MESA/BOOGIE

Owner's Manual

The Spirit of Art in Technology

MESA ENGINEERING

1317 Ross Street Petaluma, CA 94954

Hello from the Tone Farm...

YOU, the smart player and all around intuitive human, have put your trust in us to be your amplifier company. This is something we do not take lightly. Our reward is that we've made a classic amplifier and by choosing this amplifier, you have become part of the Mesa family...Welcome! Our goal is to never let you down. Your reward is that you are now the owner of an amp bred of fine all tube amp heritage...benefiting from the many patented pioneering Mesa/Boogie circuits that led to the refinement of your new instrument. Feel confident, as we do, this amp will inspire many hours of musical satisfaction and lasting enjoyment. It was built with you in mind, by players who know the value of a fine musical instrument and the commitment it takes to make great music. The same commitment to quality, value and support we make to you...our new friend.

TREM-O-VERB

TABLE OF CONTENTS

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:

Do not expose amplifier to moisture, rain or water, 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.

Insure adequate air circulation behind amplifier.

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.

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.

Remove the power plug from the AC mains socket if the unit is to be stored for an extended period of time.

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 PERMANET 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.

TREM-O-VERB

Operating Instructions

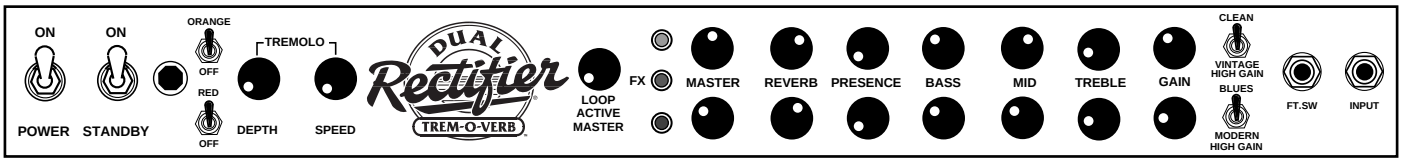
OVERVIEW:

Congratulations on your choice of the DUAL RECTIFIER TREM-O-VERB. You have purchased a handbuilt instrument of the finest quality and craftsmanship. A unique blend of yesteryears' black magic power section design combined with our race-shop approach to finely tuned, high gain pre-amp circuitry leaves the TREM-O-VERB standing alone...instantly a classic destined for vintage status. With two channels housing four definitive and distinctly different Modes, a complete array of supremely dialed guitar sounds can be obtained quickly and easily. Add to this Patented Switchable Rectifiers (Tube/Silicon Diode,) and Channel Cloning (TM,) a hard Bypassable / Channel Assignable FX Loop, Spongy / Bold A.C. Power, Reverb, Tremolo and you've got the most performance packed, bodacious self contained guitar amp ever. And if all these features don't tell the truth about the TREM-O-VERB...how about the on board Bias Switch that enables you to use either 6L6 or EL34 power tubes. Customize this dynamic power section for the tube style that fits your music best!

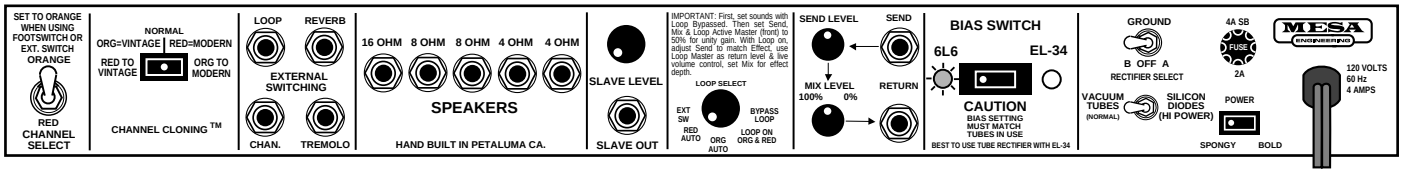
Looking to the rear panel assures that all your interfacing needs are covered. A Parallel Effects Loop with a Mix Control provides tone insurance for even those questionable effects. To use the TREM-O-VERB in larger rack systems, or to interface to other power sections, the Slave Jack and Level Control is a welcome feature. Three speaker jack combinations have been provided... two 4 Ohm, two 8 Ohm and one 16 Ohm - to ensure the proper impedance match to many types of speaker enclosures. The other features will prove to be quite valuable to you and further along in this manual they are covered extensively.

FRONT VIEW HEAD VERSION: TREM-O-VERB

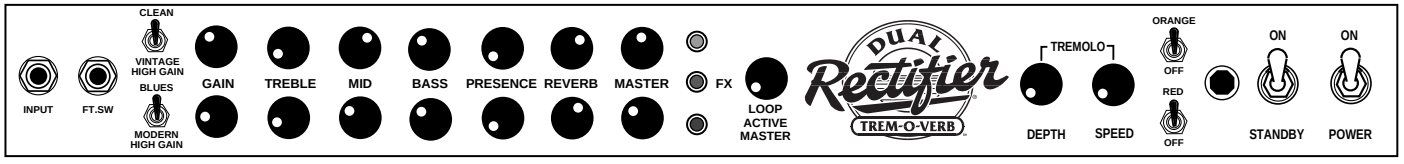
Instant Gratification Demo Settings



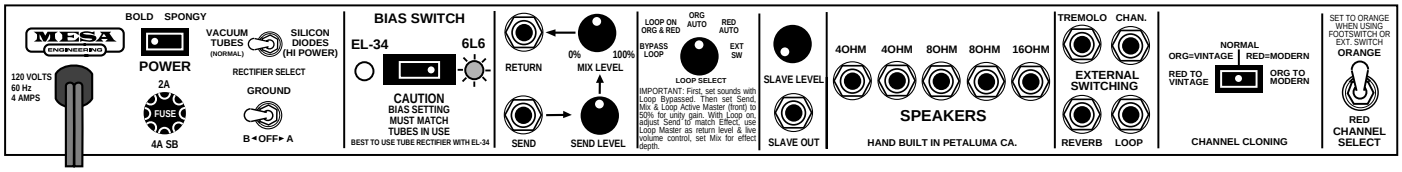
REAR VIEW HEAD VERSION: TREM-O-VERB



FRONT VIEW COMBO VERSION: TREM-O-VERB



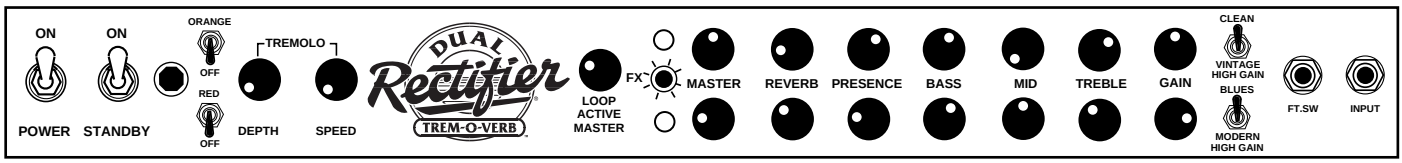
REAR VIEW COMBO VERSION: TREM-O-VERB



FRONT PANEL:

First familiarize yourself with the layout of the front panel and locate the Footswitch Input jack. This jack, when connected to your footswitch will allow you to select either the Lead or Rhythm channel remotely. The rear panel Channel Select toggle must be in the UP position (ORANGE.) If you don't have a footswitch available, the Channel Switch located on the rear panel (far left end of panel if facing front of amp) will activate this switching procedure. Before we get intimate with each control, let's audition the two channels with a basic clean setting in the VINTAGE ORANGE (Rhythm Channel) and a fairly high gain overdriven sound in the MODERN RED (Lead Channel.)

POWER-UP: First remove the protective covers from the tubes (plastic webbing) before connecting the A.C. cord to a power receptacle. Connect your favorite guitar to the Instrument Input jack. Turn the power switch "ON" while leaving the STANDBY Switch set to "STANDBY." (It is always a good idea to practice this start up procedure as at least 30 seconds of warm-up time lessens the shock on cold power tubes, thus prolonging their life substantially.) Next, using the example below as a guide, set the controls as illustrated and



HEAD VERSION

turn the STANDBY Switch to the "ON" position to listen to the two distinctly different channels using either the footswitch or the Channel Select toggle switch as mentioned in the paragraph above.
The above settings are merely examples of the channels, VINTAGE ORANGE and MODERN RED. These two channels are voiced very differently when the Channel Cloning (TM) switch, located on the right side of the rear panel, (when viewing from the rear) is set to NORMAL. The Modes are selected using the mini toggle switch just to the right of the Input and Footswitch jacks. ORANGE is the softer, sweeter of the two channels and houses two modes of operation "CLEAN" and VINTAGE HIGH GAIN." The MODERN RED channel boasts two modes also and these are labled "BLUES" and "MODERN HIGH GAIN."

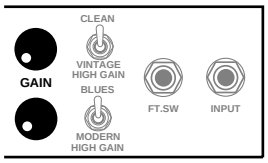
NOTE: It is normal to hear a volume level difference when switching from CLEAN to VARIABLE HIGH GAIN. This difference will get larger as the MASTER volume is increased and the amp is played loud. The MODERN RED channel will display a similar volume difference when switching modes from "BLUES" to "MODERN HIGH GAIN."

Since all the modes are extremely useful and versatile, they may all be considered as Variable High Gain modes with CLEAN being the obvious lower gain of the four. We encourage experimentation as the names we have given each of the modes refers more to a region of gain than to a stylistic boundary.

Like the Dual Rectifier Solo Head which inspired this incarnation, the amazing sounds of even one of the modes many times left us with the desire to have two of the same channels. This would allow a player to have two of the same modes with just different settings. That way a player could use, say, the ORANGE (VINTAGE HIGH GAIN) for a crunch rhythm sound and switch to virtually that same sound with maybe a touch less Treble or a pinch more Gain and a higher Master setting for soloing. Or, maybe one might want to use the CLEAN mode in the ORANGE channel, yet want the Variable High Gain mode in the ORANGE channel as well for a different type of blues solo sound. This type of wish listing the channel configuration eventually led to the concept of Channel Cloning (TM.) Since the switch for this feature is located on the rear panel, we will review it later in the manual under rear panel.

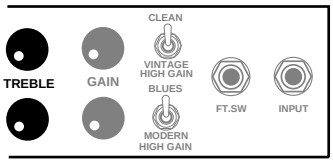
Now that you've heard the TREM-O-VERB'S two channels, let's move on to understanding the controls and their interactive roles in achieving the sounds that you want to hear.

GAIN: Like most amplifiers, the GAIN Control in each channel determines it's sensitivity and overall tonal characteristics. It meters the amount of Gain (volume) that your guitar signal will produce. In the T-VERB, we paid special attention to the amount and frequencies of Gain present in each mode, making sure the whole range of available Gain is musically usable. We also worked diligently with our suppliers to develop pots with tapers useful to players that require that touch sensitive relationship of input signal level to Gain saturation. An essential ingredient to a great amps expressive nature. To maximize your expression, spend time learning the different regions of Gain in each mode and tonal colors they enhance. Almost more - or certainly equal to the tone controls, the GAIN Control shapes your sound.



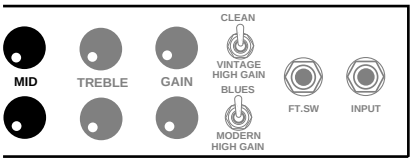
HEAD VERSION

TREBLE: As with most guitar amplifiers, the TREBLE Control is the strongest of the three rotary tone controls. Its setting on the TREM-O-VERB determines the blend and strength of the MIDDLE and BASS Controls. Set high, it is the dominant dominant control, thus minimizing the amount of MID and BASS that would be possible in the mix. Set low, the TREBLE becomes the recessive control and a warmer, darker blend is produced. Dial with care. Subtle tweaking of this control tends to produce the best results.



HEAD VERSION

MIDDLE: The MID Control determines the blend of midrange punch and boldness. It also has a great deal to do with how a sound feels to play. Setting the Midrange low scoops the attack, making the sound and feel more liquid and resilient. Setting the MID higher introduces more punch and authority, helping sounds cut through a mix better. Setting the MIDS very high may make the strings feel a little stiffer and less spongy. Keep this in mind when dialing up your sounds so that you can retain the best feel on the strings, allowing you to always play your best.

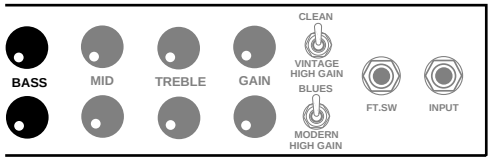


HEAD VERSION

In the BLUES mode, the MID Control set low produces a sweet smooth clip and really allows this classic sound to purr. Try the GAIN Control set at around ● or so and the MID Control set at around ◔ to ◔ for a tasty blend of smooth dynamic overdrive. Add Treble to focus the attack and fatten with the BASS Control. Presence will "Open up" or compress this "beyond vintage" sound that howls with authenticity. This has to be one of the best sounds in the TREM-O-VERB, and was cast early on in the development as it's quintessential voice, and this mode will let you enjoy lunching on elderly vintage amps.

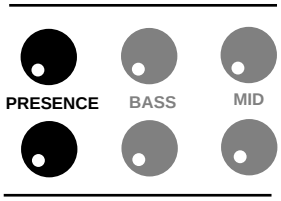
At high Gain settings in either the VINTAGE ORANGE or MODERN RED modes, the MID Control dials in punch and aggression. For the tightest crunch chording, set the MID Control high, say around ● - ● . To make single notes feel juicier and more liquid, reduce the MID Control to around ◔ or so. In the MODERN RED mode, using the MID higher and in conjunction with the PRESENCE Control also set high, delivers a down right ugly crunch that's huge and angry - not fit for the meek! This setting also sounds great and becomes easier to play and more elastic feeling with the GAIN Control set at ● or higher.

BASS: This control blends in the lower frequencies and its effectiveness, again, depends on the setting of the TREBLE Control. It should be set with moderation as extreme settings in either low or high directions can produce an unbalanced tone. Be "especially" especially careful in higher Gain settings of either channel. Too much BASS will cause a flabby unfocused sound. Try setting the BASS to ● for clean sounds in both channels Rhythm modes and ● or below when dialing up high gain overdriven sounds in these modes. In the LEAD modes, try setting the BASS somewhere between ● and ● . These settings will vary with the amount of Gain and Treble you have dialed up.



HEAD VERSION

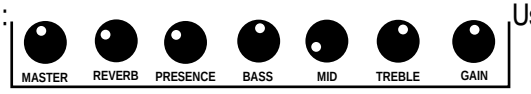
PRESENCE: These are controls that work in the power section to reduce attack and brightness. They work on a different frequency than the TREBLE Control, and depending on the mode chosen, and the amount of Gain dialed up, can sound higher or lower than the Treble frequency.



In the Rhythm mode it dials in sparkle and shimmer, letting clean sounds cut through better. Balance the Treble and PRESENCE until the desired blend is reached. In distortion or high gain sounds in the ORANGE Channels' Variable High Gain Mode, you will find it very helpful in darkening and compressing the sound for single note work. Set the PRESENCE low and this compression will also focus the notes and omit any unwanted "buzzy" frequencies. For high gain chording try higher settings of the PRESENCE Control to bring out the harmonic haze. In the RED Channel the PRESENCE circuitry is quite advanced because it switches from one type of PRESENCE located in one part of the power section, to a different PRESENCE circuit located earlier in the pre-amp section. This switching makes the complete transformation possible that delivers the BLUES mode authentically and the MODERN HIGH GAIN absolutely over the top! In the BLUES mode the PRESENCE is similar in strength and frequency to that of the ORANGE Channels' Clean mode. Set low it warms up single notes 'til they purr. At high settings it adds bounce and improved dynamics that can really dynamics that can really help when you want to back your guitar volume down and "clean up" for rhythm playing.

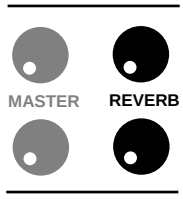
When the MODERN HIGH GAIN mode is called up, the PRESENCE makes the move to a new place in the circuit and gets revoiced to work on a lower frequency. Just right for adding attack and urgency, this PRESENCE is the aggression control. It is normal for high settings of this control to make MODERN RED seem extremely loud in comparison to the other modes. This is a result of "unclamping" what worked as the PRESENCE in the other three modes and letting the T-VERB ponies run free. It is in fact, the loudest setting on the amplifier. Use this PRESENCE with discretion as it can make for some ear damaging, almost harsh sounds if set too high. Try the MODERN HIGH GAIN mode with the GAIN Control set high, around to . Dip the MID Control to - then increase the PRESENCEe to dial in the right attack and blend of aggression. You may want to play with the balance between the MID and PRESENCE Controls as they are somewhat similar in that they are very powerful and dominant in MODERN RED. With these two controls dialed right, MODERN RED is to this day the most huge and heinous crunch we've come across. When you hear this, you will probably won't believe that this could be the same amp that moments ago was crying the blues with such mournful conviction.

Another cool use for this alternate PRESENCE frequency shows up when you use the VINTAGE ORANGE Channels' Clean Mode. Using this example:



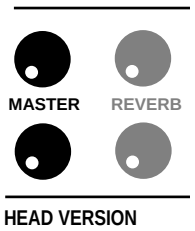
Use the Channel Cloning (TM) switch on therear panel and revoicethe ORANGE Channel to MODERN. You will hear your rhythm sound get louder and much punchier. This difference is largely due to the moving and revoicing of the PRESENCE. This occurs automatically when you "Modernize" the ORANGE Channel and now you instantly have a Vintage clean pre-amp with a Modern power section. This can be useful at larger gigs to boost the clean sound volume level or simply as an alternate voicing of the same mode style.

REVERB: These self explanatory controls deliver the rich all tube reverb sound. Although the circuit is the same for both ORANGE and RED Channels, the amount of REVERB available is not. In the RED Channel there is slightly less REVERB available overall because of this channel's very nature. The reason behind this is two fold: (1) that it is easier to prevent the massive amount of Gain and signal strength present in the MODERN HIGH GAIN mode from causing unwanted REVERB oscillations. (2) This channels aggressive nature lends itself more to musical styles where high settings of REVERB are simply not traditional. Don't worry...there is still plenty of REVERB for drenched solo work in the BLUES mode. Simply run the control a little higher than that of the ORANGE Channel.



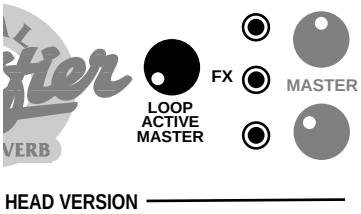
HEAD VERSION

MASTER: A simple control found on most amps today, these serve to balance the playing level of the two channels. They enable the pre-amps Gain Control to be used in a wide range of settings, while never having to affect the listening level. On the T-VERB these MASTERS serve another purpose as well. When the FX Loop is switched out of Bypass and programmed to either channel specifically or, simply ON all the time, these MASTER Controls double as FX Loop Send Level Controls.

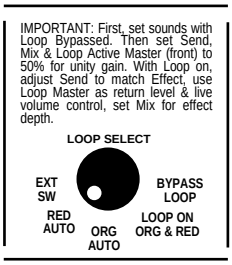


This is not their primary function, but the setting here does affect the channels' Send strength. This is not a problem because the TREMO'S loop also incorporates a Master Send Level Control that compensates for the possible level mismatch when using the MASTER'S to balance the channels. We have found the middle ranges through to be very well behaved for most effects. Setting the MASTERS in this region should make for trouble free FX interfacing when using the loop.

LOOP ACTIVE MASTER: This knob of a different color, works in conjunction with the FX "Loop Select" rotary control that is found on the rear panel in the FX Loop section of the amplifier. When the Loop is switched out of "Bypass" the Yellow Loop LED next to this control comes on with the channel that the loop is active in. When this LED is illuminated the Loop Active Master replaces the Channel Masters to become the overall Master Volume Control. At this time the Channel Masters become channel balancing controls and Effects Loop Send Level Controls. This LOOP ACTIVE MASTER also serves as an effects Return Control and can be very useful when trying to use certain older effects with weak output capabilities. It also makes it much easier to use the Effects Loop and makes sure that no signal is being lost to an effects' less than adequate output circuit. Let's try an experiment that will quickly show you why the TREM-O's Loop is the state of the art:



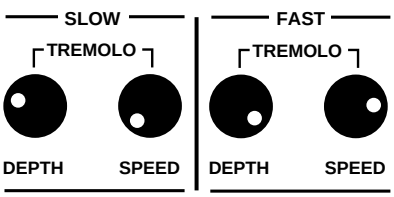
(1.) Choose a sound in one of the channels and dial it in to your liking. (2.) Connect an effect processor to the FX Loop Send and Return Jacks. (3.) Set the Effects' input to preferably, but not necessarily, to "Line Level." (4.) Go to the rear panel of the TREM-O-VERB and by using the Rotary Loop Select Control, turn the Loop On all the time by setting this rotary to "LOOP ON ORG. & RED."



At this time the front panel Loop LED will come on notifying you that the LOOP ACTIVE MASTER now controls the Volume level of the whole amp. (5.) Increase or decrease this to about the same playing level you had before turning the loop on. (6.) Now go to the other channel and find a sound in one of the modes. (7.) Use the Channel Master to determine its' balance in relationship to the first channel you dialed up. When the listening levels are satisfactory, double check your effects processors' input headroom indicating LED's or, if it is an old classic stomp box, listen for unwanted clipping. (8.) Fine tune this Send Level strength with the Effects "Send Level Control" in the Effects Loop section found on the rear panel. Use the Rotary Loop Select Control on the rear panel to toggle between "LOOP BYPASS" and "FX On ORG. & RED." (9.) Set the FX Mix Control to the desired "wet" blend. (10.) Adjust the volume difference between these two positions with the LOOP ACTIVE MASTER. If the processor you have used is a decent one, you should be able to compensate completely for any tonal thievery the unit might have caused in amps with lesser loops.

When you toggle the Loop Select in this set up, you should hear the effect come on, without noticing a disappointing difference like you would in many other effects patching scenarios. The LOOP ACTIVE MASTER helps greatly in avoiding this all too common occurrence. This interfacing compatibility is yet another reason why we think you will come to really appreciate the TREM-O-VERB'S parallel FX Loop.

TREMOLO: The TREMOLO creates a pulsating effect much the same as that found on the wonderful amps of yesteryear. Built into the TREM-O-VERB'S circuitry, the TREMOLO changes the "amplitude" but not the frequency of the note played. The Depth knob controls the intensity of how much the note will rise and fall, while the Speed knob controls theRate at which this rise and fall action takes place.

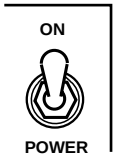


The TREMOLO is assignable to either, or both channels via the toggle switches located next to the Depth and Speed knobs on the right side of the front panel. Use taste in dialing

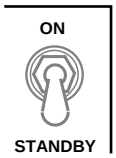
up this effect for over-use can be ineffective and can even dilute what might otherwise be a nice sounding tone. External switching of the TREMOLO is possible by a remote footswitch, see section on External Switching.

To obtain the smoothest TREMOLO effect, bear in mind that for every range of speed - there is a sweet spot on the Intensity Control. This is especially true for slower speed settings. Generally speaking, the slower the speed - the less intensity, while faster speed settings would require just the opposite. Getting the slow speeds to sound smooth may be a little tricky at first, for they are more obvious when they are not optimized. Exercise patience and learn to blend the more active power of the Intensity Control tastefully for these slower TREMOLO effects. Understanding the interaction of these two controls is crucial for obtaining great TREMOLO in your TREMO.

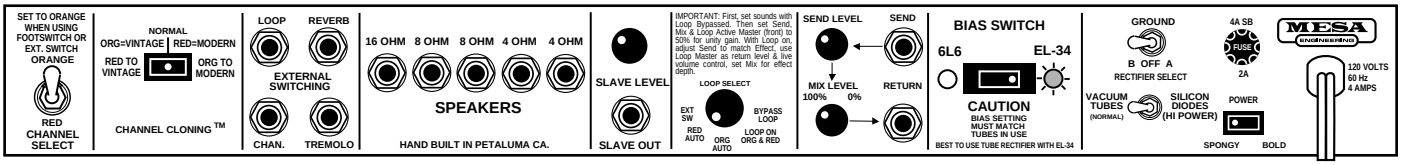
POWER / ON: This switch delivers the A.C. power to the TREM-O-VERB. Make sure the unit is grounded (all three terminals of the A.C. power cord must be connected whenever possible to avoid injury to the user as well as to the unit) and that the proper voltage is present. Follow the cold start procedure described in the ON / STANDBY section below when powering up your TREM-O-VERB.



ON / STANDBY: Perfect for set breaks... this toggle switch also serves an even more important purpose. In the STANDBY position the tubes are at idle so that during power up they may warm up before being put to use. Before power is switched on make sure the STANDBY switch is in the STANDBY position. Wait at least 30 seconds and then switch the STANDBY to the "ON" position. This prevents tube problems and increases their toneful life substantially.

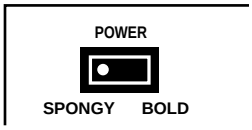


REAR PANEL:

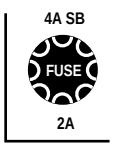


HEAD VERSION

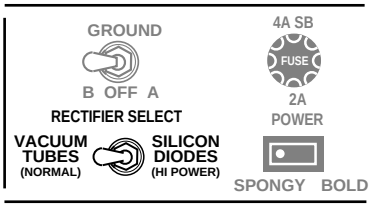
POWER SELECT: The two different power selections of the TREM-O-VERB are equally important when looking for a particular sound. "Spongy" works like a built in Variac, reducing all the internal voltages for a true vintage feeling and that extraordinary "brown sound." Power is reduced somewhat too, making it easier to achieve an overdriven power sound, especially when the Rectifier Select switch is in the Vacuum Tube position. Using the TREM-O in this power setting will also extend tube life and overall reliability, while still producing enough power to work many of your gigs...and all of your recording needs! With the TREM-O-VERB'S POWER SELECT Switch in the up position, maximum power, clean headroom and volume are obtained.



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 blownFUSE...Follow the cold start procedure mentioned in the ON/STANDBY switch section and watch the power tubes as you turn the STANDBY to the ON position. If a power tube is going bad or is arcing you will see it! Turn the STANDBY switch to STANDBY immediately and replace the faulty power tube and the FUSE if necessary. If you see nothing abnormal as you lift the Standby, 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 extra 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. See page 13 and 14 for more information on tube replacement.



RECTIFIER SELECT: This patented switchable feature allows you to select between two different types of rectifiers for different sounds and feel. It first appeared on our Dual Rectifier Solo Head and is, in fact, part of the magic behind the whole Dual Rectifier series of amplifiers. It has since found its way into some of our other products as well, such as the MAVERICK, HEART-BREAKER and the BLUE ANGEL. Voodoo and versatility have been added to these products by the inclusion of this cool, patented feature.

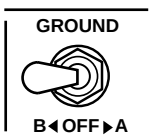


Solid State (HI POWER) calls up the silicone diode rectifiers offering more punch, a tighter attack with added brightness and substantially more headroom. This would be the preferred position for loud clean playing or tight rhythmic playing with a high front end Volume setting (HIGH GAIN.)

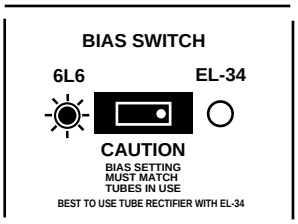
The Vacuum Tube (NORMAL) position takes a power section walk down memory lane, paying tribute to those vintage gems of yesteryear. In those early days of amplification, the only rectifiers available were tubes. Unbeknownst to their creators, these sweet sounding amplifiers would someday become relics as the demand for higher volumes and more power per package led to the abandonment of the tube rectifier in favor of the five cent silicone diode's greater efficiency. With this decision went much of the sweetness and soul, and by the mid 70's, many amps were bold, loud, and efficient, and unfortunately...sometimes lacking some of that earlier soul.

We wanted the Dual Rectifier series to capture that... "thing" that you... "can't quite put your finger on...but you know it when it's got it." Soul, Personality and Feel. The VACUMM TUBE position gives you a sweetness of sound and a liquid feel that simply cannot be duplicated in any other way. This position shines for single note lead work in either channel and delivers a warm, breathing clean sound in the Rhythm channel that was previously unavailable in all but the best vintage amps. If you are like most of the players we know, you'll probably end up leaving your TREMO set to the VACUMM TUBE position all the time. Regardless of your preference the RECTIFIER SELECT gives you options that you won't find anywhere else and versatility that makes the TREMO a born vintage performer in any stylistic arena.

GROUND: This switch reverses the polarity of the A.C.GROUND. It can be helpful in eliminating annoying hum or A.C. buzz as well as those painful microphone shocks. It should be left in the center "OFF" position when neither of these problems are occurring.



BIAS SWITCH: Your TREM-O-VERB was designed with versatility in mind. So to add to the already awesome array of on board features...we felt it essential that the TREMO be able to adapt its power output section to use the other classic pentode power tubes, the British style EL 34. These tubes are largely responsible for the signature sound of many immediately identifiable and wonderful sounding amps created in Great Britain and used on some of the best recordings to date. The nature of their sound is usually brighter in the extremely high frequencies...some players find this almost thin at first. However, aficionados of the EL 34 sound know that nothing has the lushness of harmonics or spread like a power amp using EL34's. In truth, EL 34's do focus in on a region of upper harmonics that 6L6's reproduce, but not really enhance in the same way the EL 34's do.

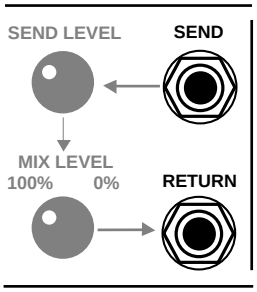


This characteristic is sometimes preferred for sounds that range from a soft clip that would be used for chording or soloing, to an all out high gain crunch or lead sound. Players that use mostly these types of sounds may prefer the EL 34 clip to the 6L6's that come standard in the TREMO. If you need a variety of sounds and rely on a clean chording sound much of the time, you will likely prefer the TREMO'S stock compliment of 6L6's. We feel the 6L6 is a more balanced sounding tube that produces plenty of harmonic lushness, while at the same time delivering the rich lows that are crucial to both a warm clean sound and huge, tight high gain crunch sound.

We recommend the 6L6 for reliability: In our many tests and continued use of the currently available EL 34 type power tubes on the market today, we regret to say that they do not appear to be as rugged in construction as the available 6L6. This is another reason why your TREM-O-VERB was shipped with 6L6 power tubes. If you plan to use the EL 34's we suggest that you keep a full set of tubes and extra fuses with you during all performances in the event of a tube failure occurring when using the currently available EL

34's. Make sure that the BIAS Switch is set correctly to match the tube type that you are using. Failure to do this will result in tube failure that could possibly burn resistors in the Bias supply. Although this is a fairly simple repair for an authorized technician, it is easily avoidable. ALWAYS CHECK THE BIAS SWITCH setting if you experiment with alternate tube types and you will enjoy uninterrupted performances from your TREM-O-VERB.

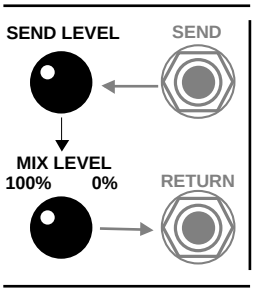
SEND / RETURN: These two 1/4" jacks are the patch point for external signal processing effects. The Effects Loop in thewired in parallel the TREMO is wired in parallel with the unaffected or dry signal which enables you to preserve the integrity of the all tube tone and feel that the TREMO is capable of delivering. To use the Effects Loop for your processors, simply connect the Effects SEND jack to your first effects' INPUT jack. Connect your last effects' OUTPUT jack to the Effects RETURN jack.



The Effects Loop interrupts the signal between the pre-amp and power section. Therefore, the RETURN jack can double as a "Power Amp Input" jack. Remember that the Loop must be engaged for signal to pass this junction. You will also want to run the MIX Control at 100% to use the Loop as a Power In patch point.

NOTE: We suggest that when using the TREMO'S power section only, that you have the amp switched to the VINTAGE ORANGE channel and the Channel Cloning switch set to "NORMAL". This assures a more neutral power sensitivity thus making the TREMO more friendly to use as a power amp.

SEND LEVEL: This is the master SEND LEVEL Control for the parallel Effects Loop. The inclusion of this control makes it possible for different channel specific volume levels to be used via the front panel channel MASTER Controls, while at the same time insuring that you will not overload your processors' INPUT stage with an incompatible signal strength. For the best results, try this method:



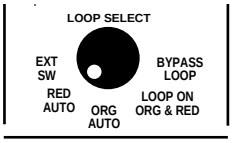
1.) Set up the VINTAGE and MODERN channels to your preferred Gain and Tone control settings.

2.) Adjust the individual channel MASTER Controls to the desired listening level.

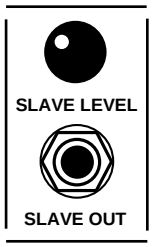
3.) Set the rear panel Effects Loop SEND LEVEL Control so that your processors' INPUT indication LED is displaying the proper input signal strength (hopefully unity gain .)

4.) Adjust the front panel LOOP ACTIVE MASTER Control to the desired level. See page 5 on: LOOP ACTIVE MASTER - for more information regarding SEND LEVEL.

LOOP SELECT: This 5 position rotary type switch determines the status of the Effects Loop. The Loop can be assigned to either of the channels individually or active at all times (Loop on ORG. & RED) It may also be triggered remotely with MIDI controlled switching devices by connecting the EXTERNAL SWITCHING jacks and selecting EXT. SW. on the LOOP SELECT rotary. As you might surmise, the ORG. AUTO position assigns the Loop automatically to the VINTAGE / ORANGE Channel and every time the ORANGE Channel is called up, the Loop will be engaged. RED AUTO duplicates this scheme for the MODERN / RED Channel. For you purists, the TREMO gives you the ability to remove all Loop circuitry from the signal path completely by selecting the BYPASS LOOP position.

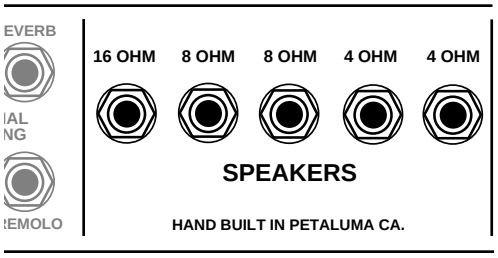


SLAVE LEVEL CONTROL: This 1/4" jack and control provide a signal derived from the speaker jack. Perfect for using the TREM-O-VERB as a master pre-amp, or additional power amps may be connected for more power when needed. Some players use this to derive an FX Send Signal and go to other amps for their wet sound.



NOTE: Once a signal is taken from the SLAVE, it can not be inserted back into the FX Loop Return jack or a feedback loop will occur. Much like holding a microphone into the PA system's cabinets...a loud high pitched squeal will occur.

SPEAKERS: Two 8, two 4 and one 16 Ohm jack are provided for speaker interfacing. The TREM-O-VERB is not very sensitive to speaker mismatches and will not be damaged by them, except that very low ohmage loads will cause the power tubes to wear faster. A single twelve-inch 8 Ohm speaker should generally be connected to the 8 Ohm output. When using two 8 Ohm speakers, connect them both to the 4 Ohm outputs provided (because the total load is 4 Ohms in that case.) If you have the TREM-O-VERB Combo, your two 16 Ohm speakers are wired in parallel producing an 8 Ohm load.

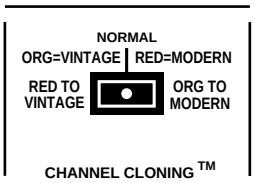


4x12 cabinets may be 4, 8 or 16 Ohms. If you are not sure of the impedance of your cabinet, you may need to remove the rear panel in order to verify the impedance rating of the individual speaker or speakers. Mesa/Boogie 4x12 and 4x10 cabinets come standard wired to 8 Ohms, and are wired in series-parallel. Some Non-Mesa 4x12 cabinets are wired 16 Ohms using four 16 Ohm speakers. By wiring all four speakers in parallel, you can reduce the cabinet to an impedance load of 4 Ohms (assuming the speakers are 16 Ohms each.) No matter how unusual your speaker setup, it is always possible to get good performance.

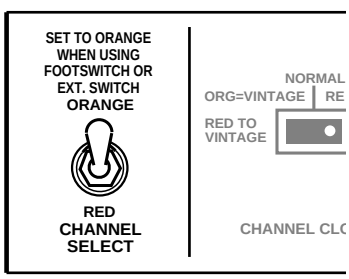
EXTERNAL SWITCHING JACKS: These jacks allow (usually MIDI-programmed) operation of your amplifier's functions from an external switching source. In either case, the switching is accomplished by connecting ("shorting") the jack's "Tip" to its "Ring" (or ground.)

CHANNEL CLONING (TM): This circuit (patented) makes possible a concept, so inherently right, that in it's simplicity it was long overlooked. To be able to set a group of controls in a given channel of a two channel amplifier - to duplicate that channel and that control setting, (save for maybe one or two controls,) in another separate channel of that same amplifier. Sounds' simple? Well it would be, but most, if not all amplifiers, must use the available internal space to offer circuitry and front panel real estate for alternate channels that vary greatly in both gain structure and tonality.

CHANNEL CLONING (TM) is our answer to this channel expanding idea. By providing two identical groups of front panel controls and interfacing each of them to it's own different and dedicated channel, we achieve the VINTAGE ORANGE and MODERN RED channels. Sophisticated internal switching circuitry then enables you, the user, to utilize the channels for their differences - "Normal" or; with a flick of the switch - Clone them "ORANGE to MODERN" or "RED to VINTAGE." This allows for virtually any combination of your two favorite sounds to be footswitchably possible even if they are normally found in the same channel! CHANNEL CLONING greatly enhances the versatility of the TREM-O-VERB live or in the studio, while retaining its clean front panel layout.



NOTE: When the CHANNEL CLONING (TM) feature is used and the MODERN RED channel is cloning RED to VINTAGE (so that it sounds like the ORANGE channel) - be aware that both the ORANGE and RED channels' PRESENCE Controls are active in the (bottom) RED channel in this setting only. Some amazing sounds are possible because the two PRESENCE Controls maintain their respective voicing differences giving you two regions of top end harmonics to play with in this mode.



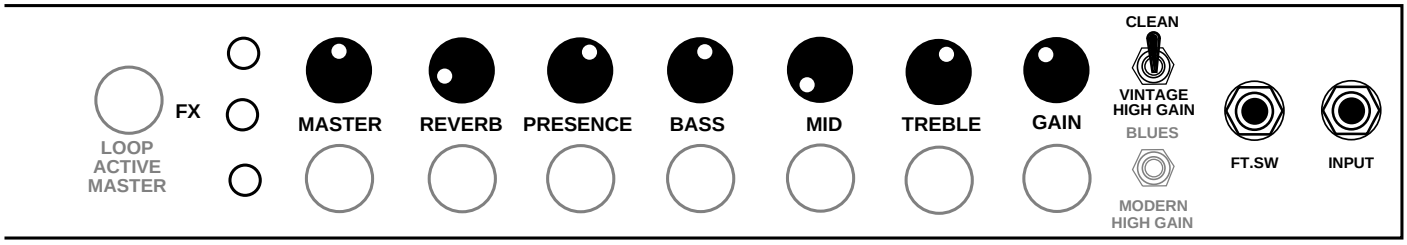
CHANNEL SELECT SWITCH: This switch simply allows you to switch between the two channels (VINTAGE /ORANGE and MODERN RED) without using the CHANNEL SELECT footswitch or, when one is not available. To use the footswitch however, the CHANNEL SELECT switch must be in the up (ORANGE) position.

HEAD VERSION

SAMPLE SETTINGS

SAMPLE 1 *Sparkling Clean*

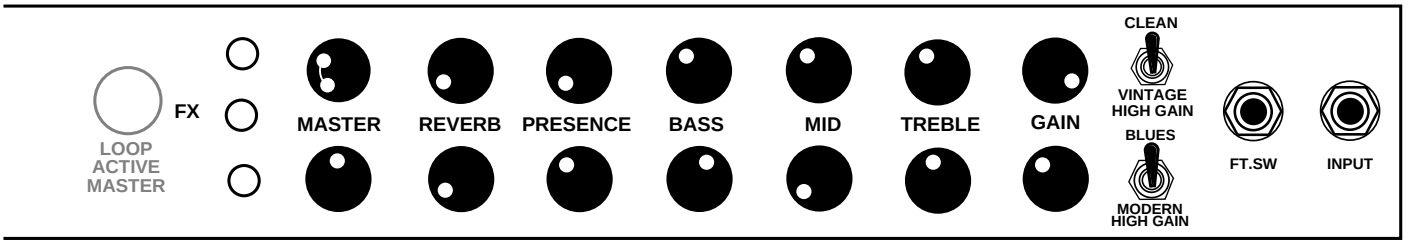
Power Section: — Bold - Tube Rectifier
— or Solid State Rectifier.



HEAD VERSION

SAMPLE 2 *Pushed Bluesy Rhythm / Solo: Both Channels*

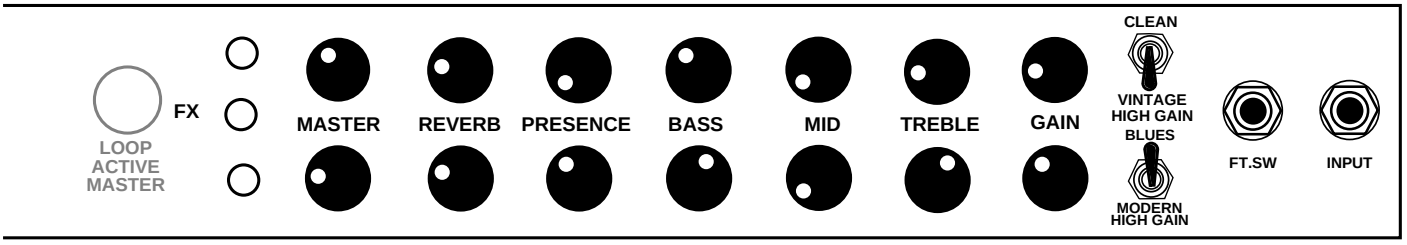
Power Section: — Spongy or Bold
— Tube Rectifier.



HEAD VERSION

SAMPLE 3 *Blues Lead: Both Channels*

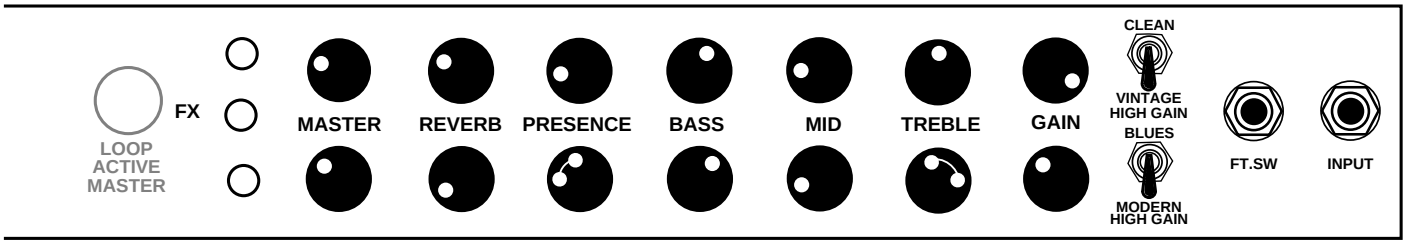
Power Section: — Spongy or Bold
— Tube Rectifier.



HEAD VERSION

SAMPLE 4 *High Gain Lead / Crunch: Both Channels*

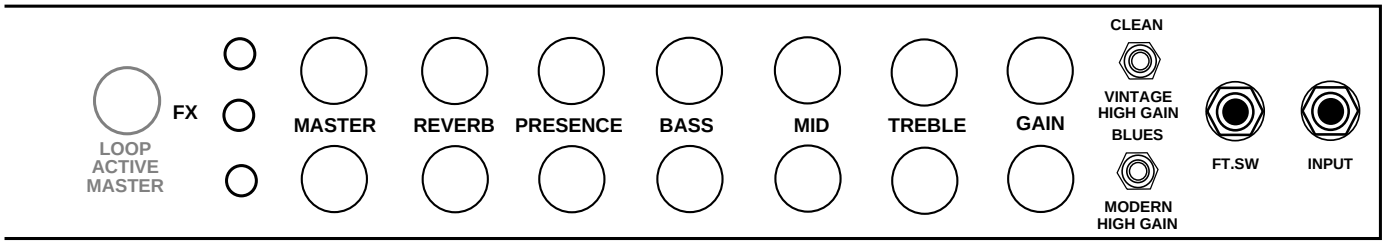
Power Section: — Bold
— Solid State Rectifier



HEAD VERSION

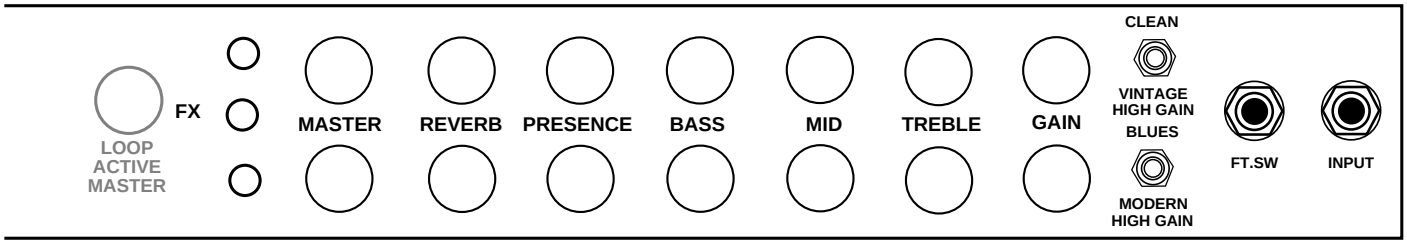
PERSONNAL SETTINGS

SAMPLE 1 _____ **Power Section:** _____



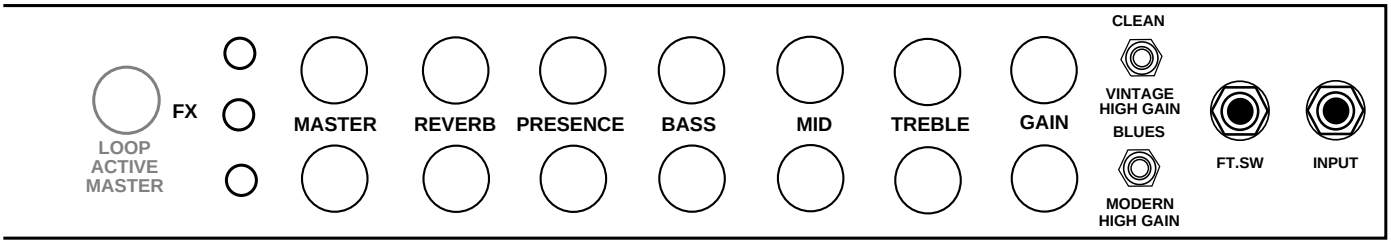
HEAD VERSION

SAMPLE 2 _____ **Power Section:** _____



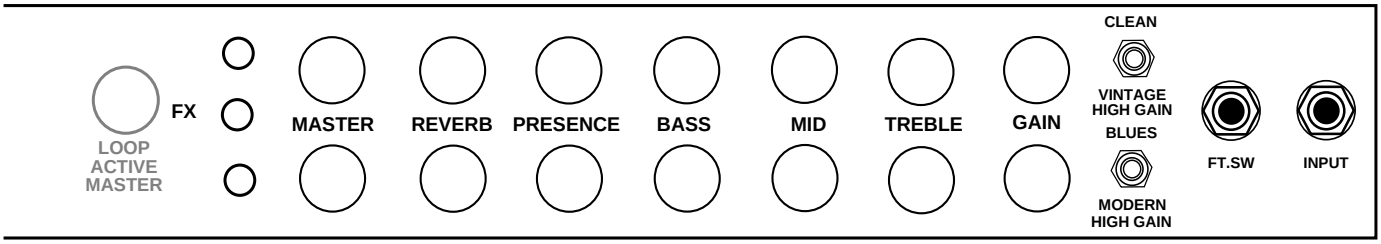
HEAD VERSION

SAMPLE 3 _____ **Power Section:** _____



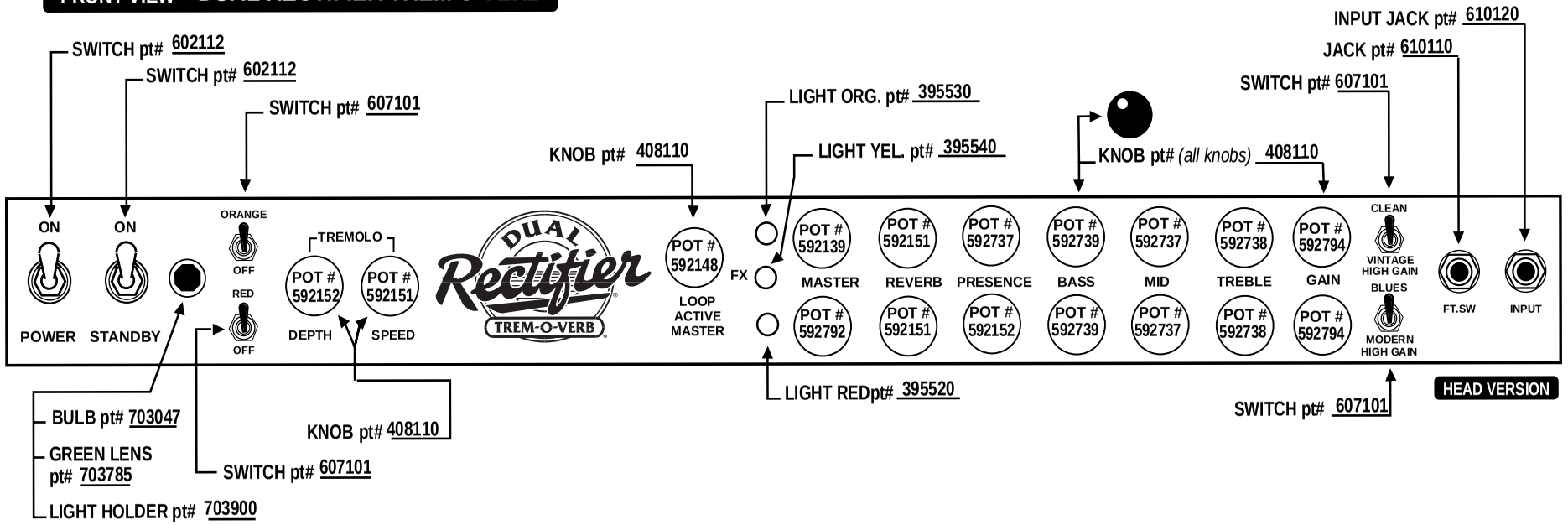
HEAD VERSION

SAMPLE 4 _____ **Power Section:** _____

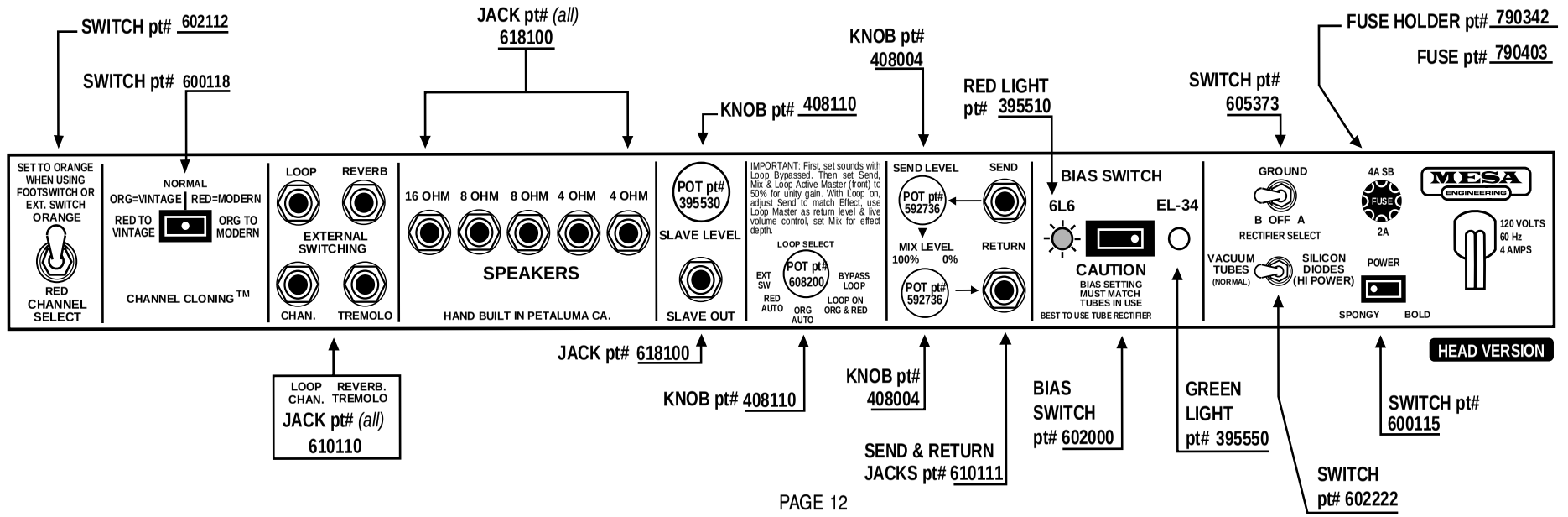


HEAD VERSION

FRONT VIEW DUAL RECTIFIER TREM O VERB



REAR VIEW DUAL RECTIFIER TREM O VERB



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 FAILURES:

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, 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 OPERATE 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 TREM-O-VERB on STANDBY, remove it from its socket and turn it back on. It will cause no damage to run the TREM-O 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 at some point you will experience minors 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 Lead 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. Then refer to the Tube Task Chart found on the following page and it should lead you to the tube needing replacement. Then all that remains is to swap the suspect tube for a known good performer.

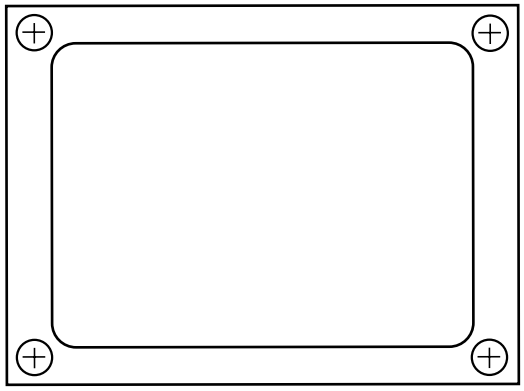
If you cannot narrow down the trouble to a specific mode or channel, the problem may be the small tube that drives the power tubes which is operational in all modes and channels. Though rare, a problem with the driver tube would show up in all aspects of performance - so if you can't narrow the problem 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 preamp 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 labled 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, unplug the power cord, speaker and reverb cables then remove the chassis from the cabinet by unscrewing the four mounting bolts on top. The chassis then slides back like a drawer and comes out. 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. 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. Preamp 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 bizzare noise, it is considered normal and functional.

BACK EDGE OF CHASSIS



DUAL RECTIFIER "TREM-O-VERB" TUBE TASK CHART

(Each 12AX7 contains two separate Triodes)

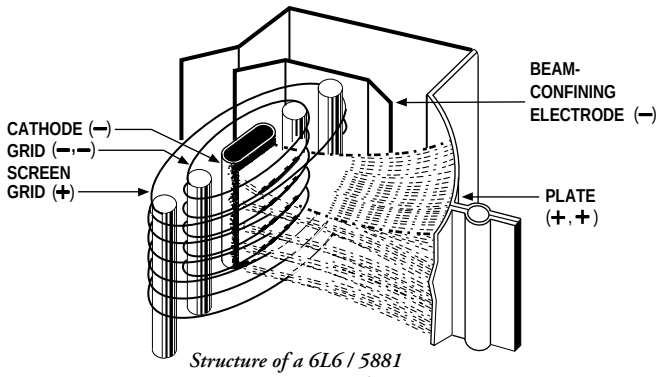
PARTIAL VIEW OF CHASSIS

Description of Tube Functions

V1 A= 1st Input/Gain Stage
V1 B= Reverb Return
V2 A= 2nd Gain Stage
V2 B= 3rd Gain Stage
V3 A= 4th Gain Stage
V3 B= 5th Gain Buffer
V4 A= FX Return - Amp
V4 B= FX Send - Buffer
V5 A= Reverb Driver
V5 B= Reverb Mixer Amp
V6 A= / V6 B= Phase Splitter / Output

BIAS ADJUSTMENT: (Part of a continuous series)

NOTE: An article written by Randall Smith that we thought you might find interesting.



Structure of a 6L6 / 5881 Beam Power Pentode.

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."

And that's right. Tubes don't effect the bias setting, but the bias setting does effect how the tubes work. But HOW it effects the tubes is difficult to measure.

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' 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 carpetted 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 flucuations in that current flow when are ARE playing. If the amount of current increases and decreases 440 times per second, then you'll hear an A note. If the fluctions 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 interuppted — 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 except 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.

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 mis-match 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 6 6 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.

Randall Smith
Designer & President

MESA/BOOGIE

The Spirit of Art in Technology

Thank you for trusting MESA/Boogie to be your amplifier company. We wish you many years of toneful enjoyment from this handbuilt all tube instrument.

MESA ENGINEERING