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## AMPEG 101

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Our goal in this course is to give you a better understanding of the history of Ampeg and arm you with general knowledge of bass amplifiers including: features, equipment necessary for operation, inputs and outputs, indicators, hookup recommendations, and types of amplifiers.

Schedule:

1<sup>st</sup> 15 minutes – An oral company history.

-The people. The gear. The mission.

2<sup>nd</sup> 15 minutes – An introduction and discussion of the different kinds of amplifiers.

-Tube, solid-state, hybrid, and class D.

3<sup>rd</sup> 15 minutes – An explanation of gain structure and an explanation of features and signal path.

-Exploration of Block diagrams.

-Discussion of all of the control and signal flow options commonly available on bass amplifiers.

4<sup>th</sup> 15 minutes – Learning how to hook up each amp and discuss what is needed for operation.

-The easiest part: connecting everything we've learned to make some noise.

-Conclusion.



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## COMPANY HISTORY

-Ampeg, the “Amplified Peg” was invented 1946 by Everett Hull, who was a pianist and a bassist, which placed a transducer inside an upright bass on an extended support peg.<sup>i</sup>

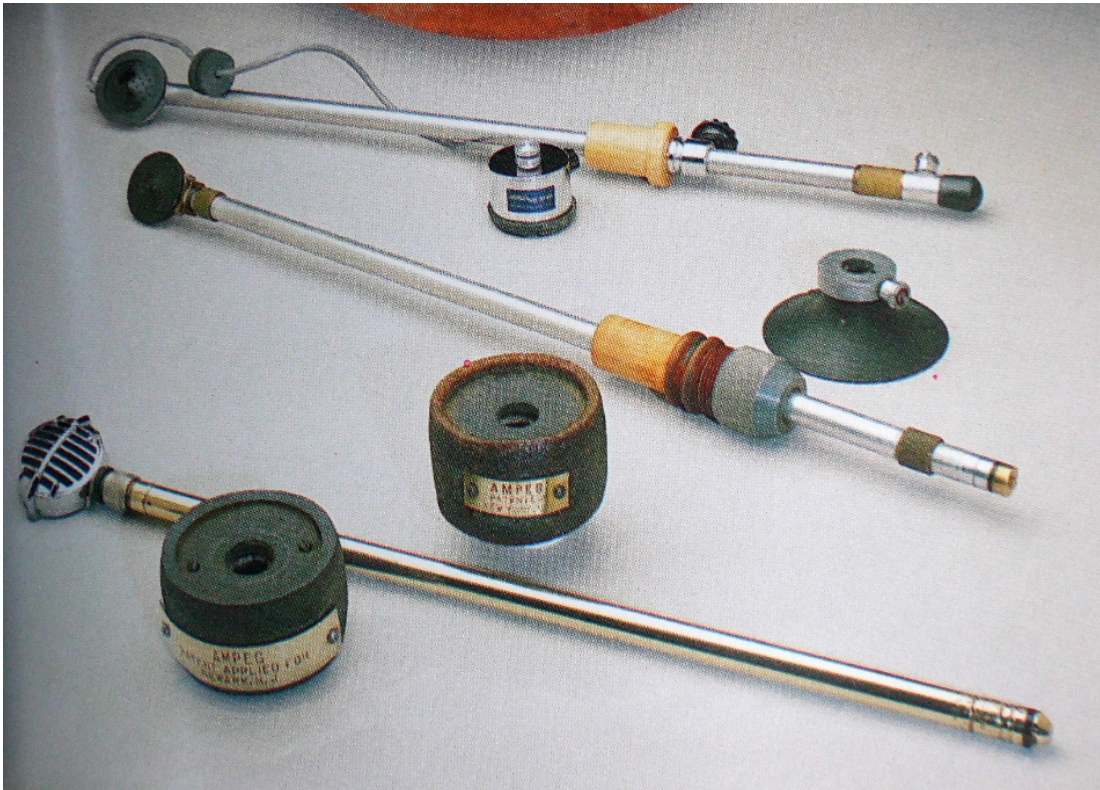


Figure 1 Examples of the Amplified Peg.

-The name was coined by Gertrude Hull.

- Everett Hull came from a jazz/orchestra/country/western background. Because of this he hated loud music. He kind of freaked out when he learned that people would purposely use distortion.<sup>i</sup>

-Partnered with Stanley Michael in 1946.<sup>i</sup>

- They founded Michael Hull Electronic Labs to manufacture and market Hull's “Ampeg” transducer, along with the 18-watt 1x12 Michael-Hull Bassamp. The close-back amp, designed for upright bass, really starts the modern era of bass amplification.<sup>i</sup>



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- Patent was granted to Everett Hull in 1947.<sup>i</sup>

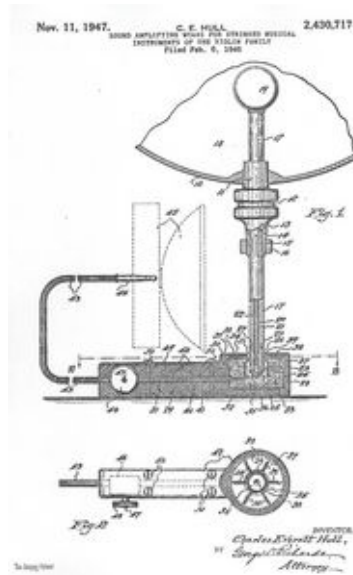


Figure 2 Patent for the Amplified Peg.

-In 1948 Stanley Michael went on to the Sano Amplifier Company.<sup>i</sup>

-The company was renamed AMPEG Bassamp Company 1949<sup>i</sup>

-First bass amp the company ever made was the Super 800 18W 112 w/ rear port<sup>i</sup>



Figure 3 Early Bassamp with an amplified peg.

-Ampeg broke new ground 1951



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-Introduced model 815 which boasted a 115 and 20W!

-Throughout the 1950's Ampeg refined the 115 bass amp series increasing the wattage and improving on the design.<sup>i</sup>

-In 1960 Jess Oliver introduced the Portaflex B15 Fliptop for \$355. The idea of the Fliptop came from a singer sewing machine Jess Oliver had seen. The B15 was a great success that is used in recordings to this day.<sup>i</sup>

-Jess Oliver is the first person to put reverb in a guitar amp.

-He also hired Bill Hughes, the man responsible for the SVT.

-In 1968-1969 Ampeg develops the enormous amp rig that sets the tone, punch, and arena-rattling standard for all future large format bass amps: the 300-watt SVT, or "Super Vacuum Tube" amp, with a pair of 8x10 sealed cabinets. The SVT is introduced at the July '69 NAMM show, and The Rolling Stones take these on tour in '69, '72, and thereafter, using them for both guitar and bass.<sup>i</sup>



Figure 4 The Rolling Stones on tour with AMPEG.

1970s Although many other manufacturers were attempting to turn up the volume with powerful tube bass amps moving up to 400 watts, the Ampeg SVT remains the standard concert stage bass rig.<sup>i</sup>



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1980's New and improved solid-state technology allows for powerful, reliable bass amps that are more economical to build and maintain than tube amps. Ampeg beefs up the SVT's speakers so the powerful amp can be used safely and economically with just one cabinet.<sup>i</sup>

1970-1980s Ampeg changes hands multiple times throughout this period of time. Some of the brands owners are:

-Unimusic 1967-1971

-Selmer Magnavox 1971-1980

-MTI 1980-1986 (Production was moved to Japan during this period)

1986 St. Louis Music saves Ampeg with a bankruptcy court buy-out and quickly reestablishes the name. Ampeg develops a wide variety of effective bass amp products, including all-tube, solid-state, and hybrid amps.<sup>i</sup>

2006 Loud Technologies purchases Ampeg from St. Louis Music and continues to build on the "amp peg" legacy and brought back US manufacturing with the Heritage series of amplifiers.

-Check out this video on how we build Heritage Amplifiers in the USA starring our very own Hodgy!

<http://www.youtube.com/watch?v=YZZxuO22daE>



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## AMPS

-Tube

-A tube amp is generally classified as an amp that uses vacuum tubes throughout the signal path. Also, tube heads have to be plugged into a cabinet to meet impedance requirements. You can damage the amplifier by turning the head on without a cabinet attached.

Examples: SVT-CL, B-15N, V4B





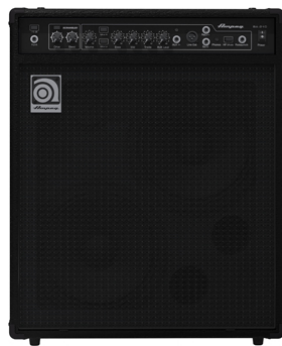
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-Solid State

-Solid state amplifiers are based on semiconductor (solid-state) circuits for the signal path. These amps are more reliable and have a lower signal to noise ratio than tube amplifiers.

Examples: BA Series, Micro-VR, Micro-CL



**MICRO-CL**





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-Hybrid

-Some solid state designs incorporate tubes in the preamp stage for their subjectively warmer overdrive sound. These units still take advantage of a solid state power section.

Examples: SVT-3PRO, SVT-4PRO







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-Class D

-It is akin to a solid state amp with a switching power supply that can significantly reduce the weight compared to other amps and higher power efficiency.

Examples: SVT-7PRO, PF series





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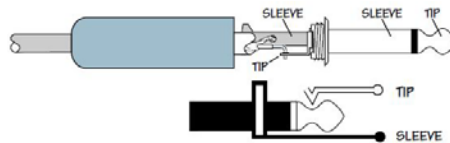
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-Stuff needed to play bass amp

-A bass guitar is needed to get this going...silly I know, but you don't work in tech support.



- A ¼" TS (tip, sleeve) shielded instrument cable will be needed to get the signal from the bass guitar to the amplifier itself.



*Figure C: TS Plug*

- Unbalanced microphones
- Electric guitars and electronic instruments
- Unbalanced line-level connections
- Speaker connections

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-An AC power cable is necessary in this process as well. Most amplifiers will either have a power cord hard wired inside of the unit or will include a universal IEC power connector.

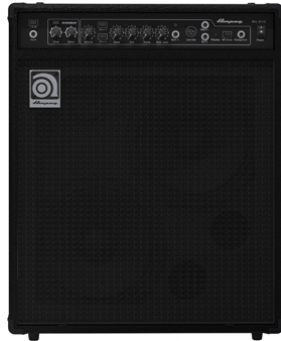


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### -Amp Categories

- A combo amp generally has a speaker and amplifier built in one unit that cannot be separated. Some combo amps have a speaker out jack for an external cabinet. This sometimes disengages the amp from the built in speaker.



-A head/cab set up has the amplifier unit separate from the speaker cabinet. The head (amplifier) sits on top of the speaker cabinet. This type of amp allows for higher gain and more flexibility for “tone chasing” because you can mix and match head and cabs to achieve a wide range of sound.



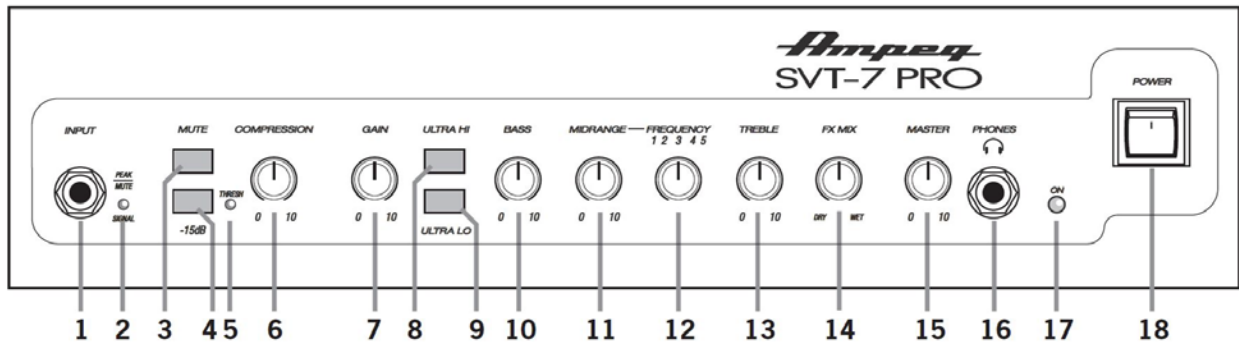
### -INPUT/OUTPUT/FEATURES

-There are several inputs, outputs, and features that are available for flexibility and tone options. We will use the SVT-7 PRO for a visual representation for the rest of the course. We will also be using the owner's manual for the SVT-7 PRO as a reference. Numbers in bold correspond to the numbers on the line drawing for the amplifier.

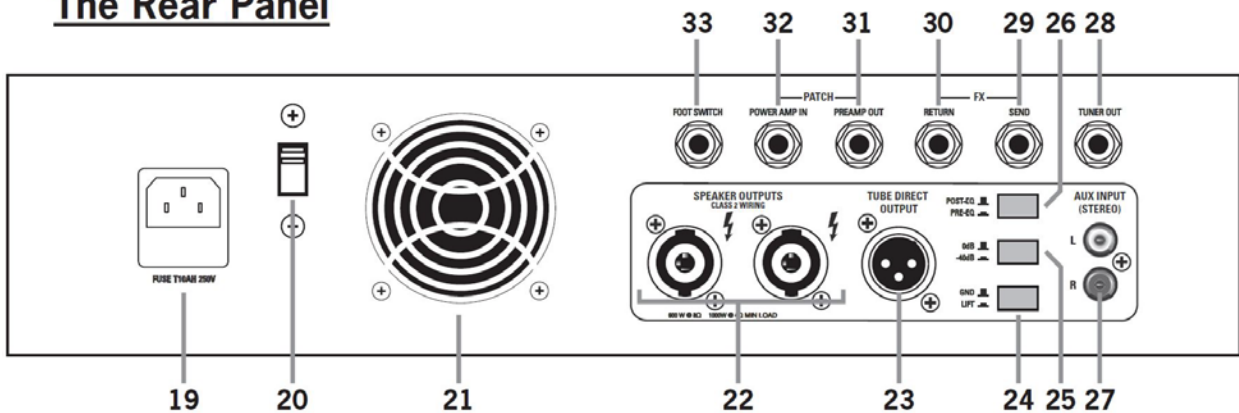


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### The Rear Panel



**1 - INPUT:** This jack is generally where you will plug your bass guitar in. This is usually designed to accept a ¼" TS shielded instrument cable.

**2 – PEAK/MUTE LED:** This LED will come on if: the mute switch is engaged, or if the input signal is too high, the gain control is set to high, or there is too much boost from the bass, midrange, and treble controls. If it comes on regularly, even when these controls are low, try engaging the -15dB pad.<sup>ii</sup>

**3 – MUTE:** When this button is depressed it mutes the signal. The peak/mute LED illuminates when this switch is engaged.<sup>ii</sup>

**4 - -15dB:** Press this switch in to reduce the input signal by 15 dB and compensate for active bass guitars or other high output sources.

**5 – THRESH LED:** This lights when the signal level is above the compressor's threshold and the compression has been activated.



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**8 – ULTRA-HIGH:** This switch, when engaged, enhances the amount of high frequency output by 9 dB at 8 kHz.<sup>ii</sup>

**9 – ULTRA-LOW:** This switch, when engaged enhances the amount of low-end output by 2 dB at 40 Hz and -10dB cut at 500 Hz.<sup>ii</sup>

**10 – BASS:** Use this to adjust the low frequency level of the amplifier. The low frequency output is flat at the center position.<sup>ii</sup>

**11 – MIDRANGE:** Use this to adjust the midrange frequency level of the amplifier.<sup>ii</sup>

**12 – FREQUENCY:** This control allows you to select the center frequency of five “voices” for the midrange.<sup>ii</sup>

**13 – TREBLE:** Use this to adjust the high frequency level of the amplifier.<sup>ii</sup>

**14 – FX MIX:** This control varies the mix between the direct (dry) signal and the effects (wet) when the effects loop is used.<sup>ii</sup>

**15 – MASTER:** Use this to control the overall output level. It affects the speaker outputs and the headphones output.<sup>ii</sup>

**16 – PHONES:** Use this ¼” TRS stereo output to connect your headphones. The signal to the power amp is killed when headphones are connected.<sup>ii</sup>

**17 – POWER LED:** This LED illuminates when the power is on.<sup>ii</sup>

**18 – POWER SWITCH:** Use this switch to turn the power on.<sup>ii</sup>

**19 – IEC POWER INPUT CONNECTOR:** This is where you connect the AC power cord.<sup>ii</sup>

**21 – VENTILATOIN:** Make sure that the ventilation openings are not obstructed in any way. These ports allow for air cooling the amplifier’s heatsinks.<sup>ii</sup>

**22 - SPEAKER OUTPUTS:** Commonly Neutrik or ¼” TS output jacks supply speaker-level power to the speaker cabinet. Often there are multiple outputs wired in parallel, which means you can use either one, or use both. When hooking up multiple cabinets, make sure you are maintaining the correct impedance. Only use speaker cables with this output, normal instrument cables may overheat.<sup>ii</sup>

**23 - (TUBE) DIRECT OUTPUT (DI):** Typically, you would connect this balanced output to the balanced input of an external mixer, or a recorder. In this way, you do not have to mic the speaker cabinet in order to add it to the main mix, or to record. The output is not affected by the master control.<sup>ii</sup>



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-This output can connect to external power amplifiers, or powered loudspeakers, as long as they have their own input controls to adjust the volume level.<sup>ii</sup>

**24 – GROUND / LIFT:** Press this switch in to engage the Ground Lift, if necessary, to help eliminate hum at the XLR jack.<sup>ii</sup>

**26 – POST-EW/PRE-EQ:** The signal at the tube direct out can be set to either Pre-EQ or Post-EQ with this switch.<sup>ii</sup>

**27 – AUX INPUT (STEREO):** This dual RCA jack allows you to connect external sources such as a CD player or mp3 player. This signal comes after the FX Return but before the Master Volume.<sup>ii</sup>

**28 – TUNER OUT:** This jack supplies the only live output when the mute switch is engaged. This allows for silent tuning through an electronic tuner.<sup>ii</sup>

**29 – FX SEND JACK:** Use this ¼" TS unbalanced output to send a line-level output to an external effects processor. This output can be affected by all controls except the volume.<sup>ii</sup>

**30 – FX RETURN JACK:** Use this ¼" TS unbalanced input to return the processed line-level output of an external effects processor.<sup>ii</sup>

**31 - PREAMP OUT:** This jack is usually a direct post master output for use with an external power amp. Use shielded instrument cables with this jack.

**32 - POWER AMP IN:** this jack connects directly to the internal power amp for use with an external preamp.<sup>ii</sup>

**33 – FOOTSWITCH:** Connect a dual footswitch to this jack for remote Mute and FX On/Off control.<sup>ii</sup>



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## Signal Path

-On the next page is the block diagram for the 7-Pro which details the signal flow from the input through the different sections of the amplifier and out the many outputs available on the amplifier. This is a very helpful tool in understanding signal flow and can also be helpful in diagnosing possible issues you may have with your amp in the future. The main signal path is indicated in **red** and alternate signal paths are outlined in **dark blue** whereas, alternate inputs are indicated in **orange**.

-The (**red**) signal goes from the input through the tube preamp into the compressor (**green box**).

-It then travels through the tone control circuitry (**purple box**).

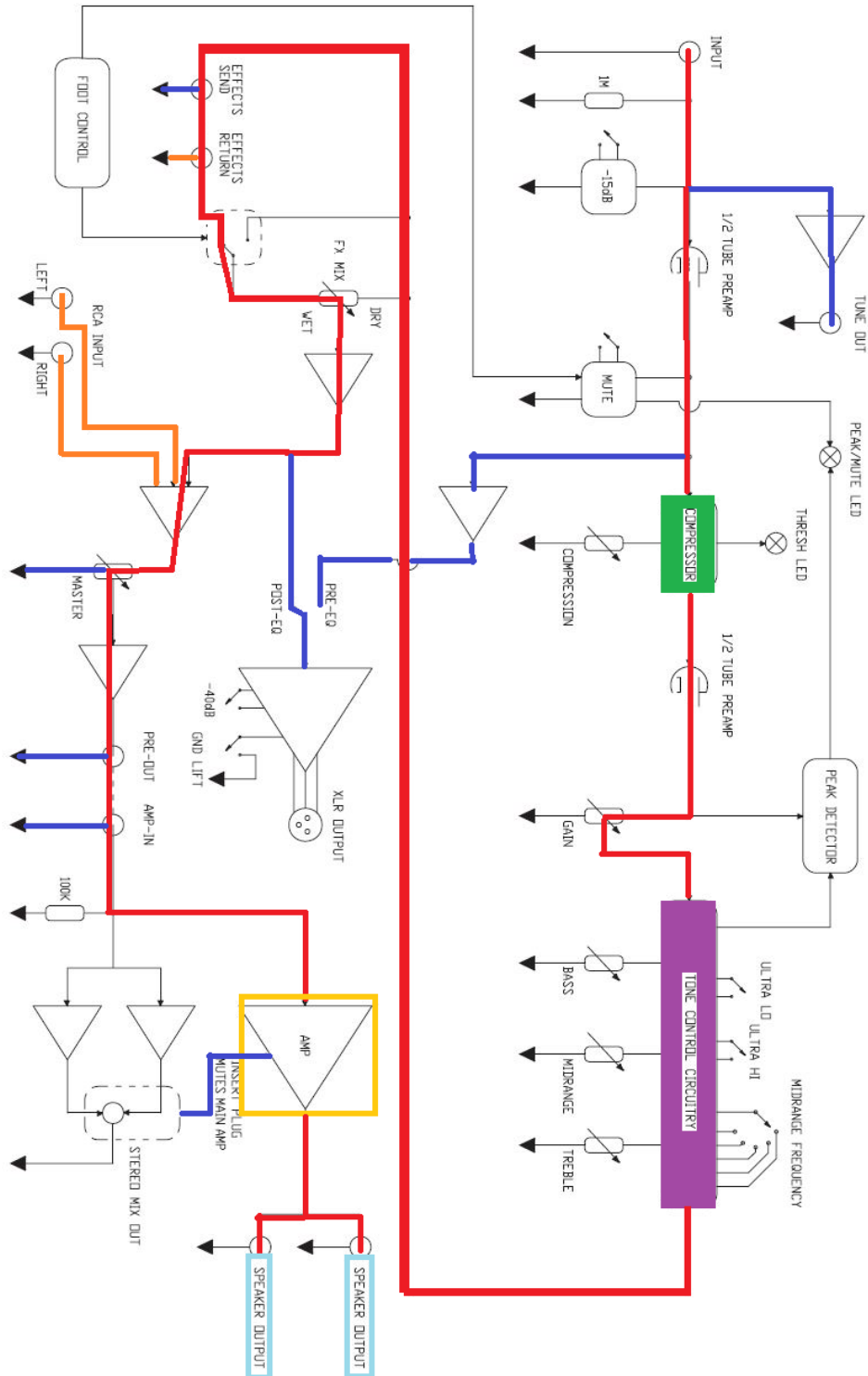
-After being modified by the EQ the signal is routed through the master volume control and finally is delivered to the power amp (**yellow box**).

-From the power amp the signal is routed to the speaker outputs which drive the speaker output (**light blue boxes**) and make sound.



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### -Types of Basses

Basses usually come in 4, 5, or 6 string varieties.

-Active: Uses a battery to power an onboard preamp to increase output gain and adds active tone control.

-Passive: Has no power built into the bass and all tone controls and pickups are passive.

### 4 - Pads

-Used to attenuate the incoming signal from a bass guitar. It functions either by pushing a button that attenuates a single input jack or having two jacks: one attenuated, one not attenuated. Usually used to control gain staging for active basses.

### 6 – Compression

-This knob adjusts the amount of signal compression. When the knob is turned fully counterclockwise there will be no compression; at the fully clockwise position the compression ratio will be 10:1. Ratios for compression may vary depending on which amp you are using.

-Compression on a bass amp helps the player control the dynamic range (the difference between how loud or quiet something is) of the instrument and in turn the amps overall output.

### -Gain vs. Volume

-Gain Stages are points in the signal path where the signal is increased. This increase is generally controlled by a knob.

7 - The "GAIN" knob often is used to control the amount of signal boost added at the preamplifier gain stage. Increasing the level at this point in the signal path usually generates a "heavier" sound with more harmonic distortion.

-“EQ” are also gain stages, but more about those later.

15 - The "Volume" or "MASTER" knob is the final control point before your signal travels out to your speakers. This will be a more powerful gain stage than the preamp stage.

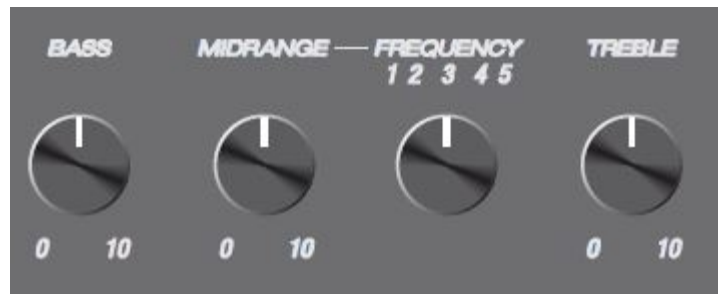


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**10-13** -The EQ on a bass amp allows you to attenuate or boost specific frequency bands for either tone shaping or harmonic synergy with other instruments.

-Most bass amps have what is commonly referred to as a “three band EQ” because there are three bands; “two band EQ” only has bass and treble. “Four band EQ” splits the mid control into two knobs a “low mids” and “high mids” This type of EQ is called a “tone stack” which has a fixed bandwidth in which the frequency points cannot be controlled.



### EXAMPLES OF EQ

*Setting 1 - Classic Ampeg*



*Setting 2 - Funky Thing*



*Setting 3 - Ethereal Fretless*





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Figure 5 4PRO Examples of EQ.

### Setting 4 - "Jaco"



### Setting 5 - R&B Groove



### Setting 6 - Downright Upright Done Right



Figure 6 4PRO Examples of EQ.

- Baxandall EQ is featured in all Ampeg preamps and uses a boost cut type equalization.

-A good video describing our Baxandall EQ is located at the following link. Go check out Rikk Beatty and have a listen to what he has to say.

[http://www.youtube.com/watch?v=WU3Uk5Wxd\\_w](http://www.youtube.com/watch?v=WU3Uk5Wxd_w)

-A graphic EQ is available on some bass amps but not all. Graphic EQs send the input signal to a bank of filters. Each filter only controls a select frequency range of the overall



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signal commonly referred to as a “Band”. The sliders boost or cut the frequencies in that particular band.

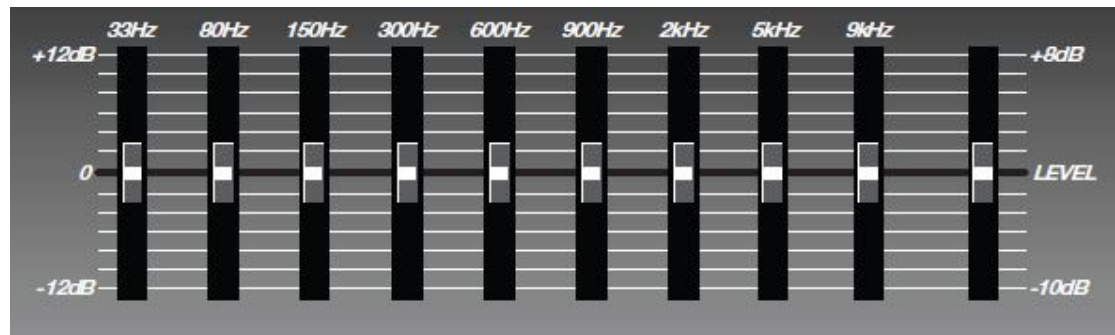


Figure 7 Example of a Graphic EQ from the SVT-4 Pro.

**12** - EQ Selectors are generally designed to adjust the frequency response of the middle band of your EQ but in some circumstances can affect the entire EQ.

-On the SVT-CL the mid frequencies are 220 Hz, 450 Hz, 800 Hz, 1.6 kHz, and 3 kHz. These frequencies are similar to the options available on most other amplifiers.

-Dino Monoxelos has a great video on the frequency selector and some great tips and tricks regarding this tone control.

[http://www.youtube.com/watch?v=\\_vI756RP85I](http://www.youtube.com/watch?v=_vI756RP85I)

**Distortion:** Distortion effects create “warm”, “dirty”, and “fuzzy” sounds by compressing the peaks of an electric musical instrument’s sound wave and adding overtones.

The terms distortion, overdrive, and fuzz are often used in the same context, but they do mean different things.

**Overdrive:** A milder effect producing warm overtones when played quietly and more abrasive distortion as gain is increased.

**Distortion:** This effect produces about the same amount of distortion regardless of volume. Distortion’s effect on overall tone is much more obvious and intense.

**Fuzz:** This effect changes the audio signal until it nearly becomes a square wave and adds complex overtones by way of a frequency multiplier.



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-The Bass Scrambler overdrive delivers SVT grind. Not all amps have built in distortion but it is a cool feature for more tonal flexibility.

-This feature is available on the \*NEW\* BA series using a concept from the old Ampeg Scrambler Pedal originally introduced in 1969.

### The Hookup

**19** - Plug your bass amplifier into an active AC outlet using the provided IEC power cable.

**1** - Plug one end of your instrument cable into the output jack on the bass guitar then connect the other end to the input jack on the bass amplifier.

-In the instance of a head/cab setup you will need a non-shielded speaker cable to connect the amplifier to the cabinet. You will need to connect the Speaker Output **22** to the speaker input on the cabinet. Do not use instrument cables as they may overheat.

**18** - Turn the amplifier on using the "ON" or "POWER" button.

-Tube amplifiers will need to be warmed up in stand-by mode for 15-20 minutes before reaching optimal operating temperature.

**Pick up your bass, turn up the volume knob, and prepare to bring some thunder!**

### Conclusion

Now that we have discussed all the individual inputs, outputs, lights, knobs, cables, and history we are now ready to go out and make some awesome music! I hope that you can walk away with a better understanding of bass amplifiers and the power of AMPEG. Thank you for taking the time to learn a little bit about Ampeg and how bass amplifiers work.



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<sup>i</sup> Hopkins, Gregg, Bill Moore, Jon F. Eiche, and Greg Gagliano. *Ampeg: The Story behind the Sound*. Milwaukee, WI: Hal Leonard, 1999. Print.

<sup>ii</sup> Ampeg SVT-7 PRO Owner's Manual