Thus the proper cocktail waitress - visible through the louvers - is scantily clad so as to be all the more effective at reinforcing the attractive influence of her bar and by being located in between the door and the bar, she serves as bait to lure customers past the door's negative influence. Once through the door however, it is the rare Irishman who actually comes in personal contact with the cocktail waitress as, for all intents and purposes, she - like the screen grid - turns out to be a vanishing illusion. Yet, having come this far, the solid influence of the bar itself now takes over and attracts the customers to congregate, having happily reached their destination.

If you're still following this and haven't lost track of the count, you'll know we're still one element short of the five needed to make a Pentode. This last part is a pair of beam-confining shields which being negatively charged, serve to direct the flow right toward the plate. This is much the way a short entrance hall to the bar prevents wandering accidentally into the Men's room on the way.

Once at the bar though, the circuit is complete and the process of soul-nourishing works its ritual magic. Biases having been overcome, illusory nightingales having vanished, the spirits truly soar and the once surly Irishmen now are filled with warmth, wit and kindred friendship, enjoying the music and glowing nicely with their heaters on.

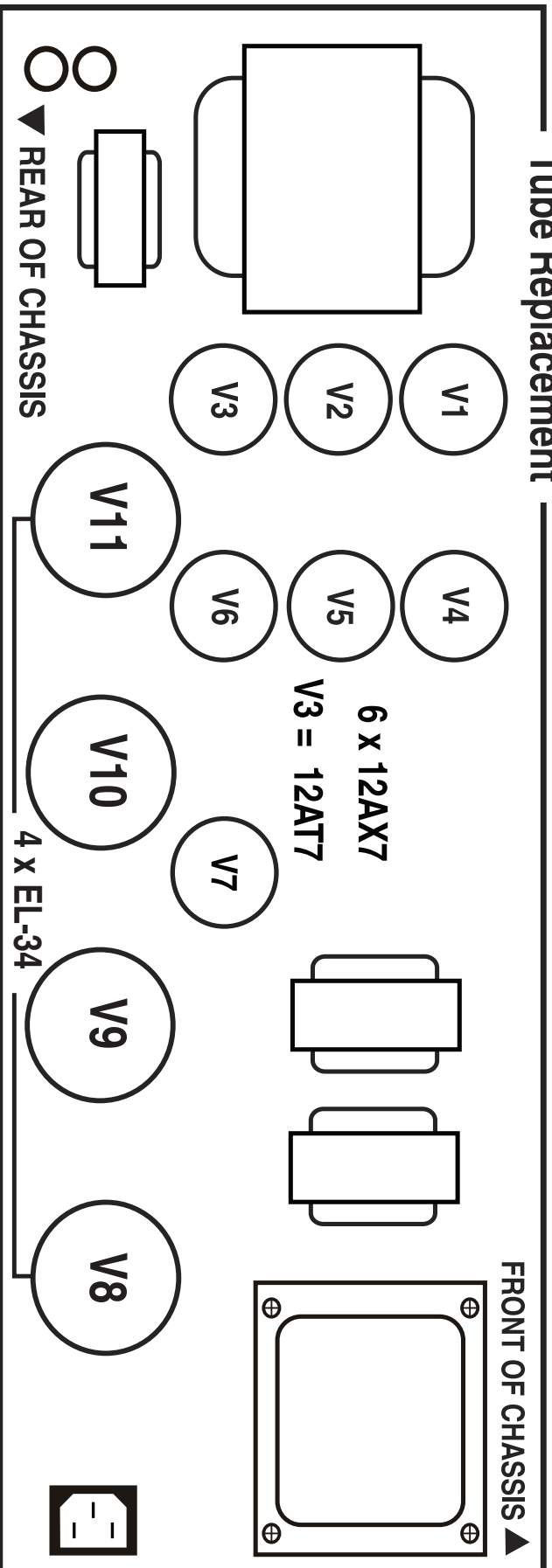
With appreciative thanks to the inhabitants of the Land of the Leprechaun, we have now concluded our little diversion into the mechanics of proper bar lay-out.

A feature article by Randall Smith
Designer / President

RA-100 Head

BEFORE CHANGING TUBES FLIP POWER SWITCH TO OFF

Tube Replacement

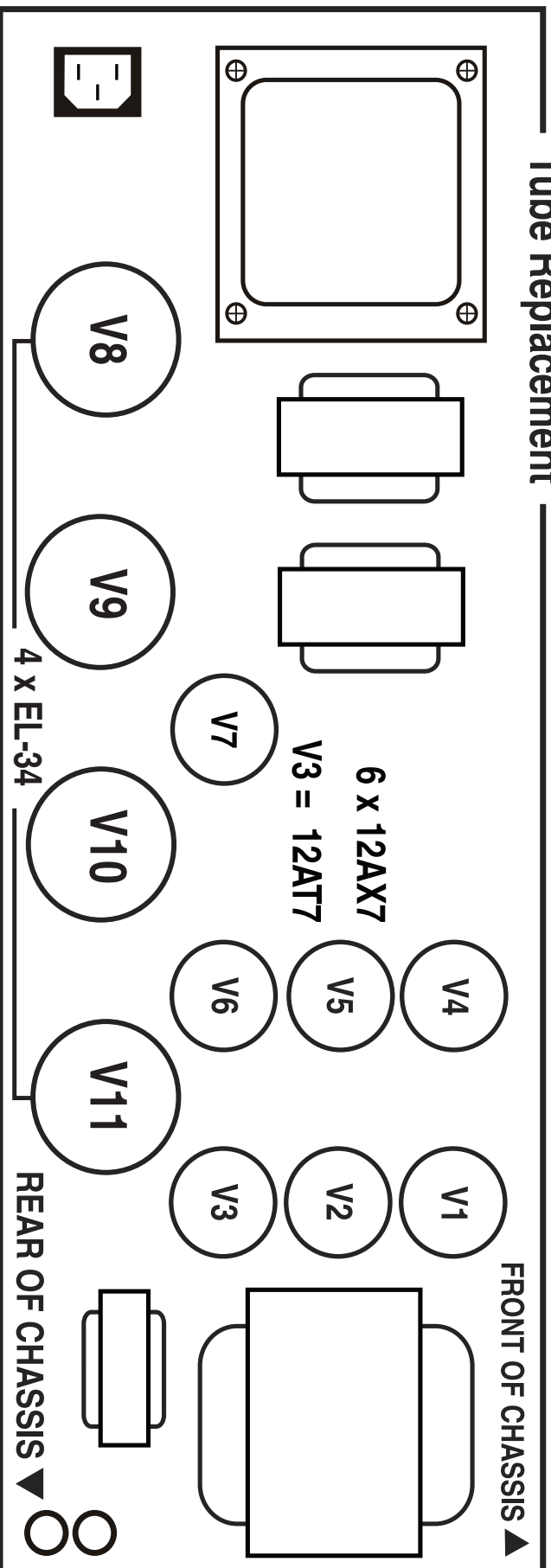


| Preamp Tubes | | Power Tubes | |
|--|-------------------------------|------------------------------|--|
| V1A-- Vintage Hi & Lo 1st Gain Stage | V4A-- Clean 1st Gain Stage | 100 Watts = V8, V9, V10, V11 | |
| V1B-- Vintage Hi 2nd Gain Stage | V4B-- Clean 2nd Gain Stage | 50 Watts = V8, V11 | |
| V2A-- Vintage Lo 2nd Stage | V5A-- Clean 3rd Gain Stage | | |
| Vintage Hi 3rd Stage | V5B-- N/A | | |
| V2B-- Vintage Hi & Lo Tone Control Drive Stage | V6A-- Reverb Send Stage | | |
| | V6B-- Reverb Return Stage | | |
| V3A-- Effects Send Stage | V7A&B-- Driver/Phase Inverter | | |
| V3B-- Effects Return Stage | | | |

RA-100 Combo

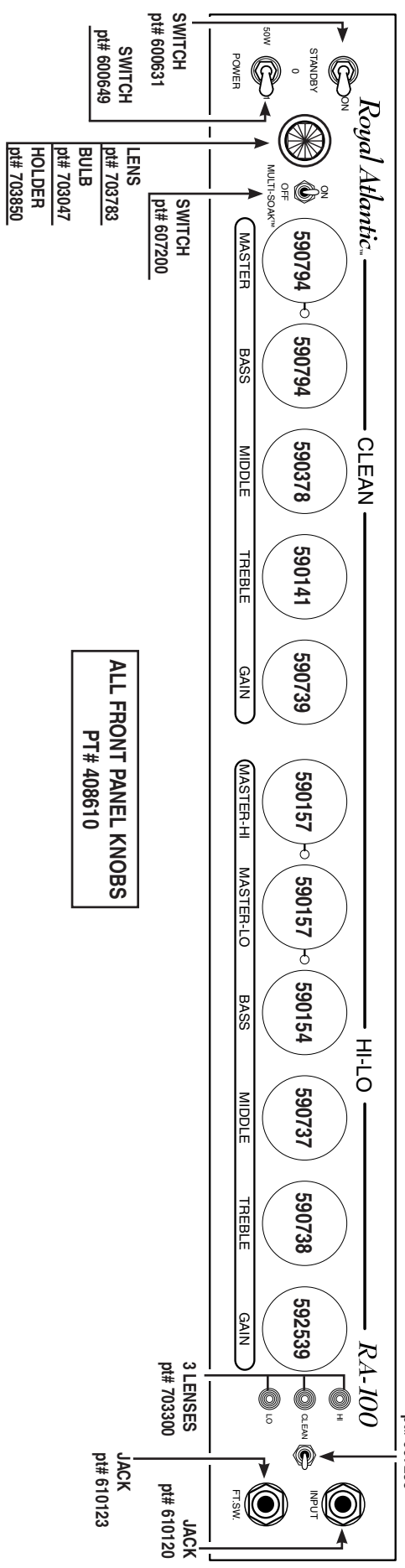
BEFORE CHANGING TUBES FLIP POWER SWITCH TO OFF

Tube Replacement



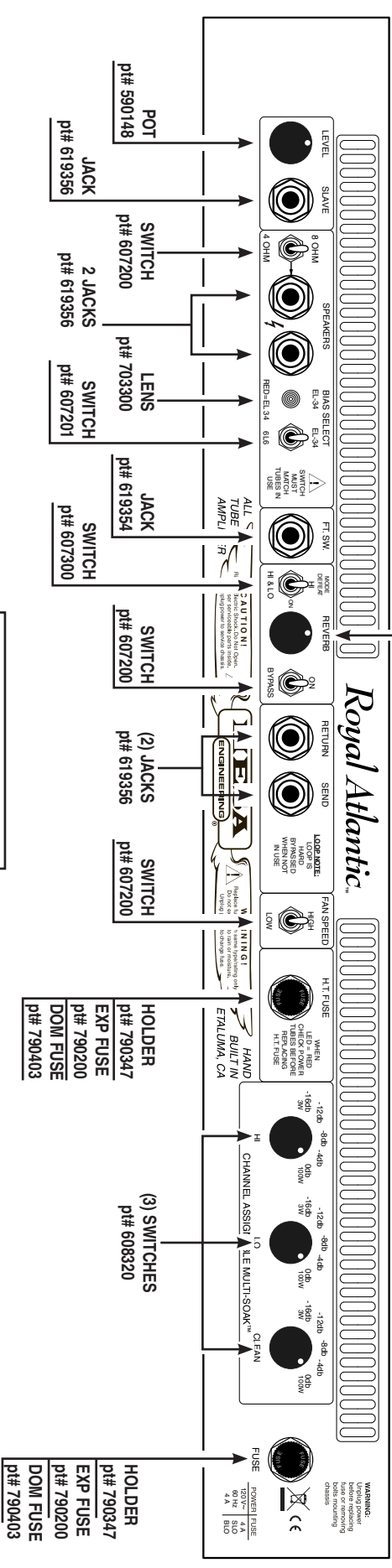
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| V2A-- Vintage Lo 2nd Stage | V5A-- Clean 3rd Gain Stage | | |
| Vintage Hi 3rd Stage | V5B-- N/A | | |
| V2B-- Vintage Hi & Lo Tone Control Drive Stage | V6A-- Reverb Send Stage | | |
| | V6B-- Reverb Return Stage | | |
| V3A-- Effects Send Stage | V7A&B-- Driver/Phase Inverter | | |
| V3B-- Effects Return Stage | | | |

FRONT PANEL: Royal Atlantic Head



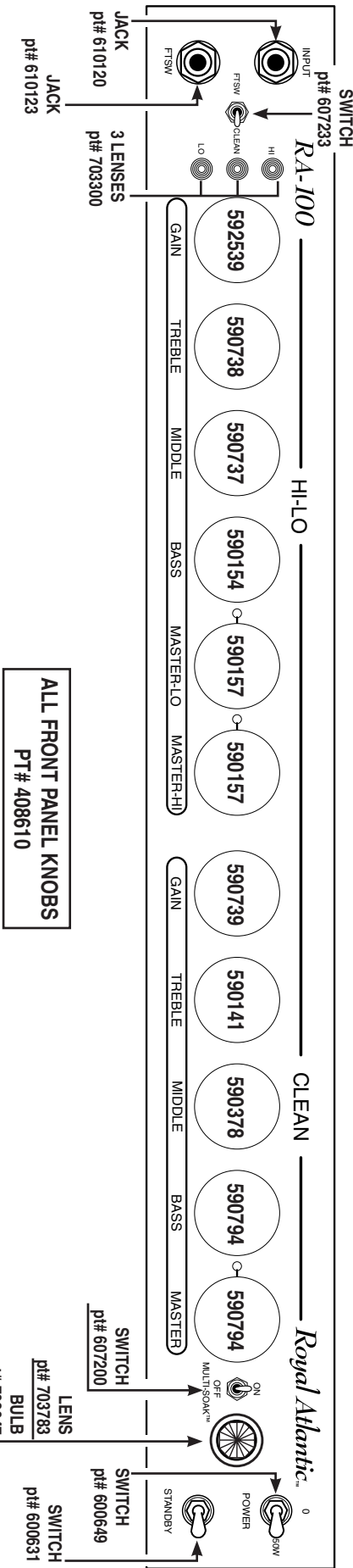
**ALL FRONT PANEL KNOBS
PT# 408610**

REAR PANEL: Royal Atlantic Head

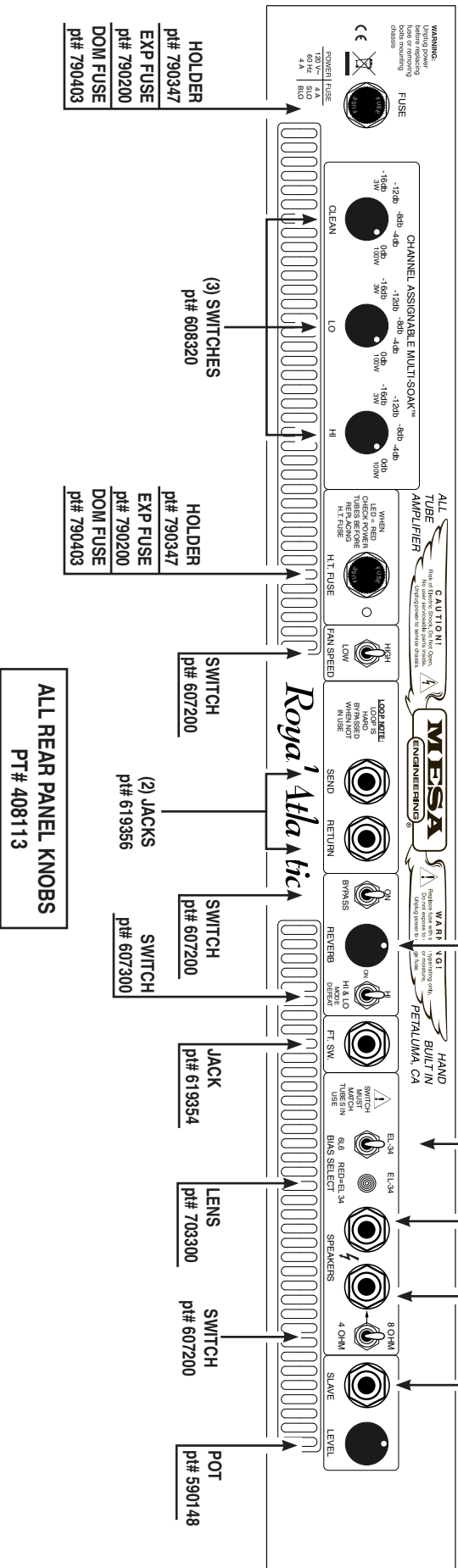


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FRONT PANEL: Royal Atlantic Combo



REAR PANEL: Royal Atlantic Combo



NOTES

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