



BASS AMP

POWER / PRECISION / TONE

MASTERCLASS

Jonathan Herrera

COURSE BOOK



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INTRODUCTION

When Leo Fender debuted the first mass-produced bass guitar in 1951, the Fender Precision Bass, it became clear that a purpose-built bass amp would be necessary.

After all, one of the chief motives for the development of the bass guitar, besides portability, was its ability to be heard in the increasingly loud world of electrified music, and existing guitar amps weren't up to the task.

At the core, a bass amp needs to make a bass guitar loud. This raw fact has never altered, but the means of achieving this goal are in a constant state of flux. In this course, we're going to explain the latest developments, and illuminate some of the technology behind the sound.



MEET JONATHAN HERRERA

Jonathan Herrera is a graduate of the University of Southern California and the Los Angeles Music Academy and the former Editor-in-Chief of Bass Player Magazine.

His playing credits include: Fantastic Negrito, Zigaboo Modeliste, Stanley Jordan, Brain, Oz Noy, Garaj Mahal, Cathedrals, Miguel Migs, Cyrus Chestnut, Jon Fishman, Steve Turre, Moetar, and many more.

In addition to Jonathan's extensive performing experience, he's a sought-after clinician and teacher. He's a former Artist-In-Residence at LAMA, visiting faculty member of the California Jazz Conservatory, and has taught clinics and lectured at Stanford University, Bates College, USC, Musician's Institute, Crossroads, and Bass Player LIVE! He runs a full-service recording studio, Dime Studios, in Oakland, California.



LESSON 01

IN THE BEGINNING

Let's begin by outlining the progression of bass amp technology through the years.

Ampeg and Fender

The earliest bass amp, 1949's Ampeg Super 800, was designed to complement Ampeg's innovative acoustic bass pickup, but the seeds for bass guitar amplification were sown.

On the heels of the P-Bass debut was the 1952 release of the Fender Bassman, a 50-watt amp with a single 15" speaker. In 1954, Fender updated the Bassman with a 4×10 speaker configuration and an upgraded circuit. Meanwhile, Ampeg continued to evolve its lineup, culminating in one of the most important amps of all time, 1960's B-15 Portaflex.

During the mid '60s, other manufacturers started making their own amps. England's Marshall and Hiwatt were early pioneers in high-output amplification, and the loud rock bands of the mid to late '60s quickly took to their 50- and 100-watt heads and large 4×12 cabinets.



LESSON 01



The Birth of Solid-State

Although the transistor had been integrated into radios and other small amplifiers since the early '50s, it wasn't until the mid-to-late '60s that solid-state amps began to steal market-share from the all-tube predecessors mentioned above.

Vox released one of the earliest solid-state bass amps, the T.60. Although the T.60 developed a reputation for unreliability, Vox continued to be an important solid-state brand through the '60s, in part because of brilliant endorsement deals with major acts of the day, including the Beatles, the Rolling Stones, and James Brown.

In 1968, RCA – then among the world's most influential electrical engineering firms – released a paper describing important developments in solid-state amplifiers, helping the technology flourish even further among smaller amp manufacturers.

The '60s was also the decade when many iconic bass-amp innovators started their careers, including Russ Allee and Roger Smith of AMP and Steve Rabe, founder of SWR. Bob Gallien, the man behind Gallien-Krueger, designed one of the decade's most powerful solid-state amps, the GMT 226B.



LESSON 01



Tubes vs. Transistors

The Ampeg SVT, released in 1969, would prove to be the dominant amp of the '70s, and to its many fans, it continues this dominance today.

The SVT (short for Super Valve Technology) was leagues ahead of its all-tube contemporaries. Bill Hughes' design offered 300 watts of power at a time when most amps struggled to eclipse 100, and its accompanying cabinet featured eight 10" speakers in an innovative sealed and baffled design.

It was the first amp to really allow bass players the volume and projection to compete with the screaming electric guitars and thunderous drums of the era's rock music.

Released in late 1968, the solid-state Acoustic 360 stack, consisting of the Model 360 preamp and 361 powered cabinet, was one of the most coveted rigs among period bass players.

While not as powerful as the Ampeg, the Acoustic's clever design, solid-state immediacy, and unusual tone-shaping circuit helped it stand out.

The 361 cabinet included a rear-firing horn and single 18" speaker, and was legendary for its projection into large rooms. It would become a key part of the tone of bass greats like John Paul Jones, Larry Graham, and Jaco Pastorius.



LESSON 01

The Rise of Hi-Fi

By the end of the '70s and into the '80s, many bassists who had been content with the rich and thick sound of their SVTs, B-15s, and Acoustic 360s now craved greater clarity, speed, and power to better suit the era's music. Many manufacturers flourished in the '80s, contributing essential amps to the industry.

Former Acoustic Control Corporation engineer Russ Allee formed AMP (Amplified Musical Products) in 1981, soon hiring fellow Acoustic cohort Steve Rabe to help design the AMP 420 bass head. While not a huge seller at the time, AMP's modern approach to solid-state design would be hugely influential, and Allee would continue to be a major figure in bass amp design for years to come.

Steve Rabe founded SWR in 1984. Building on the solid-state experience he gained at Acoustic and AMP, Rabe's first amplifier, the PB-200, could be described as one of the earliest truly modern bass heads, with many features that continue to be commonplace today. Realizing that SWR needed a bass cabinet to sell alongside its hot head, Rabe turned to David Nordschow of Eden Electronics for assistance.

Then better known for PA-style cabinets, the first Eden design for SWR would radically change cabinet design through the decade. The Goliath I cabinet, with its 4×10 + horn configuration, was capable of high volume – but it was also articulate, quick, and blessed with extended high-frequency response thanks to its built-in tweeter. Subsequent Goliath speaker designs would move in-house, but Nordschow's early influence was critical to their development.

Nordschow saw an opportunity for Eden to expand into amplifier design. An early partnership with famed audio engineer James Demeter yielded the VT-40 head, a kind of hybrid of Demeter's VTB-201s preamp and a 400-watt solid-state power amp. Eden continues to be a major force in bass amps today, as does DNA (David Nordschow Amplification), which Nordschow launched after his split from Eden.

After its early success and innovation with the 226B, Gallien-Krueger had more tricks up its sleeve. In 1982 it debuted the 800RB, an iconic head renowned for its durability and clever circuit, which included a built-in DI and bi-amp capabilities. It also introduced the essential feature set that would characterize GK's later, more powerful designs.



LESSON 01



The Modern Age

From the '90s onward, solid-state amps became the vastly dominant technology. While many manufacturers continued to produce all-tube models, the advantages of solid-state were significant, especially when power, durability, and cost were factors.

For decades, loud amps were heavy, and so were the cabinets capable of contending with their high output. Now, it is not uncommon to find 1000-watt heads weighing less than ten pounds.

LESSON 02

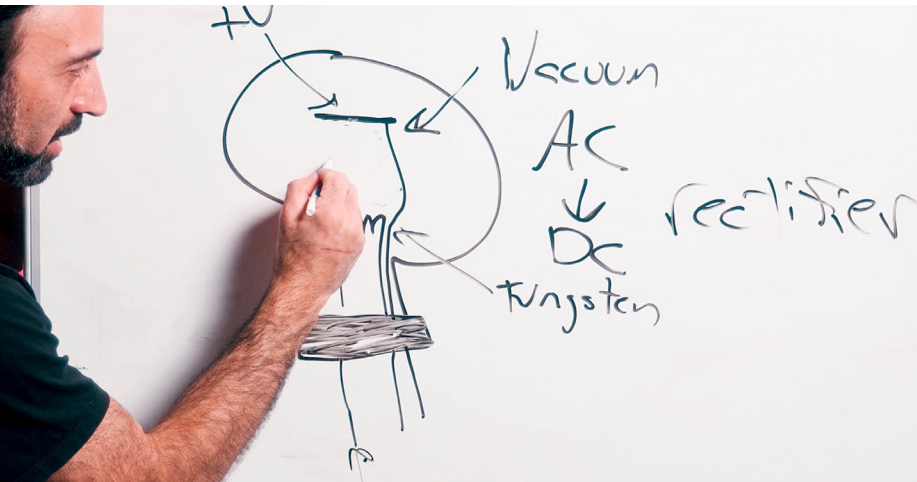
WHAT DOES A BASS AMP DO, ANYWAY?

Here comes the science bit.

Electric guitars are powered by electromagnetism – and electromagnetic induction. We can say that a changing magnetic field generates or ‘induces’ electricity. It's also true that a changing electric field generates magnetism. If you feed electricity through a coil of wire, you generate a magnetic field around it. That's how you can make a magnet controlled by electricity – better known as an electromagnet.

What does all this have to do with bass guitars? The strings on your bass make electricity when you move them. Under the strings, there are electricity-generating devices called pickups. Each one consists of one or more magnets with hundreds or thousands of coils of very thin wire wrapped around them. The magnets generate a magnetic field that passes up through the strings. As a result, the metal strings become partially magnetized and, when they vibrate, make a very small electric current flow through the wire pickup coils. The pickups are hooked up to an electrical circuit and amplifier, which boosts the small electric current and sends it on to a loudspeaker.

It's a basic rule of physics (called Faraday's law) that a changing magnetic field produces electricity. So a guitar string will produce electricity for as long as the magnetic field is changing – in other words, for only as long as the string is moving. When it moves in one direction, the current is positive; in the opposite direction, it's negative. The positive and negative swings create an Alternating Current. Think of it as an electrical signal that's essentially a duplicate of the strings' movement.



LESSON 03

TUBE AMPS EXPLAINED

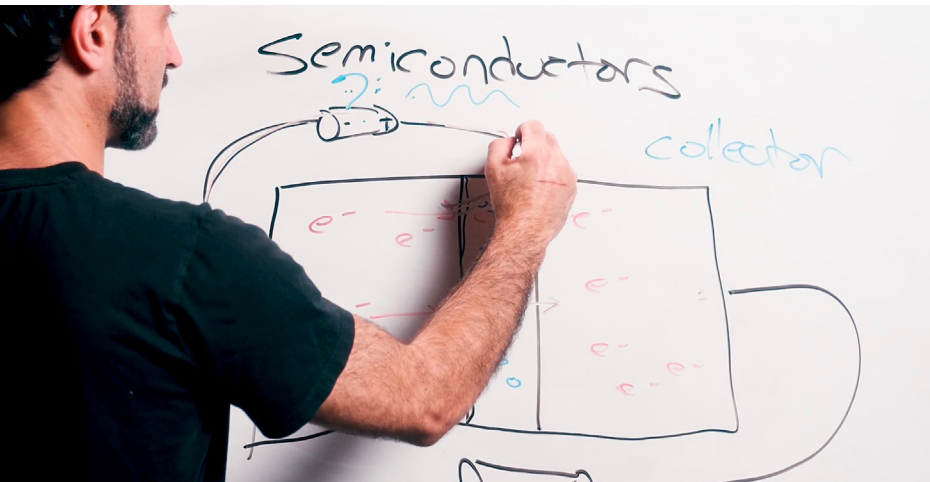
The physical difference between a solid-state amp and a tube amp is that a solid-state amp derives amplification from electronic transistors, while a tube amp uses vacuum tubes (also known as valves).



A tube is a small glass cylinder that contains a number of different components within a vacuum, and its purpose is to increase the amplitude of a signal. With a tube amp, a bass guitar's signal is sent through tubes at a rate determined by controls on the amp such as gain and volume.

When electrical current flows through a tube, heat is generated by a filament (this is the part you see glowing) that causes the cathode to release negatively charged electrons. Surrounding the cathode is a plate called the anode, which carries a positive charge – as you probably know, opposites attract, so electrons flow from the cathode to the anode.

Situated between these two is the grid, which is connected via a cable to the guitar's pickups. The signal from pickups controls the flow of electrons and can cause lots of them to reach the anode, amplifying the signal.



LESSON 04

WHAT IS A SOLID-STATE AMPLIFIER?

In the 1970s, when solid-state amps came into existence, it was expected that most bass players would make the shift to the new type of amplifier, which uses transistor circuits to convert an electrical signal into an audio wave.

These contain multiple advantages over tube amplifiers, but not all of them are related to audio quality. If you are a gigging musician and need to haul an amp all over town, weight can play a big factor!



LESSON 05

LIGHTER & LOUDER

Lightweight amps predominantly make use of two key pieces of technology.

First, the power amps generally operate in a Class D topology. Peavey was a big innovator in this realm, releasing the first Class D amp for live audio applications in 1984.

Class D amps also achieve much greater efficiency than conventional Class AB amplifiers, so less output power is wasted as heat, and more of the input power is converted directly into sound. The resulting amps require fewer output devices, less heat-sinking, and a physically smaller power supply.

The industry approached the technology tentatively in the early 2000s, but now virtually every manufacturer (except for the hardcore all-tube specialists) makes at least one bass head that utilizes a Class D power amp. The other critical component of today's ultra-lightweight amps is the switched-mode power supply (SMPS).



LESSON 06

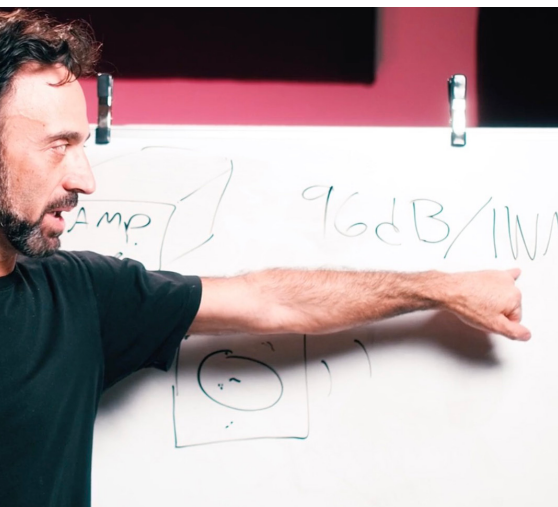
COMBO VS. STACK: WHICH IS RIGHT FOR YOU?

Typically, amplifiers tend to fall into two categories; combo amps, or amp heads.

A combo amp takes the electrical signal from your bass, feeds it through a tone shaping circuit and then amplifies it before driving it towards your chosen speakers. This entire process happens within a single unit, making them extremely convenient.

Amp heads, on the other hand, conduct only the tone shaping and amplification and require a separate speaker cabinet to output the sound. This gives the advantage of being able to mix and match heads and cabs to create unique sounds, but does add an extra layer of gear – and potential cost – to your rig.

Another type of amp is growing in popularity; the amp sim. Many modern multi-effects or software packages offer software versions of the amplification process.



LESSON 07

HOW MUCH POWER DO YOU NEED?

In general, bass amps need higher wattages than guitar amps as they require more headroom to push a low-end signal to cabinets filled with large speakers.

If you're looking for a home practice amp and won't be playing with a drummer, you may be fine with a great sounding lower-wattage bass amp.

Look out for two power ratings on your speaker cabinets. These are designed to help buyers match the right amplifier to the right speaker, but why two different wattages? These dual power ratings denote important aspects of the cab's design and performance.

So, here's the useful part: When you're matching cabinets to amps, use the "continuous" power rating as your guide. This rating is the lower wattage and the one more relevant to the day-to-day use of your speakers. It describes the amount of average power a speaker can continuously handle.



LESSON 08

UNDERSTANDING SIGNAL FLOW

A bass amp typically consists of a preamp stage and a power amp stage.

The preamp stage comes first and is where most of the tone shaping happens; the power amp stage comes second and provides the muscle that powers your sound out into the world.

Your amp's traditional tone controls reside in the preamp stage and accomplish their work before the signal reaches the power amp. In this lesson, let's try to demystify the voodoo that happens under the hood of your bass amp and equip you with the confidence to experiment.



LESSON 09

TONE SHAPING FOR SPECIFIC APPLICATIONS

More than anything in your signal chain, your amp defines the overall characteristic of your tone.

But there are a myriad of different amplifiers out there, and ultimately it comes down to your personal taste as to what suits your particular setup.

In this lesson, let's take a closer look at some of the different types of amps that exist, how to choose the right feature set, and other considerations you need to know.



LESSON 10

INPUTS & OUTPUTS

In this lesson, we're breaking down the different inputs and outputs (I/O) into functional parts and explaining how each of these work.

Does your amp have a line out jack? Or an aux in? What about an effects loop for routing your signal to your effects.

For those of you who have a head/cab rig, the speaker jacks on the back of the amp send the amplified signal out to the cabinet. Got it? Or still a bit confused? Don't be. All you have to do is follow the signal path.

LESSON 11

THE FUTURE OF BASS AMPLIFICATION

The future of bass guitar amplification is increasingly moving toward compact, lightweight solutions and advanced digital technologies.

Traditional bass amplifiers and heavy speaker cabinets, while beloved for their powerful sound and analog warmth, are gradually being complemented or even replaced by smaller, more versatile systems. Manufacturers are investing in high-efficiency, lightweight materials for cabinets and Class D amplification, offering portability without sacrificing tone. Additionally, advances in direct amplification and in-ear monitoring are enabling bass players to perform without the need for large stage rigs, relying instead on preamps and DI boxes to interface directly with a venue's sound system.



A major shift in the industry is the rise of amp simulation plug-ins and pedals, driven by improvements in digital modeling technology. These tools emulate the sound of iconic bass amps and cabinets with remarkable accuracy, giving players access to a wide variety of tones at a fraction of the cost and size of traditional setups. Amp simulation plug-ins are becoming essential in studio and live environments, allowing bassists to tailor their sound with precision and flexibility. Pedals like the Line 6 HX Stomp and plug-ins like Neural DSP's Parallax are reshaping how bassists approach tone creation, emphasizing portability and convenience. This trend is likely to accelerate, as digital modeling continues to evolve, offering bass players unparalleled control, consistency, and the ability to experiment with diverse sonic landscapes.



COURSE SUMMARY



Discuss in the Community

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Choosing the right bass amp can be a pretty daunting task when there is so much choice.

Choice of size, choice of technology, choice of features and functionality. Tone, effects, versatility and portability should all factor into your thinking here. But the question we always come back to is: "how are you going to use it?" Your answer will automatically filter out the options that probably won't be suitable for you.

The bass guitar has basically stayed the same since it was invented. There's a body. There's a neck. There are strings and some way of converting the strings' vibration into an electrical output. Amps, on the other hand, are a venue for truly radical change. Whatever you end up choosing, make sure it's a setup that suits your style.



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