

***MESA/BOOGIE***<sup>®</sup>

**SUBWAY<sup>®</sup> TT-800<sup>™</sup>**

*Owner's Manual*

## *Greetings from the Home of Tone®*

*...You, smart player and intuitive human, have put your trust in us to be your amplifier company. This is something that we do not take lightly. By choosing this instrument to be part of your musical voice, you have become part of the MESA® family... WELCOME... and to those of you who are already part of the Mesa family, we thank you for returning to your roots.*

*Our goal is to never let you down. Your reward is that you are the new owner of an amp, bred of fine heritage, benefitting from the many pioneering and patented MESA circuits as well as fresh cutting edge research and development efforts leading to this new and exciting model. We are confident that 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.*

# SUBWAY® TT-800™

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## **IMPORTANT SAFETY INSTRUCTIONS**

Read these instructions.

Keep these instructions.

Heed all warnings.

Follow all instructions.

Do not use this apparatus near water.

Clean only with dry cloth.

Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where it exits from the apparatus.

Only use attachments/accessories specified by the manufacturer.

Unplug this apparatus during lightning storms and when unused for long periods of time.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug damage, liquid spilled or foreign objects entered the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

To ensure proper ventilation always make sure there is at minimum four inches (101.6mm) of space behind the rear of the apparatus, and to the sides of models that include side ventilation. The ventilation should not be impeded by covering the ventilation openings with items, such as newspapers, tablecloths, curtains, etc. Do not impede ventilation by placing objects on top of the apparatus which extend past the rear edge of its cabinet.

When rack mounting this unit, adequate ventilation space must be maintained. Do Not cover or block front, rear or sides and allow a minimum of 2" (50mm) of clear space on both sides of the unit.

No naked flame sources, such as lighted candles, should be placed on the apparatus.

The apparatus shall not be exposed to dripping or splashing liquids, and no objects filled with liquids, such as vases, shall be placed on the apparatus.

**WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

The AC plug is the mains disconnect. The plug should remain accessible after installation.

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

**WARNING:** Always make sure proper speaker load (as specified in the operating instructions) 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 ensure the amplifier is properly grounded. Always unplug AC power cord before performing ANY service to the amplifier, including but not limited to changing the fuse. Use only same type and rating when replacing fuse. Internal fuses are not user replaceable, please refer to qualified service persons.

Keep amplifier away from children.

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

Do not use excessive force when handling buttons, switches and controls. Do not use solvents such as benzene or paint thinner to clean the unit.

Always connect to an AC power supply that meets the power supply specifications listed on the rear of the unit. Export models: always insure unit is wired for proper voltage. Make certain grounding conforms with local standards.

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

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

**READ AND FOLLOW INSTRUCTIONS OF PROPER USAGE.**

# SUBWAY® TT-800™

## *Operating Instructions*

## OVERVIEW:

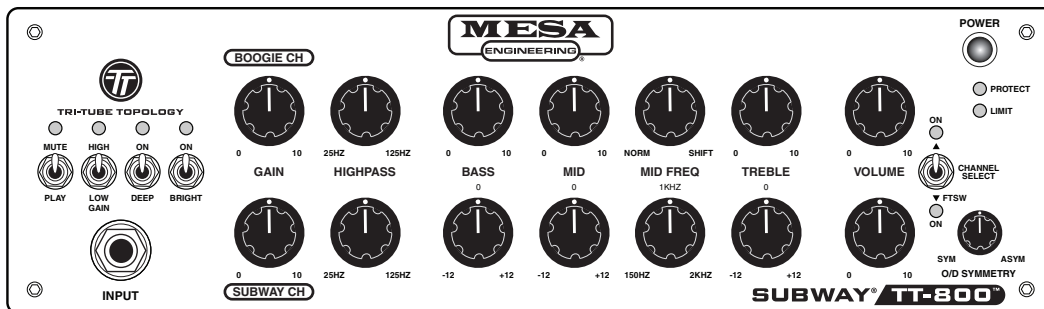
Congratulations on your choice of the SUBWAY TT-800™ and welcome to the MESA/Boogie® family! First, we would like to thank you for choosing us as your amplifier company and trusting us to help create your musical voice. This is something we never take for granted and you'll find that we are here and ready to assist should you ever need help. Our goal is to help you sound your best at all times! We feel confident that your new amplifier will bring you many years of reliable service, rewarding inspiration and create a newfound freedom to express your music.

You have chosen an amplifier bred of a fine heritage, and this model is a testament to our legacy of tone. Its forefathers can be traced back to the very first MESA amplifier ever built, the MESA 450 Bass Head. In fact, the first 5 MESA amplifiers built in the Lagunitas mountain shack were bass amps... a piece of trivia little known and overshadowed by our overwhelming notoriety for guitar amplification. But we've always loved the bass, and have — since day one — been committed to elevating its stature through our art form. The bloodline for MESA bass continued with the first rack-mount chassis bass amplifier in 1980, the D-180. The mid-eighties saw the introduction of the BASS 400 and later in 1988, the BASS 400+ with its stunning pitch, punch and power delivered by an additional 6 x 6L6s bringing the total to 12 x 6L6 power tubes in the mighty power section.

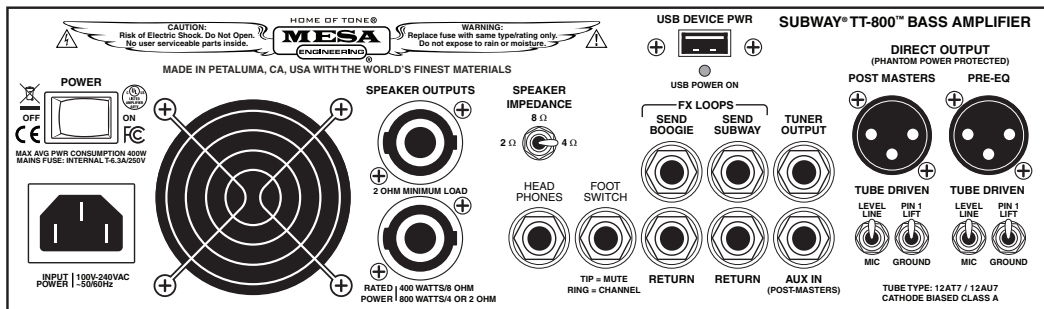
The 400+ went on to become a classic, used by the world's most talented bassists for two decades. Paul McCartney, Mark King, Stanley Clark, Jack Blades, Michael Anthony, Blasko and Bootsy Collins, are but a few of the international stars that put the 400+ center stage to anchor the band during its 20 year build cycle. These iconic amps still bring top dollar when you can find one changing hands on the pre-owned market. While MESA has since pioneered an entire line of tube-driven mosfet amplifiers (including the legendary Walkabout, and lightweight class D amplifiers (Subway series)), that shored up our position in the bass market, changing times have encouraged us to revisit our roots by incorporating Randall Smith's legendary Bass 400+ preamp concepts with our newer Subway technology to create a new approach to a 2 channel bass amp, while remaining true to our long-standing heritage and tradition of tone.

2019 is the 50th anniversary of the Mesa Boogie company. While looking through the company's archives, studying some of Randall's legacy bass amp designs, and talking with the guys working at the company when the 40/400+ were being developed, we were es-

## FRONT VIEW: SUBWAY® TT-800™



## REAR VIEW: SUBWAY® TT-800™



pecially drawn to the story of the 400/400+ models. It became clear that there were additional paths and evolutions that these amps might have taken had the technology available today been available back then, by combining Randall's classic tube circuitry with newer technology and manufacturing techniques to create what we think is the best of both worlds. The SUBWAY TT-800 combines a true 2 channel preamp (a classic "BOOGIE CHANNEL" preamp and a "SUBWAY CHANNEL" preamp) along with our rock solid 800 watt, 2 ohm capable class D power amplifier into a bass amp full of the features that are expected by the top players of today. The SUBWAY TT-800 is hand built in Petaluma, CA. with the world's finest materials.

## OVERVIEW: FRONT PANEL

The SUBWAY TT-800 begins with the front panel input section, which is comprised of the INPUT jack, MUTE switch and HIGH/LOW GAIN switch. The INPUT jack feeds a high impedance J-FET input "buffer amplifier" which provides appropriate loading for all active and passive pickups (including most piezo types). The MUTE switch silences the signal from the INPUT jack to the SPEAKER output, HEADPHONE output and both DI outputs for silent tuning with a tuner connected in line with the instrument or to the TUNER OUTPUT jack. The HIGH/LOW GAIN switch sets the gain of the input stage, allowing better scaling of the input stage for more precise control of levels as well as to improve the performance when intentionally overdriving the gain stage circuitry. Also present are the DEEP and BRIGHT switches, something that was common to some versions of the Bass 400/400+ and Subway models. Indicator (tally) LEDs are provided for all switched functions. Both channels share a common 12AT7 (or 12AU7) vacuum tube GAIN stage (V1A and V1B), splitting from this point to feed each channel's respective circuitry.

**BOOGIE CHANNEL:** This channel takes original concepts from Randall Smith's Bass 400/400+ designs and combines them with some of today's most requested features. One concept is the first tube gain/buffer stage (V1A & V1B), common to both channels, which also drives the pre-eq DI output. A feature pioneered in the Subway series is the precision variable HIGH PASS FILTER, which blocks unwanted sub-sonic signal, as well as being useful for specific tone shaping functions (especially related to preamp overdrive). Another feature is the all tube gain stage (V2A and V2B) which directly drives the BOOGIE TONE STACK EQ. Historically, this is the basic eq/tone stack that Randall has favored going back 50 years, updated with a new mid shift control, and is in part responsible for the more aggressive voicing of this classic "old school tone" channel. The output feeds a fully buffered pre-channel "master volume" effects loop (more on this later), channel "master volume", channel switching and output drive circuitry.

**SUBWAY CHANNEL:** This channel takes much of its inspiration from our popular Subway series, with elements from the D-800, D-800+ and the WD-800. Of course the variable HIGH PASS FILTER is provided which, similar to the WD-800, directly drives the tube gain stage (V3A). This is followed by an active Baxandall EQ which consists of LOW and HIGH FREQUENCY shelving bands plus a sweep mid band. The Subway channel retains the voicing similarities of the D-800, D-800+ and WD-800 models, but with some subtle differences as well. The output of the EQ section feeds a fully buffered pre-channel "master volume" effects loop (more on this later), channel "master volume" control, channel switching section and the output drive circuitry.

**MASTER SECTION:** The master section of this amp contains some unique features that make this model stand out as an "amplification solution" and not just a bass amp. Each effects loop can operate as a standard series effects loop but can also function as a signal insert point, allowing an external preamp (pedal or rack mount) to be substituted in place of an on-board preamp via the EFFECTS RETURN jack. These return inputs allow the signal to follow the channel switching and post eq DI routing, so that any combination of onboard preamps and external preamps may be used seamlessly, the balance between either of the return inputs may be adjusted via the channel "master volume" controls. Using the onboard preamps, the combination of positions between the input GAIN and CHANNEL MASTER volume, along with the signal strength from your bass (which is also affected by your playing style and touch) allows for a wide range of tones and feel, from shimmering clean to overdriven and everything in between. Another unique feature is the power amp overdrive symmetry control which modifies how the output tube emulation works by altering how the signal enters and exits the soft clipping portion of the circuitry. As in the WD-800, there is POWER AMP DAMPING control, but unlike the WD-800, this function is tied directly to the impedance selector switch on the back and automatically tracks the speaker impedance just like in a tube amp's output transformer. What is POWER AMP DAMPING you might ask? This damping function fine tunes the inherent looseness/tightness of the power amp which gives more bounce to the feel and makes the amp a little bit more interactive with the speakers. By integrating it with the impedance selector switch, it's performance remains more consistent from 8 ohms all the way down to 2 ohms.

## OVERVIEW: REAR PANEL

On the rear panel, you will find the power switch, and the AC mains inlet on a standard IEC “C14” connector. The SUBWAY TT-800 contains an auto-ranging universal power supply that can accept and operate on any voltage between 100-120 volts & 220-240 volts AC, 50/60Hz without the need for any user adjustments or fuse change. This feature makes these amps ideal for the international touring musician who plays in a variety of global regions. The only thing necessary to make the amp work is the correct power (mains) cable that matches the power outlet/receptacle of the region. It is important for the mains power to be grounded/earthed for safety as well as for EMC reasons.

Next are parallel connected NL-4 SpeakOn™ connectors, which are wired with the amplifier positive to terminal “1+” and the amplifier negative to terminal “1-“. An IMPEDANCE SELECTOR switch provided to properly match the power amplifier to the load.

The SUBWAY TT-800 is equipped with a HEADPHONE output, which will drive all common headphones and IEM ear pieces between 8 and 32 ohms (and can be used safely with no speaker cabinets connected to the head), a MUTE/CHANNEL SW footswitch jack that mutes the signal when the tip is shorted to the sleeve and switches channels when the ring is shorted to sleeve. Additional connections are provided for individual serial CHANNEL EFFECTS LOOPS, an AUX input, and a TUNER output.

One feature that sets your new SUBWAY TT-800 apart from the rest of the market is the inclusion of a two studio grade XLR balanced DIRECT OUTPUTS. Unique to this amp is that both DI outputs are tube driven, the first is pre eq and pre channel switching, the second is post channel effects loop, volume and channel switching so that the signal automatically tracks channel switching and channel volume balance, even if an external preamp is being used in place of one or both on-board preamps. A MIC/LINE level switch and pin 1 GROUND LIFT switch is provided on both DI outputs. Circuit attributes include full phantom power protection, high RFI immunity and extreme tolerance to ground potential differences.

Another feature carried over from the Subway WD-800 is the inclusion of a USB charging port, which allows you to charge most USB connected devices. This can be handy when rehearsing with an MP3 player, tablet, or phone. With a suitable converter cable, USB power can be used to power pedals and outboard devices.

## OVERVIEW: TUBES / VALVES

The SUBWAY TT-800 uses specially designed circuitry that replicates the uniqueness of our earlier legacy designs, but doing so in ways that allow us to exploit advantages of modern lightweight technology while remaining faithful to Randall's vision. This involves a type of design called “blueprinting”, where we take the response curves of the original circuits and overlay response curves of prospective new circuits to match up the various parameters (including frequency, filters, dynamics, linearity, clipping/overdrive responses). Once we matched up the curves as closely as we can, we shared these results with original design team (yes, many are still here!) to get a sense of what differences they might have preferred, with the benefits of hindsight and newer technology. This included extensive discussions regarding evolutionary changes in requested feature sets, music styles, playing styles, speakers, instruments, expectations, and player needs. The result is that these circuits, using 12AT7 and 12AU7 tube types, were consistently chosen as meeting the above criteria best. The 12AX7 variants just didn't have the necessary performance parameters to match the target curves with the newer circuitry, and may not bias up properly like a 12AT7 or 12AU7.

V1: This tube handles the input gain and buffering functions, and is located after the deep and bright filters. Generally, this tube is not overdriven except with the GAIN SWITCH in the high position, with a high output bass and an aggressive playing style. In general, a 12AT7 will have slightly more complex harmonics and add a little more texture compared with a 12AU7 in this position. A 12AU7 will typically be a little tighter with a lower ratio of harmonics which may feel a bit more articulate and open with a “simpler” feel. The amp ships with a 12AT7 in this position.

V2: This tube handles all of the BOOGIE CHANNEL gain as well as driving the tonestack eq. network. As the GAIN CONTROL is turned up you will reach a point where this tube will begin to overdrive. Given that the channel is strongly based on the Mesa Bass 400/400+ topology, this will produce that classic Mesa Bass 400/400+ signature tube growl. Generally, a 12AT7 is the preferred tube for this position because it tends to overdrive a little bit earlier and has a bit looser feel to the overdrive. If you prefer a cleaner, punchier, less colored tone when driven hard, a 12AU7 may be a better choice. The amp ships with a 12AT7 in this position.

V3: This tube handles all of the SUBWAY CHANNEL gain as well as driving the Baxandall eq. network. As the GAIN CONTROL is



turned up, at some point this tube will begin to overdrive, adding a more neutral, modern tube overdrive. Generally, a 12AT7 is the preferred tube for this position because it is a little more colored and adds a nice dimensionality to the more modern channel voicing. If you prefer a cleaner, less complex or colored tone, especially when driven hard, a 12AU7 may be a better choice. The amp ships with a 12AT7 in this position.

## INSTANT GRATIFICATION:

The SUBWAY TT-800 is really a very simple amp to get great tone. Start with the MUTE switch down (mute off), the GAIN SWITCH to the low gain position, the DEEP and BRIGHT SWITCHES off, and the HIGHPASS FILTER set to the 9:00 position.

On the SUBWAY CHANNEL, set the BASS, MID and TREBLE eq controls in the “flat” (12:00 straight up) position, the SUBWAY CHANNEL VOLUME control set to the 1:00 position.

On the BOOGIE CHANNEL, set the BASS control, to the 10:30 position, the MID control to the 3:30 position, the MID FREQ control all the way to the normal position and the TREBLE control to the 10:00 position. Set the BOOGIE CHANNEL VOLUME control set to the 1:00 position.

Set the IMPEDANCE SELECTOR SWITCH on the back of the amp to match the total impedance of the connected speakers (never set this switch to an impedance higher than the impedance of your total speaker load). Plug your bass in, select the SUBWAY CHANNEL with the channel switch and turn the SUBWAY CHANNEL GAIN control up until you reach your desired volume. Now switch to the BOOGIE CHANNEL and turn the BOOGIE CHANNEL GAIN control up until you reach your desired volume.

Switch between the two channels to get a feeling for the native voicings of the two channels. Now, experiment by setting the GAIN, DEEP and BRIGHT SWITCHES, the HIGHPASS FILTER, MID FREQ and EQ to taste. The more time you spend with your new amp, the easier and quicker it will become to get to the tone that’s in your head.

## FRONT PANEL (CONTROLS & FEATURES)

**INPUT JACK:** This 1/4” (6.35mm) TS (tip-sleeve) jack is the instrument INPUT that feeds the first input amplifier stage (V1A & V1B) of the SUBWAY TT-800. This stage is inherently transparent, and directly feeds all remaining circuitry including the following tube gain stages.

**MUTE SWITCH:** This switch (and its associated red indicator/tally LED) mutes the audio signal being sent to all outputs except the TUNER OUT jack for silent tuning with either a tuner connected to the instrument cable and then through to the amp or to the TUNER OUTPUT jack. When the switch is in the up position, the red LED will illuminate and NO audio will be present at either of the DIRECT OUTPUT jacks, EFFECTS SEND jacks, HEADPHONE jack, or the SPEAKER OUTPUT jacks. This switch can also be used to place the amp into standby mode before and between sets without adjusting any of the controls. When using the MUTE FOOTSWITCH, this mini-toggle switch must be placed in the down position. When using the EFFECTS RETURN jack(s) as inputs for external preamps, these signals will not be muted by the mute switch.

**GAIN SWITCH:** This switch (and its associated blue indicator/tally LED) sets the internal sensitivity (drive level) of the input amplifier stage. This function allows the tube gain stages following the input amplifier to be driven harder in the high gain position, making it easier to overdrive the tube stages if that’s part of your desired tone. In the low gain position, it also allows for very high output pickups to drive the tube gain stages at a level that will not cause overdrive or distortion. Simply choose the position that gives you the desired results. This control does not change or lower the input impedance of the amplifier, nor does it “suck tone” like the input pads can do on some other amps.

**DEEP SWITCH:** This switch (and its associated blue “tally” or “indicator” LED) engages the DEEP filter, our take on classic low frequency enhancement and extension. Engaged, there is a mild boost in the very low frequency response while also lowering the effective high pass filter frequency. This combination brings a more round, thicker, fatter response to the bottom end. When using with small (compact style) cabinets, and limited power handling capabilities, especially with HIGH PASS FILTER settings below ~40Hz, be aware of the possibility of damage to the speaker(s) due to overpowering at high volumes.



**BRIGHT SWITCH:** This switch (and its associated blue “tally” or “indicator” LED) engages the BRIGHT filter, which causes a rising response at higher frequencies much like the “bright” switches found on many popular classic tube amps. Engaging this filter can bring some “sizzle & bite” into the tone.

## **BOOGIE CHANNEL:**

**GAIN CONTROL:** This control determines the gain (drive level) of the BOOGIE CHANNEL's 12AT7 (or 12AU7) vacuum tube gain stages (V2A & V2B). Overdriving these gain stages may be a desirable tonal characteristic of your playing style, to increase the amount of overdrive beyond what the range of this control allows, simply switch the INPUT GAIN SWITCH to the high gain position. Note that the BOOGIE CHANNEL is already a higher gain channel than the SUBWAY CHANNEL. When using significantly overdriven tones, you may find it helpful to back down on the TREBLE EQ a little bit to reduce harshness and also to reduce the BASS EQ (and/or increase the frequency on the high pass filter) to increase the clarity and impact. These tube gain circuits draw inspiration from elements of our legacy amps, primarily the Bass 400/400+. If it's your tone, this tube gain stage is designed to be overdriven, so give it a try, but it's also monstrous when run clean. When employing heavier overdrive, it's generally more pleasing reduce the tweeter level if your cabinets have tweeters. Note that the GAIN control operates in a linear fashion, an increase in gain continues linearly throughout the entire rotation of the control. The amount of overdrive is increased by turning the GAIN CONTROL up beyond the clean area of operation, and the overall volume will be controlled by turning the CHANNEL VOLUME down as needed.

**HIGH PASS FILTER:** This control sets the low frequency roll-off point of the amplifier channel, and is an important feature in maintaining control over the extreme low end (especially under high drive conditions). This precision two pole variable filter is adjustable from 25Hz to 125Hz. While HPF's have been standard fare within the pro audio industry for decades, this feature has only appeared in bass guitar amplifiers within the past few years (with some notable exceptions). This filter provides additional mechanical protection to the speakers from over-excursion by reducing the power to the speaker below the frequency range that the speaker cabinet provides adequate acoustic loading to the speakers. This is one of the primary (and preventable) causes of premature speaker failure, especially with compact speaker cabinet products that are driven very hard. A second use for this filter is to roll off the very low end when overdriving the amp. This prevents the signal from becoming muddy, and preserves the naturally musical growl and grit of the overdriven signal. A third use is for rolling off the extreme low end when boosting the bass eq control, allowing for some unique low mid voicings, and a fourth use is for reducing the sub-bass frequencies that can get out of hand in a boomy room. Experimentation will be helpful in all of these applications. This control sweeps between a linear scale between the labeled endpoints. The 12:00 position equates to ~75Hz.

**BOOGIE TONESTACK EQ:** This eq section is based very much on the legacy Bass 400/400+ tonestack, but also stretches back to Randall's earliest days, hand building amps in a Lagunitas mountain shack (a converted dog kennel). Starting with the Mesa 450, the path was set, and along with Doug, Mike, Jim and Dan, all still with us today, the rest is history. All of these legacy amps have this tonestack in common, and this amp takes this tonestack to a new level with more refined and smoothly operating BASS-MID-TREBLE controls plus a new sweepable MID FREQ (MID SHIFT) control which provides expanded range and Q of the mid portion of the circuit. Even though this is a “passive” tone network, additional makeup gain circuitry makes it even more usable and toneful than before by reducing inherent losses through the passive network. These are evolutionary steps in our path, evolution being something that we have done continuously over the past 50 years.

**BASS CONTROL:** This control is shelving type filter, responsible for the amount (or volume) of low frequencies present in the signal, relative to the rest of the spectrum. Low frequencies (<80Hz) are responsible for the “depth”, “bottom”, “roundness”, and “feel” of the tone. The HIGH PASS FILTER control, combined with the BASS CONTROL adds another dimension of tone sculpting by rolling off the extreme low end when boosting the bass eq control, allowing for some unique bass and low mid voicings.

**MID CONTROL:** This control is responsible for the amount (or volume) of midrange present in the signal, relative to bass and treble. There is an inherent mid dip present (in this design around 500Hz), which is characteristic of this style of tone stack eq, so for a stronger, flatter response you will find this control set between the 1:00 and 4:00 positions will get you there. The midrange is responsible for the articulation and perception of pitch, especially in the lowest octave of the instrument, because of how the harmonic spectrum is distributed in the output of a bass guitar's signal.

**MID FREQ CONTROL:**

This control shifts the response of the MID CONTROL as the control is rotated clockwise from the normal “classic” position. In the fully clockwise (shifted) position, the amp will be voiced flatter with a little more of a modern feel. This control simultaneously adjusts both the range and the effective Q of the midrange filter, becoming narrower and steeper as the control is rotated counter-clockwise. Don’t worry about the technicalities though, just experiment and let your ears be the guide.

**TREBLE CONTROL:**

This control is a shelving type filter responsible for the amount (or volume) of high frequencies present in the signal, relative to the rest of the spectrum. High frequencies (>2.5kHz) are responsible for the “bright”, “airy”, “clarity”, “shimmery” character of the tone. In this classic circuit, there is quite a bit of high frequency boost available, which might appeal to some styles (especially slap), and also with tweeterless cabinets, but in general better results are obtained with the control operated in the 9:00 to 2:00 position.

**CHANNEL “MASTER” VOLUME CONTROL:**

This control is responsible for the level of the BOOGIE CHANNEL being sent to the power amp, and determines the playing volume of the BOOGIE CHANNEL relative to the SUBWAY CHANNEL. Using the CHANNEL MASTER VOLUME along with the INPUT GAIN control allows the optimal control over playing volume. For example, if you are using high input gain to achieve an overdriven tone, it will be likely be necessary to adjust the CHANNEL MASTER VOLUME down to obtain a reasonable playing volume. Likewise, if you are looking for a very clean tone, you may wish to start with a lower INPUT GAIN control setting and use a higher CHANNEL MASTER VOLUME control setting to obtain the desired playing volume. The CHANNEL MASTER VOLUME control operates in a linear fashion, an increase in volume continues linearly throughout the entire rotation of the control.

**SUBWAY CHANNEL:****GAIN CONTROL:**

This control determines the gain (drive level) of the SUBWAY CHANNEL’s 12AT7 (or 12AU7) vacuum tube gain stage (V3A & V3B). Overdriving this gain stage may be a desirable tonal characteristic of your playing style. To increase the amount of overdrive beyond what the range of this control allows, simply switch the INPUT GAIN SWITCH to the high gain position. When using significantly overdriven tones, you may find it helpful to back down on the TREBLE EQ a little bit to reduce harshness and also to reduce the BASS EQ (and/or increase the frequency on the high pass filter) to increase the clarity and impact. This hybrid tube gain circuit draws inspiration from elements of our legacy amps, including the Walkabout, Carbine, and even from the legendary Bass 400/400+. If it’s your tone, this tube gain stage is designed to be overdriven, so give it a try. When employing heavier overdrive, it’s generally more pleasing reduce the tweeter level if your cabinets have tweeters. Note that the GAIN control operates in a linear fashion, an increase in gain continues linearly throughout the entire rotation of the control. The amount of overdrive is increased by turning the GAIN CONTROL up beyond the clean area of operation, and the overall volume will be controlled by turning the CHANNEL VOLUME down as needed.

**HIGH PASS FILTER:**

This control sets the low frequency roll-off point of the amplifier channel, and is an important feature in maintaining control over the extreme low end (especially under high drive conditions). This precision two pole variable filter is adjustable from 25Hz to 125Hz. While HPF’s have been standard fare within the pro audio industry for decades, this feature has only appeared in bass guitar amplifiers within the past few years (with some notable exceptions). This filter provides additional mechanical protection to the speakers from over-excursion by reducing the power to the speaker below the frequency range that the speaker cabinet provides adequate acoustic loading to the speakers. This is one of the primary (and preventable) causes of premature speaker failure, especially with compact speaker cabinet products that are driven very hard. A second use for this filter is to roll off the very low end when overdriving the amp. This prevents the signal from becoming muddy, and preserves the naturally musical growl and grit of the overdriven signal. A third use is for rolling off the extreme low end when boosting the bass eq control, allowing for some unique low mid voicings, and a fourth use is for reducing the sub-bass frequencies that can get out of hand in a boomy room. Experimentation will be helpful in all of these applications. This control sweeps between a linear scale between the labeled endpoints. The 12:00 position equates to ~75Hz.

**BASS CONTROL:**

This active eq control is a shelving filter that is responsible for the amount (or volume) of low frequencies present in the signal, relative to the rest of the spectrum. Low frequencies (<80Hz) are responsible for the “depth”, “bottom”, “roundness”, and “feel” of the tone. This is an active control with boost and cut, the amount of boost proportional to the clockwise rotation to the right of “flat” (12:00 straight up) position and the amount of cut proportional to the counter-clockwise rotation to the left of “flat” (12:00 straight up) position. As with everything related to EQ, generally, a little bit goes a long way. The HIGH PASS FILTER control,

combined with the BASS CONTROL adds another dimension of tone sculpting by rolling off the extreme low end when boosting the bass eq control, allowing for some unique low mid voicings. Use enough to get the job done and no more. Note that if you have very compact cabinets and need high volumes, you will want to be aware that it is possible to overdrive speakers with excessive bass boost. If your speaker is not getting you enough high level low end, it's possible that you do not have enough "rig for the gig", and "more speaker" is needed (or there is possibly damage to the speakers).

**TREBLE CONTROL:** This active eq control is a shelving filter that is responsible for the amount (or volume) of high frequencies present in the signal, relative to the rest of the spectrum. High frequencies (>2.5kHz) are responsible for the "bright", "airy", "clarity", "shimmery" character of the tone. This is an active control with boost and cut, the amount of boost proportional to the clockwise rotation to the right of "flat" (12:00 straight up) position and the amount of cut proportional to the counter-clockwise rotation to the left of "flat" (12:00 straight up) position.

## PARAMETRIC MID EQ CONTROLS:

**MID CONTROL:** This control is a peak-dip (or bell) style filter that is responsible for the level (or volume) of the corresponding midrange frequencies present in the signal, relative to the rest of the spectrum. The center frequency of the mid band being affected is selected with the mid frequency control (the next control to the right). This is an active control with boost and cut, where the amount of boost is proportional to the clockwise rotation to the right of "flat" (12:00 straight up) position, and where the amount of cut is proportional to the counter-clockwise rotation to the left of "flat" (12:00 straight up) position of. Remember that a little eq goes a long way, use just enough to get the job done.

**MID FREQ CONTROL:** This control is responsible for selecting the center frequency (or pitch) that the MID EQ control acts on. Rotating this control sweeps the center frequency from lower (counterclockwise) to higher (clockwise). If the eq gain control is set at 12:00 noon ("flat"), there will be no effect when rotating the frequency control because there is no boost or cut being performed. Sweep range is 150Hz – 2.5kHz. The frequency distribution of the sweep control is linear from endpoint to endpoint. It should be noted that these controls do not act on a single frequency but act on a range of frequencies approximately 1/3 of an octave on each side of the center frequency.

**CHANNEL "MASTER" VOLUME CONTROL:** This control is responsible for the level of the SUBWAY CHANNEL being sent to the power amp, and determines the playing volume of the SUBWAY CHANNEL relative to the BOOGIE CHANNEL. Using the CHANNEL MASTER VOLUME along with the INPUT GAIN control allows the optimal control over playing volume. For example, if you are using high input gain to achieve an overdriven tone, it will be likely be necessary to adjust the CHANNEL MASTER VOLUME down to obtain a reasonable playing volume. Likewise, if you are looking for a very clean tone, you may wish to start with a lower INPUT GAIN control setting and use a higher CHANNEL MASTER VOLUME control setting to obtain the desired playing volume. The CHANNEL MASTER VOLUME control operates in a linear fashion, an increase in volume continues linearly throughout the entire rotation of the control.

## MASTER SECTION:

**CHANNEL SWITCHING:** This is a true 2 channel amp with A/B switching available either on-board via this mini-toggle switch or via an optional footswitch. This allows for switching between the SUBWAY and BOOGIE CHANNELS, and since the switching is done after each channel's EFFECTS RETURN jack, there is the additional feature of being able to substitute your "favorite" preamp in place of one of the on-board preamps by plugging the out-board preamp into the effects return in place of one of the on-board preamps and having the amp switch between it and the remaining on-board preamp. As an extreme example, this amp could also be used with 2 outboard preamps, as a switching platform with a power amp. When using it this way, the POST-EQ DIRECT OUTPUT will still provide the switched signal post-channel volume control. When used with the optional footswitch (available from our dealers or our on-line store), this mini-toggle switch must be in the down position otherwise the BOOGIE CHANNEL will over-ride the footswitch.

**OUTPUT OVERDRIVE SYMMETRY:** Another "new" concept introduced in the SUBWAY TT-800 is the OUTPUT OVERDRIVE SYMMETRY control, which provides adjustment to the symmetry of the output soft clip circuitry waveform just like how many tube phase inverters and tube output stages behave in real world tube amps. This works in conjunction with the internal damping

factor control that automatically tracks load impedance like an output transformer via impedance taps. These features are a continuation of the research that led to the development of the Subway WD-800's well received power amp damping control. This feature's contribution becomes apparent the closer to output stage limiting that the amp is played. It's somewhat subtle with as much of an impact on feel as on tone. Just like on the bass guitar itself, perfect symmetry of the waveform is not necessarily a desirable attribute. By decreasing the amount of symmetry in the overdrive circuitry, the overdrive character becomes more smooth, polite and forgiving as well as allowing added interaction with the symmetry of the bass guitar's signal. Some players may perceive this as an added richness or dimensionality to the tone and feel of the amp when driven hard.

Why would a player want to be able to adjust the symmetry of the output overdrive? Control over the symmetry changes how the power amp enters and exits an overdrive event on a cycle by cycle basis. The greater the symmetry the tighter and more abrupt the signal enters and exits overdrive. Perfectly symmetrical "clipping" appears to have the greatest "compression effect" and feels a little stiffer and more "solid state like". As the overdrive event becomes less symmetrical, the signal enters the overdrive region more gradually and with a progressive effect, which acts more like a soft knee compressor. It tends to be more forgiving, retaining a more dynamic feel, with greater articulation.

**POWER AMP DAMPING:** This is a "hidden feature" of the SUBWAY TT-800, first introduced in the Subway WD-800. One of the primary differences between solid state and tube amps is how tightly the speaker is coupled to the power amplifier's output stage. All amplifiers have some resistance (more correctly, impedance) between the power circuitry and the speaker. This impedance greatly affects how tightly the amplifier can control the speaker. High damping means that there is very little impedance between the amplifier's output circuitry and the speaker, the feel will be tighter and more controlled. Low damping means that there is more impedance between the amplifier's output circuitry and the speaker, the feel will be looser and less controlled. Because a speaker has a complex impedance, lowering the damping can be responsible for a bit more "bloomy", organic feel (especially in the low end).

Generally, tube amps fall into the medium to low damping category while solid state amps typically fall into the higher damping category. Speakers have mass and the force required to accelerate the mass back and forth comes from the power generated by the amp and delivered through the voice coil sitting within the magnetic gap of the speaker's motor. This means that to accurately accelerate and decelerate the cone at each end of its travel requires efficient power delivery to the speaker. As the power delivery becomes less efficient, the force becomes less and the cone accelerates and decelerates more sluggishly, corresponding to undershoot and overshoot of the cone. This, plus native voicing, are the most likely explanations for the "bloomy", slightly "round bottom" feeling reputation that many tube amps enjoy.

In tube amps, the impedance between the output stage and the load is high (resulting in a low damping factor of approximately 20-50) while in a solid state amp the impedance between the output stage and the load is low (resulting in a high damping factor of maybe 500 to 1000). These are inherent properties of the respective topologies. These damping factor numbers also vary with frequency, as does the speaker impedance, so the interaction is quite complex actually. Since a tube amp matches the power tube plates to the load through an output matching transformer, changing the tap automatically corrects for changes in the output impedance, therefore the damping factor remains reasonably constant (though low) from 8 ohms down to 2 ohms.

What does this mean? With lower damping (compared with typical solid state, including class D), an amp will tend to feel a little looser (especially on the low end), more bloomy, and a bit more organic. While there will be some tonal differences, it's really more of a feel difference. With higher damping, an amp will feel a little tighter, dryer and more controlled on the bottom end. To some players it may feel more "immediate", others may describe the feeling as "tight" or "dry". On the SUBWAY TT-800, the damping factor is designed to be medium-low (at approximately 50, like the Bass 400+) and remains relatively constant no matter what the speaker load is, emulating what happens through the output transformer on a tube power amp. This feature is controlled automatically by the impedance selector switch located on the back of the amp, which should be set to the impedance of the connected speaker load.

**POWER LED:** This blue LED indicates that the amplifier is connected to a power source and is switched on, operating correctly. If this LED is not on, double-check the power source, and be sure the power cable is firmly inserted into the IEC power inlet socket.

**PROTECT LED:** This red LED indicates that the amplifier has entered protect mode and is either protecting itself from an external fault (such as blocked ventilation, shorted speaker cable or defective speaker), or that there is an internal fault within the amp itself. Verify that it's not a fault external to the amplifier by disconnecting all cables (except the power cable) from the amplifier. If the protect LED is no longer lit, the problem is most likely a bad speaker cable or defective speaker. Testing with a set of headphones



can help to narrow down the problem, as the headphone signal is derived post-power amp using a frequency compensated, cabinet emulation network.

**LIMIT LED:** This amber LED indicates that the power amp is nearing maximum power and is entering the soft clip/limit output tube emulation mode. Soft clip/limit output tube emulation mode mimics many of the desirable characteristics of tube amp output stage overdrive (like soft clip character, damping, symmetry, recovery) while eliminating the common solid state clipping artifacts. There is approximately 6dB of range on this circuit, driving beyond this, of course, will cause gradual output stage clipping. It's acceptable for this amplifier to operate in output stage overdrive mode (if that's the tone you are after) with the LED flashing roughly 25% of the time on.

## REAR PANEL (CONTROLS & FEATURES)

**POWER SWITCH:** This switch is used to turn your amp on and off by disconnecting the amplifier from the power source (mains). This amplifier complies with the EU Eco-design directive by providing a switched "0.00 watt power consumption off-mode".

***Note** that there is protection circuitry built in that prevents the amp from starting up multiple times within a 20 second window. If you turn the amp on, then off the on again, there will be ~20 second delay in the power-up sequence.*

**IEC POWER INLET:** This power inlet conforms to the IEC C-14 type standard, and is to be used with a cordset containing a matching connector, and appropriate plug for the intended market.

**OPERATING POWER REQUIREMENTS:** The SUBWAY TT-800 is designed with a universal, auto-ranging power supply that automatically adjusts to line voltages between 100-120V and 220-240V, 50 or 60Hz. The power supply is internally monitored by supervisory protection circuits and thus contains a non-user replaceable fuse that opens in the unlikely event of a major failure. The amplifier is designed to be used with grounded or earthed power, meaning that the chassis is always maintained at ground/earth potential even in the event of a gross failure within (or external to) the amplifier. Never remove the grounding/earthing pin from the power plug, or alter the power cable.

**COOLING FAN:** The SUBWAY TT-800 incorporates a low speed, high reliability cooling fan which allows it to drive stressful loads (including 2 ohms) at very high duty cycles. Be sure the fan's inlet and head's vent slots are not blocked or the amplifier's protection circuits will shut the amplifier down due to a thermal fault condition. This quiet, low noise fan will always run at a low speed, the air flows into the chassis from the back and out through the front and side slot vents.

**SPEAKER OUTPUTS:** The SUBWAY TT-800 is rated to drive a minimum 2 ohm load (with the impedance selector switch set to the 2 ohm position), meaning either 4 x 8 ohm cabinets or 2 x 4 ohm cabinets. The amplifier incorporates a pair of SpeakOn™ NL4FC connectors wired in parallel that mate with either NL2MP or NL4MP plugs. ***The IMPEDANCE SELECTOR SWITCH needs to be set to the combined speaker load connected to the amp.***

Cables using NL-2 plugs contain only 1+/1- terminals and will always be correctly wired for use with the amplifier, but cables using NL4 connectors come with different wiring configurations. If using cables with NL-4 connectors, they may be constructed with standard 2 wire cable which must be wired 1+ to 1+ and 1- to 1-. If the cable contains 4 wires, that's ok because terminals 2+ and 2- which are connected to the second pair are simply not used.

The cables to avoid are what are called NL4 bridge mode cables, which are typically 2 wire, and wired 1+/1- on the speaker end and 1+/2+ on the amplifier end (used for pro audio power amps that support this specific bridged termination). These cables SHOULD be clearly marked but sometimes they are not, so be aware of the possibility when buying or troubleshooting cables.

Why SpeakOn™ cables and not the "old favorite" 1/4" (6.35mm) connector? There are several important reasons, the first being that with updates to global safety regulations, amplifiers like the Subway TT-800 require "touch-proof connections". A second reason is because the power amplifier's internal topology is BTL (bridge tied load), neither output terminal are at ground potential, so touch-proof connectors provide an added layer of safety to the system. A third reason is the often poor quality of the 1/4" (6.35mm) connection, which at low power is not much of an issue, but at higher power levels become a potential failure point. A fourth reason is that one common failure mode of amplifiers is when the 1/4" (6.5mm) speaker cable works loose at the speaker cabinet, the tip gets shorted to the sleeve within the speaker jack's bushing, applying a short circuit to the amplifier's speaker output. While this amplifier is protected

against such faults, it's not good practice to test this protection on a regular basis.

**Never connect the speaker output to anything except a speaker. This especially means not to a DI, even a speaker level DI because the Subway TT-800 utilizes a BTL (bridged) output power amplifier.** On a bridged amplifier, the minus terminal that is normally at ground is actually a driven output that swings above and below ground at peak currents of up to 30 amps. Using a DI, the normal shell or ground terminal of the DI is not at ground at the amplifier's end but may be connected to the console (mixer) circuit ground bus at the console's end which would cause the amplifier to drive dangerous currents into circuitry that does not expect to see such currents, nor is it generally protected from this fault. **So, in addition to possibly damaging your amp, you could also damage a (potentially) very expensive console.**

**SPEAKER IMPEDANCE:** All speakers have a "rated nominal impedance". Impedance is the resistance to AC electrical signal that the amplifier is tasked with delivering. The lower the speaker's impedance, the greater the current that the power amplifier must provide. The lowest impedance that the SUBWAY TT-800 amplifier is capable of driving safely is 2 ohms (with the impedance selector switch in the 2 ohm position). Note that measuring speaker cabinets using an ohm meter will not give accurate results because ohm meters read DC resistance not AC impedance (technically called "reactance"). AC impedance will always be greater than the DC resistance, an 8 ohm speaker will typically measure between 5 and 7 ohms, a 4 ohm speaker will typically measure between 2.5 and 3.5 ohms when measured with an ohm meter (or digital multi-meter).

**SPEAKER POLARITY (OR PHASE):** All speakers have "polarity". A speaker that is wired in accordance to the current industry standard will move forward when a positive DC voltage is applied to the positive terminal of the speaker. While there are well established standards, there are also deviations from standards, either by legacy (for example early JBL drivers), by faulty repair (incorrectly wired cabinet or defective recone parts) or a manufacturer choosing to ignore the standard. If a multi-driver speaker cabinet or a pair of speaker cabinets does not appear to have the expected output or low end, it's always a good idea to double-check that all drivers move forward with positive DC voltage (no more than a 9 volt battery) momentarily applied to the + terminal (this will be the 1+ terminal on a SpeakOn™ connector, or the tip on a 1/4" (6.5mm) connector). If you find that on a multi-speaker cabinet, one speaker moves out while the other does not move, it's likely that the non-moving driver has either failed or has become disconnected. If one driver moves out while the other driver moves in, it's likely that the driver moving in is wired incorrectly (or in a sealed cabinet is failed or disconnected and is merely being moved in the opposite direction by coupling to the air mass inside the cabinet itself). Being aware of these possibilities can often help when troubleshooting something that doesn't appear to be performing quite right.

**IMPEDANCE SELECTOR SWITCH:** The SUBWAY TT-800 is equipped with an IMPEDANCE SELECTOR SWITCH to match the amplifier's drive capabilities to the connected speaker load. This is important for a couple of reasons, the first being that proper matching increases performance and prevents damage to the amp. The second reason is that the power amp behavior, including damping control, tracks the load matching via the impedance selector switch, which improves the feel and dynamics. **The IMPEDANCE SELECTOR SWITCH needs to be set to the combined speaker load connected to the amp.**

The chart below will help you choose the correct switch position for any valid combination of cabinets you might want to use:

SPEAKER COMBINATION	CALCULATED LOAD	IMPEDANCE SWITCH POSITION	POWER DISTRIBUTION PER CABINET
1 x 8 ohm cabinet	8 ohms	8 ohms	100% to the single cabinet
2 x 8 ohm cabinets	4 ohms	4 ohms	50% to each cabinet
3 x 8 ohm cabinets	2.67 ohms	2 ohms	33% to each cabinet
4 x 8 ohm cabinets	2 ohms	2 ohms	25% to each cabinet
1 x 4 ohm cabinet	4 ohms	4 ohms	100% to the single cabinet
2 x 4 ohm cabinets	2 ohms	2 ohms	50% to each cabinet
1 x 8 ohm + 1 x 4 ohm cabinets	2.67 ohms	2 ohms	33% to the 8 ohm cabinet
			66% to the 4 ohm cabinet
2 x 8 ohm + 1 x 4 ohm cabinets	2 ohms	2 ohms	25% to each 8 ohm cabinet
			50% to the 4 ohm cabinet

SPEAKER COMBINATION	CALCULATED LOAD	IMPEDANCE SWITCH POSITION	POWER DISTRIBUTION PER CABINET
1 x 2 ohm cabinet	2 ohms	2 ohms	100% to the single cabinet

**HEADPHONE OUTPUT:** The SUBWAY TT-800 includes a 1/4" (6.5mm) TRS tip-ring-sleeve headphone output jack, which will drive all common headphones and IEM ear pieces between 8 and 32 ohms (and many well above 32 ohms). ***It is not necessary to have a speaker connected to the amp when using headphones, it is completely safe to operate the amp without a speaker load.*** It's advisable to use caution whenever sticking a sound source in your ear, as damaging volume is possible, especially with "bass player accidents", and when volume is factored over a long period of time. ***This output contains additional cabinet emulation circuitry. This output should not be connected to anything but headphones, ear buds or IEM ear pieces.***

**MUTE/CHANNEL FOOTSWITCH:** This dual function footswitch jack is used in conjunction with a standard latching two button footswitch terminated with a 1/4" (6.35mm) tip-ring-sleeve plug. When the TIP is shorted to the sleeve, the signal is muted. ***(Note that the front panel MUTE SWITCH must be in the down position for this function to work, otherwise, the front panel switch over-rides the footswitch by placing the amp in mute mode regardless of the position of the footswitch).*** When in the mute mode, the signal is available only at the tuner output jack, the signal is muted at the speaker output, headphone output, effect send outputs and DI outputs. When the RING is shorted to sleeve, the channels will switch between the BOOGIE and SUBWAY channels and the green LEDs will indicate which channel is selected ***(Note that the front panel CHANNEL SWITCH must be in the down position for this function to work, otherwise, the front panel switch over-rides the footswitch by placing the amp in BOOGIE CHANNEL mode regardless of the position of the footswitch).*** MESA sells SUBWAY TT-800 specific footswitches (two button) separately through our authorized dealers and distributors, our parts and accessories online store, or by contacting our customer service department.

**EFFECTS LOOPS:** A serial (series) effects loop is provided for each channel, consisting of 1/4" (6.35mm) effects send and effects return jacks. These jacks are line level, and a convenient PREAMP OUTPUT/ INPUT patch point that can be used in the following ways:

1. For connecting "serial" line level outboard effects devices such as compressors, limiters and gates, the effects send on the amp would go to the input of the effects device and the output of the effects device would go to the return on the amp. The loop may also be used with parallel outboard devices such as delays, reverbs, harmonizers and octavers, etc. by using the wet-dry mix control on the outboard device to mix the dry with processed signal.
2. The effects send jacks can be connected to a direct box for sending each channel separately post everything except channel volume and power amp emulation control.
3. The effects return jack on either (or both) channels can be used as an input from an external preamp (pedal or rack mounted). This input feeds the respective CHANNEL MASTER VOLUME control and allows seamlessly integration with the channel switching circuitry contained within the amp. You can substitute either or both on-board channels with your "favorite preamp" while retaining the POWER AMP OUTPUT, HEADPHONE OUTPUT and POST-EQ DIRECT OUTPUT functions.

The effects loop's return jack contains a "normal switch" that interrupts the signal whenever a plug is inserted into the return jack, and automatically bypasses the effects loop when the plug is removed. Only shielded instrument/line level signal cables (not speaker cables) should be used for connections in the effects loop.

**AUX INPUT:** This amplifier is provided with a 1/4" (6.35mm) TRS AUX input. This TRS stereo jack properly sums left and right channels from an MP-3 player, i-device, or laptop as many of these new devices do not contain adequate circuitry for proper summing. The signal injection point is right ***after*** the CHANNEL MASTER VOLUME controls, you will need to use the player's volume control to balance the level between your bass and the playback device. Note that for best performance, a 1/8" (3.5mm) TRS to 1/4" (6.5mm) TRS cable (also called a stereo cable) should be used. This will always match between devices and allow the amplifier's automatic summing circuitry to work properly. For upright players, this input can be used to plug the output of your upright's outboard preamp (such as our Rosette, Subway or Subway Plus PRE-DI) into the power amp if you do not wish to use the channel switching capabilities of the effects loop return. The level of this input is controlled by the volume on the external device such as the MP-3 player or the controls on your outboard preamp. ***Please note that this input is after the CHANNEL MASTER VOLUME controls***



*and operates like a “bus input” directly feeding the power amp. You will need to use the volume control on the aux device and should start with the aux device’s volume all the way down before powering the amp up.*

**DIRECT OUTPUTS (DI OUT):** A new feature that sets your new SUBWAY TT-800 apart from the rest of the market is the inclusion of a two tube driven studio grade XLR balanced direct outputs:

**PRE-EQ DIRECT OUTPUT:** This output is pre-channel gain stages, but is a little unique due to some enhanced features that make it more useful for many practical applications. The signal take-off point for this output is post front end gain, post deep and post bright switches as well as being tube driven by the very first tube stage. This brings additional character to the signal, while remaining pre channel gain control, pre eq and pre channel volume controls. This allows the basic character of the amp’s neutral voicing to be set up and sent to this direct output.

**POST-EQ & POST MASTER DIRECT OUTPUT:** This output is also unique as it is post both channel’s eq, post channel volume and post channel switching, which allows it to capture the output tube emulation circuitry along with each channel’s HPF and EQ. This output follows the channel switching, which makes it more usable when using the amp as a 2 channel amp. Because of this, as a courtesy to the FOH and monitor engineers, discuss how best to make this work for them so that they can do their best for you.

Both of these DIRECT OUTPUTS are fully balanced, capable of driving balanced analog lines as long as 500 feet, are fully phantom power protected, noise resistant and stability compensated for a reliable, low noise floor, high quality signal. These outputs follow the pro audio standards of pin 2=non-inverting, pin 3=inverting and pin 1=ground. Every known console in the world follows this wiring standard.

**DIRECT OUTPUT LEVEL:** This switch configures the level of the direct output to either mic level or line level. While many audio engineers prefer mic level, be sure to ask which they prefer.

**DI OUT PIN 1 LIFT:** This switch connects or lifts the circuit ground/earth/common connection from pin 1 on the XLR DI OUT connector. Balanced outputs do not rely on the pin 1 or shield connection to transmit signal to the console. While pin 1 is always connected to the console’s master ground bus, sometimes (due to differences in potential of a building’s ground/earth system) currents will flow between grounds if there is a common connection, resulting in hum. By lifting the ground at the source (bass amp) end, this allows the shielding to the console’s input to remain in place while breaking the ground current flow that is responsible for inducing hum into the audio signal carrying pair of conductors. One thing that complicates this is that at very high (radio) frequencies, ground is not “really” ground, so additional techniques are incorporated within this network that allows 2 simultaneously functional grounding spectrums within the same network, providing added RFI (radio frequency interference) rejection. The general rule is to start with pin 1 lifted, and if there is noise, try connecting it and see if the noise level drops. It should also be noted that there are a lot of other possible causes for noise, this switch is only one solution for ground loop noise between the PA and the bass amp.

**USB DEVICE POWER:** This connector provides power to USB devices that might be used in conjunction with practicing, recording, jamming or even performing. It may also be used to recharge phones, MP-3 players, iPods, and any number of devices. This port follows the PC USB 2.0 standard, rated current is 500mA maximum, and conforms to the Apple USB charge current standard. While this charge port will work with most devices, there are some that do not conform to any current demand/limit standards or must be operated from a high current (or proprietary) USB charge port only. These devices will either charge more slowly or possibly not at all. Due to the lack of uniformity in the market following standards, and continual evolution/changing of the standards, this port is offered as a convenience only. Note that when charging some cell (mobile) phones, the phone can emit strong bursts of RF energy as it communicates with the towers. This is a potential source of randomly appearing noise which can be eliminated by placing the phone in airplane mode or shutting it off entirely.

This USB device power can also be used to drive any number of USB devices, including power converters that provide 9 volt pedal power. Because pedal power devices step up the voltage, the available current decreases to ~300 mA at 9V.

## DISCUSSION ABOUT SMPS & CLASS D FROM THE DESIGN TEAM:

**QUESTION:** What makes this new amplifier so light weight?

**ANSWER:** This amplifier uses new technology, both an SMPS (SwitchMode Power Supply) and a Class D power amplifier, to decrease the size and weight. These designs are carefully implemented and fully tested to insure robust, reliable performance in real world conditions night after night.

**QUESTION:** How can such a light weight amplifier deliver solid bass? I thought an amp has to be heavy to produce deep bass.

**ANSWER:** By operating in a non-linear fashion (with power devices that are either fully on or fully off) the output stage no longer has to accommodate reactive load inefficiencies, overly sensitive protection of “safe operating areas”, and dissipate waste heat from output devices operating within their linear region. This means more power and better low frequency control with less heat. The pro audio industry has been using this technology almost exclusively in the large scale touring market for about 20 years, driving massive arena and stadium subwoofers night after grueling night on the road. In fact, much of the technology in our power amplifiers comes from the high reliability touring pro audio world.

**QUESTION:** How do I know that these amplifiers will be reliable?

**ANSWER:** A five year factory warranty should inspire confidence that every aspect of design and manufacturing reflects the highest quality in the industry and decades of successful experience producing professional touring grade products. The designer of the Subway amplifier project has over 20 years of SMPS/Class D amplifier experience, in bass amplifiers as well as in touring pro audio. We have worked closely with the power module’s European engineering team on the development of these new power modules, including extensive testing, on real world stages with real musicians and real audiences, night after night, as proven by the reputation of the entire Subway bass amp line. This engineering relationship goes back over 20 years, when class D amplifiers were in their infancy.

**QUESTION:** Why is the power supply so small and light weight?

**ANSWER:** An SMPS is just like any other power supply, except for the fact that it operates at a much higher frequency (~100kHz) than a traditional power supply (either 50Hz or 60Hz). A high operating frequency reduces the size of the transformer’s core, which in turn reduces the length of the wire wound around the core. Since most of the weight of a power transformer is in the core and the copper wire, reducing the core reduces size, weight and the amount of copper needed to wrap around the core, which improves the performance of these smaller transformers under the highest load conditions.

**QUESTION:** How does the SMPS work?

**ANSWER:** Without getting too technical, a switch-mode power supply takes the incoming AC mains (50-60Hz) power, rectifies it to a high voltage direct current (HVDC). This HVDC is then filtered/stored in the input filter capacitors as reserve energy for discharge as needed into dynamic loads. This HVDC is then chopped/switched at about 100kHz into high voltage, high frequency alternating current (HVHFAC), which is fed through a high frequency transformer which converts the HVHFAC into low voltage, high frequency alternating current (LVHFAC) which is then rectified and filtered into low voltage direct current (LVDC) that the power amplifier’s circuitry uses.

**QUESTION:** Why is the Class D power amplifier so small and light weight?

**ANSWER:** A Class D amplifier operates its output stage non-linearly, meaning that the output devices are switched either fully on or fully off at a switching frequency of about 500kHz. This “cutoff-saturation” switching minimizes waste heat by avoiding operation in the wasteful “linear range”, and without the heat, there’s no need for the large, heavy aluminum heatsinks.

**QUESTION:** How does the Class D amplifier work?

**ANSWER:** In Class D amplifiers, the analog audio signal is converted into a PWM (pulse width modulated) pulse train representation of the analog audio signal (similar to the A/D converter in a PWM digital audio recorder) at +5 volts conventional logic level. This PWM signal is level shifted upwards by large switching power MOSFET transistors (that operate non-linearly to avoid waste heat) to high voltage and current. The resulting high level PWM signal then passes through a high power “low pass reconstruction filter” that extracts the original but level shifted (amplified) audio signal from the PWM signal which feeds your speakers. Class D is not “digital”, it is a non-linear analog technology, sharing some fleeting similarities with its digital counterpart. (Disclaimer: This is a simplified

description, there are many details omitted, but the basic operational function is accurate. There is a lot of engineering that goes into making a high performance, robust, safe and reliable design.)

**QUESTION:** Why does this amp use 12AT7/12AU7 type tubes/valves and not 12AX7 type tubes/valves?

**ANSWER:** This amp uses these tubes along with additional circuitry and techniques to accurately model some specific response and feel elements without the negative artifacts that are more common to many 12AX7 approaches. In fact, using a 12AT7 in the legacy bass amp models was a fairly common user modification. This type of circuitry was first adopted in the WD-800 and received such positive player feedback that its use has been expanded to this new model.

**TROUBLESHOOTING:** In the event that your amplifier appears not to work correctly, often enough the problem is not with the amp, but a related piece of equipment, so it's necessary to take a deliberate, systematic approach to troubleshooting in order to effectively identify and correct the problem. Yes, believe it or not, we have seen all of these things many times.

**SYMPTOM:** No audio output:

Is the power LED lit and do the tally LEDs over the function switches work?

**NO:** Possible causes to check in this order are

1. Verify the power source, verify that the IEC power cable is not damaged and is fully inserted into its socket,
2. Verify that nobody unplugged your amp or turned off your power strip when you weren't looking (if so, blame the guitar player, turn on and play.).
3. If these do not solve your problem, it's possible that your amplifier has failed so call our customer service department and we will help you get this resolved.

**YES:** Possible causes to check in this order are:

1. Defective speaker cable or cabinet (test known good speaker cable and cabinet)
2. Defective bass or cable (test with known good bass and instrument cable)
3. Defective pedals/effects/pedalboard (plug bass directly into amplifier input, bypassing all devices in front of the amp)
4. Mute switch engaged or mute footswitch turned on (turn mute function off)
5. Problem with effects loop (for models with effects loop, a cable plugged into the effects return will interrupt signal, there is a problem with an effects device or patch cable, there is an intermittent connection due to dust or debris inside the effects return jack. Try bypassing effects loop with short shielded patch cable.
6. Gain or Master controls turned down (turn the controls up)
7. On 2 channel amps, be sure the amp is switched to the channel you are using and that you are adjusting that channel's controls.
8. Will the amp play with a signal fed into the AUX INPUT or EFFECTS RETURN jacks? If so, the problem is with the preamp. It's possible that the tube/valve has failed. (substitute a known good 12AT7 or 12AU7 into the V1, V2 or V3, position, one at a time and see if this restores audio)
9. There is indeed a problem with the amp, call our customer service department and we will help you get this resolved.

**SYMPTOM:** Distorted audio output:

1. Defective battery in active bass causing instrument's onboard preamp to distort (replace battery)
2. With very hot 18V basses, it may be possible to overdrive the amp's first stage preamp when in high gain mode (switch to low gain mode)
3. Gain structure problem if using pedal based effects in the effects loop. The amp's effects loops operate at line level, while most pedals operate at instrument level, so it's quite possible to overdrive effects pedals designed exclusively for instrument

level signals. (Try unplugging effects from effects loop, if the distortion disappears, try the effects between the bass and the input of the amp.)

4. Slightly intermittent cable in system (this can be an instrument cable, patch cable or loose screw in SpeakOn plug)
5. Defective or blown speaker(s) in cabinet (test with known good cabinet, repair cabinet as needed)
6. Possible failing tube/valve in preamp. V1 is common to both preamps, V2 is exclusive to the Boogie channel, V3 is exclusive to the Subway channel. (substitute with known good 12AT7 or 12AU7)
7. Possible incorrect tube/valve installed in preamp. These circuits are designed for use with 12AT7/12AU7 tube types. 12AX7 tubes do not have enough drive capability to work well in these circuits and will result in decreased levels, dynamic range and increased distortion. (replace any incorrect tubes with 12AT7/12AU7 types)
8. There is indeed a problem with the amp, call our customer service department and we will help you get this resolved.

**SYMPTOM:** Noise (low frequency hum) in audio:

1. Defective instrument cable or problem with bass wiring (unplug instrument cable from amplifier, if hum goes away, this means that the noise is entering from outside the amplifier. Try known good instrument cable and/or bass)
2. Problem with wiring or a device in the effects loop (remove send and receive wiring from the amp's effects loop to identify the source of the noise, correct as necessary.)
3. Power source wiring is not grounded/earthed (check all wiring for missing grounding/earthing pins, have qualified electrician check building power wiring for missing ground/earth connections and correct as necessary.)
4. External stray magnetic field present coupling into the pickups, especially single coils (one clue that this may be the cause is when the volume level of the hum changes with position of the bass. Possible causes are large power transformers located near the performance area, if this occurs when you get close to another instrument amp it may be due to stray field from its power supply)
5. Some cell (mobile) phones can emit strong bursts of RF energy as it communicates with the towers. This is a potential source of randomly appearing noise. (locate the phone farther away from the bass and/or amp, switch the phone to airplane mode or shut it off entirely.)
6. This amp model contains tubes/valves in the preamp, it's possible that you are experiencing the beginning of a tube/valve failure (replace tube/valve one at a time with a known good tube/valve to see if this resolves the problem)

**SYMPTOM:** Noise (high frequency hiss and hash) in audio:

1. If the noise goes away when the instrument cable into the amp is unplugged, the cause of the noise is external to the amp (possibly an active preamp with the treble turned all the way up, a failing battery, defective on board preamp)
2. This amp model contains tubes/valves in the preamp, it's possible that you are experiencing the beginning of a tube/valve failure (replace tube/valve one at a time with a known good tube/valve to see if this resolves the problem)
3. If there neon or fluorescent lighting close by, it's possible that EMI is radiating into the pick-up wiring (try turning off such lighting to see if noise goes away. If so, it could be arcing secondary wire on neon lighting, failing ballast or tube on fluorescent lighting, radiated EMI getting into instrument pick-up)
4. Some cell (mobile) phones can emit strong bursts of RF energy as it communicates with the towers. This is a potential source of randomly appearing noise. (locate the phone farther away from the bass and/or amp, switch the phone to airplane mode or shut it off entirely.)
5. Power source wiring is not grounded/earthed (check all wiring for missing grounding/earthing pins, have qualified electrician check building power wiring for missing ground/earth connections and correct as necessary.)
6. Problem with wiring or a device in the effects loop (remove send and receive wiring from the amp's effects loop to identify the source of the noise, correct as necessary.)
7. Tweeter turned all the way up in a quiet room (may need to turn tweeter down under such conditions, especially if the sensitivity of the tweeter greatly exceeds that of the low frequency drivers with tweeter turned up)

**SYMPTOM:** Noise (popping) in audio:

1. Popping while playing, especially one string. (check bass set-up to be sure there is adequate clearances between the string and pickup pole pieces.)
2. Popping while just sitting there, or when touched. (under dry environmental conditions, it's possible that electrostatic discharge is the cause. (try antistatic mat on floor, humidifier in room)
3. Popping when tapping or banging on chassis. This amp model contains a tubes/valves in the preamp, it's possible that you are experiencing the beginning of a tube/valve failure (replace tube/valve one at a time with a known good tube/valve to see if this resolves the problem). Note that at very high gains and channel volume positions, no tube/valve will be perfectly quiet in this regard.

**SYMPTOM:** Protect LED turns on:

1. Disconnect all cables except power cable, if the amp is no longer in protect, try plugging in just the speaker cable. If the amp goes immediately into protect, there is likely a fault with the speaker cable. Then, plug the speaker cable into the speakers. If the amp goes immediately into protect, one possible cause is a defective driver, but another possible cause is a defective or damaged crossover (and/or high frequency driver) that is presenting an illegal load to the simplifier and the protection circuit is working correctly. (try a known good speaker cabinet from another manufacturer to rule this possibility out. If the amp works correctly with another speaker cabinet, call customer service for assistance. This is more common with "do it yourself" speaker projects with incorrectly designed/built crossovers. ALL amps with PWM carriers are sensitive to stored reactive energy is defective crossover tank circuits.)
2. Protect circuit shuts down amp while playing at low to moderate volumes (possible shorted speaker cable, try known good speaker cable)
3. Protect circuit shuts down amp at moderate to high volumes (Verify that total load to the amplifier has not fallen below 2 ohms, and that the impedance switch is set to match the impedance of the speakers connected to the amp. (possible causes are incorrect pairing of multiple speaker cabinets, incorrectly labeled speaker cabinets that were repaired or modified without relabeling, defective driver that has shorted voice coil turns as voice coil warms up.)
4. Power source voltage falling dangerously low due to improper wiring or extension cable that is too long for its wire size/gauge. (correct problems as needed with the help of a qualified electrician)

**SYMPTOM:** No (or slow) USB charging of connected device:

1. Is this an Apple device? There are several program controlled charge rates available for Apple products, varying from 100mA all the way up to 2.1A. The charge port will support the 500mA standard, which will charge the larger devices more slowly than the higher powered dedicated chargers.
2. Is this an Apple i-Pad or other large tablet? When operating an iPad or tablet, the current draw of the screen alone will be close to 500mA so the charging rate will be very low. Operating with a charged battery and also connected to the charge port on the amp will greatly extend the battery life under use however.
3. Is this an Android phone that Qualcomm QC enabled? This charger does not support QC, and will charge at the slower 500mA rate if the device software allows it.
4. Does your device use a USB-C connector? While it won't charge at the higher rate's supported by this standard, it should be backwards compatible with the 500mA standard.

## PLAYER'S NOTES AND REMINDERS

[illegible]

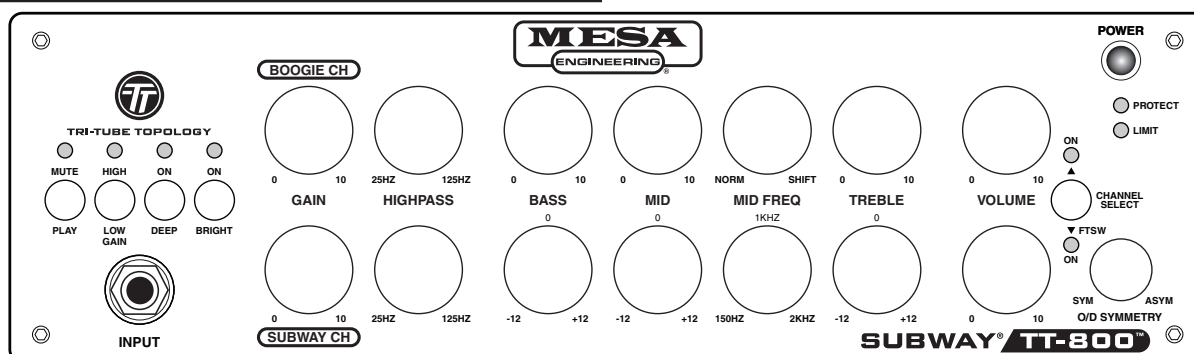
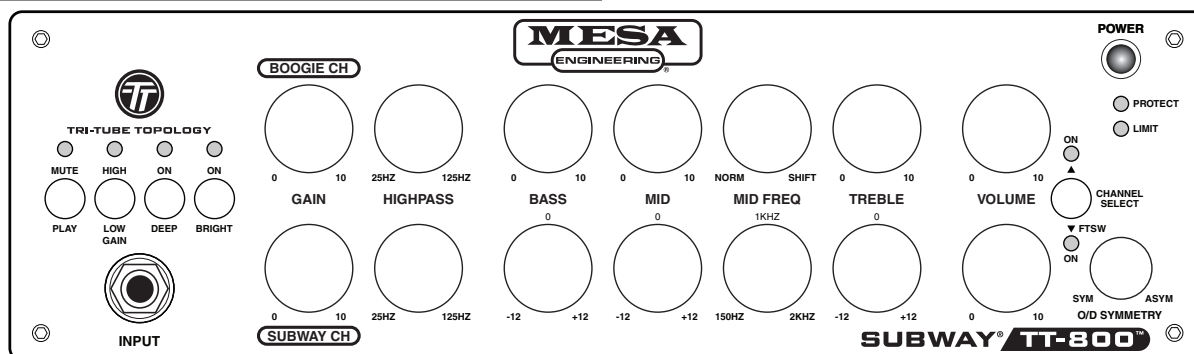
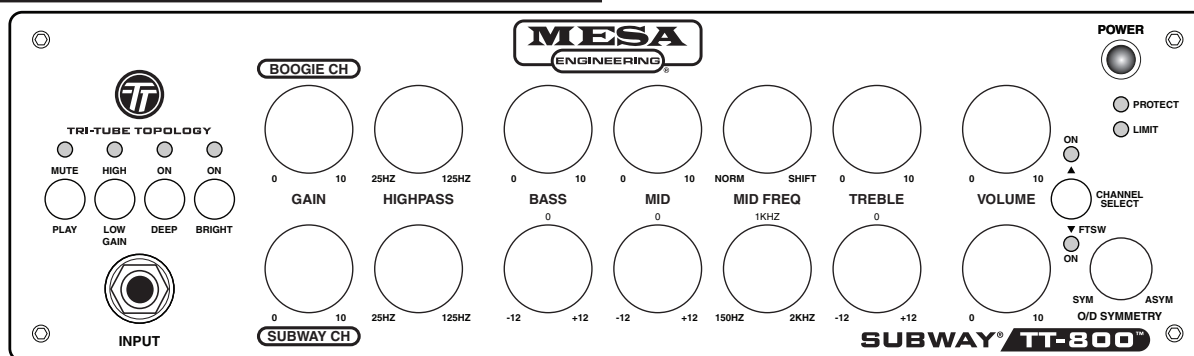
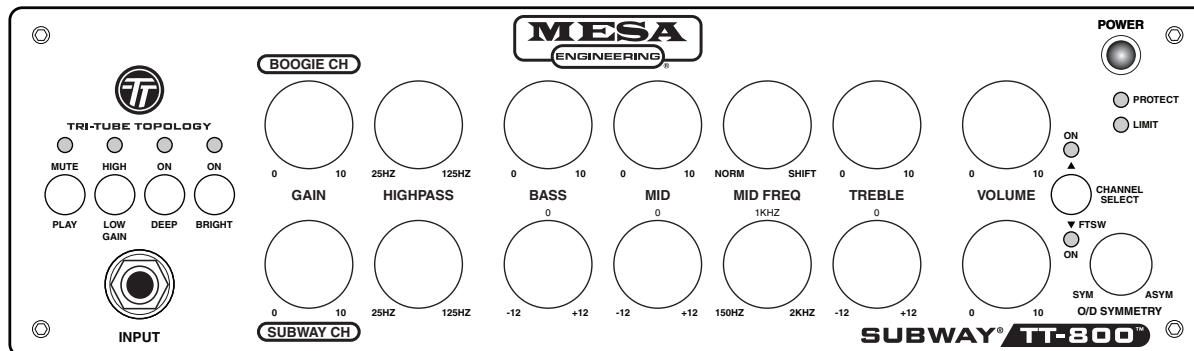


## BOOGIE CH: CLASSIC ROCK





# USER SETTINGS



# SUBWAY® TT-800™

## Specifications

Output Power Rating:	400 Watts RMS @ 8 ohms, 10% THD (includes preamp O/D THD) [note 1] 800 Watts RMS @ 4 ohms, 10% THD (includes preamp O/D THD) [note 1] 800 Watts RMS @ 2 ohms, 10% THD (includes preamp O/D THD) [note 1]	
Signal to Noise Ratio:	BOOGIE Channel: -67dB (20-15kHz, unweighted, controls at 12:00 positions) SUBWAY Channel: -69dB (20-15kHz, unweighted, controls at 12:00 positions)	
Available Gain (nominal):	BOOGIE Channel: 42dB (low gain), 50dB (high gain) [note 2] SUBWAY Channel: 46dB (low gain), 53dB (high gain) [note 2]	
Maximum Undistorted Input Level:	BOOGIE Channel: -12dBu /200mV (low gain), -18dBu /100mV (high gain) [note 2] SUBWAY Channel: -2dBu /600mV (low gain), -13dBu /175mV (high gain) [note 2]	
Switched Tone Shape Filters:	DEEP: +4dB at 50Hz (moderately interactive with HPF and Bass EQ) BRIGHT: +2.5dB at 2kHz (moderately interactive with Mid and Treble EQ)	
High Pass Filter:	2 pole fixed, 2 pole variable, 24dB/octave, 25Hz – 125Hz	
Equalization:	Boogie Channel:	Bass/Mid/Treble: Interactive legacy Mesa Boogie tonestack “flat” is approx: Bass = 8:30, Middle = 5:00, Treble = 8:00 (classic position) “flat” is approx: Bass = 10:30, Middle = 5:00, Treble = 9:30 (shift position)
	Subway Channel:	Bass: +14dB/-14dB@40Hz, shelving, Treble: +14dB/-14dB @ 4kHz, shelving [note 3] Parametric Middle Band: +14dB/-14dB, peak/dip @ selected band center
Instrument Input Impedance/Sensitivity:	>1 Meg ohm, >-10dBu nominal, (gain & master at 12:00)	
Aux Input Impedance/Sensitivity:	10 K ohm, +4dBu [note 4] (post master volume controls)	
Effects Return Impedance/Sensitivity:	20 K ohm, +4dBu [note 4]	
Effects Send Impedance/Sensitivity:	<1 K ohm, +4dBu [note 4]	
DI Output Impedance/Sensitivity:	<1 K ohm, -28dBu mic position, -10dBu line position [note 4]	
Power Amp Damping:	~50 at 2, 4 or 8 ohms [note 5]	
Preamp Tube/Valve Complement:	12AT7 or 12AU7, V1 = input amp, V2 = Boogie Channel, V3 = Subway Channel [note 6]	
Power Requirements:	100-120/220-240 VAC, 50/60Hz, 250W, auto-ranging power supply	
Size:	12.00 (305mm) wide x 10.15” (258mm) deep x 3.45” (88mm) high [note 6]	
Weight:	approx. 7 lbs (3.18 kg)	

[note 1]: area under the curve, with preamp harmonics management, >25% duty cycle, impedance switch set to match load, 12AU7 tube type

[note 2]: gain/volume controls set to the 12:00 position

[note 3]: measured approx. 1 octave from knee

[note 4]: nominal levels, there's typically a min. of 12dB of addtl. gain for signals below, and 12 dB of headroom above nominal levels

[note 5]: < 1kHz

[note 6]: Circuits optimized for 12AT7/12AU7 tubes/valves, measurements made with 12AT7. (12AX7 tube type not recommended)

[note 7]: chassis only, not including feet and controls

Mesa Boogie continually develops new products and improves existing ones. For this reason, specifications and information in this manual are subject to change without notice.

## SERVICE INFORMATION

- **USA /CANADA Customer Support:**

For technical support, troubleshooting, tone questions, settings help and more...

707-778-6565 Monday-Thursday, 9AM-5PM Pacific Time

**NOTE:** *If a Product Specialist is not available when you call (helping other customers), PLEASE leave a voice message with a phone number and a good time to call and WE'LL CALL YOU BACK!*

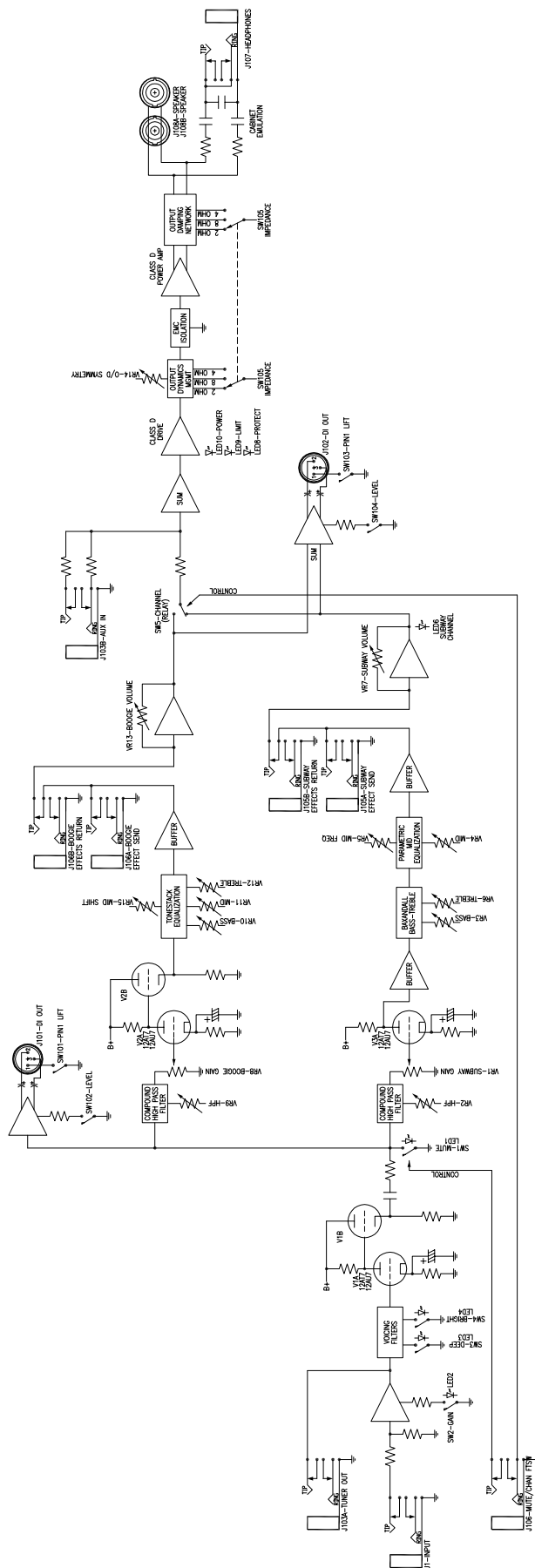
- **INTERNATIONAL Customer Support:**

For warranty and technical support, please contact your LOCAL MESA DISTRIBUTOR.

You may use this link to search the web for your local distributor's contact information:

[www.mesaboogie.com/support/locations.html](http://www.mesaboogie.com/support/locations.html)





SUBWAY TT-800 BLOCK DIAGRAM



*The Spirit of Art in Technology™*



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