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Hugo Pinksterboer

Amplifiers and Effects

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Amplifiers and Effects

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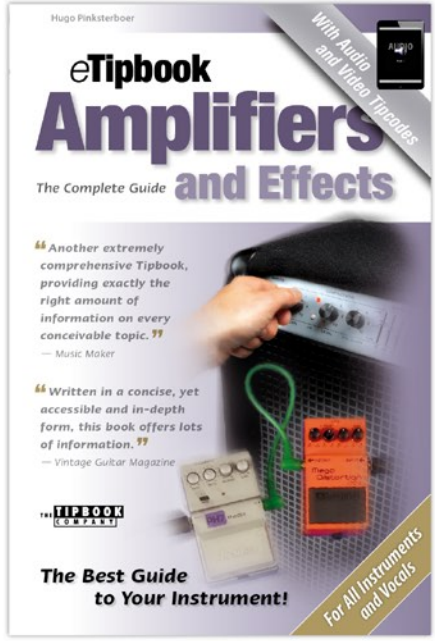

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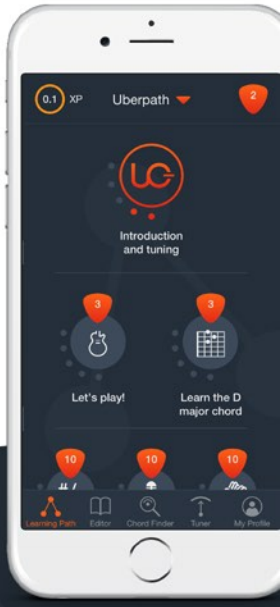

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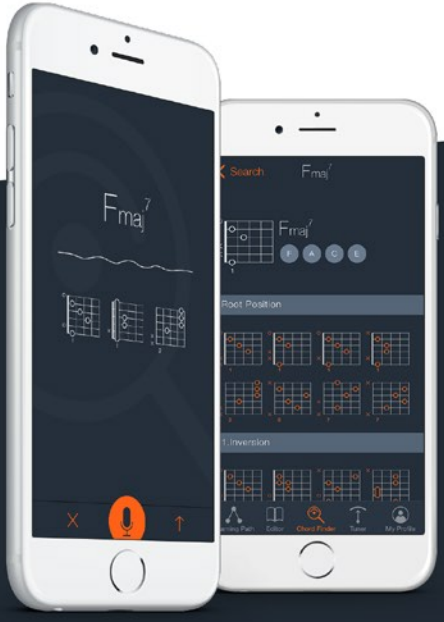

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Hugo Pinksterboer

eTipbook Amplifiers and Effects

The Complete Guide

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The Best Guide to Your Instrument!

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Thanks!

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Introduction

Are you planning to buy a new amplifier? Would you like to add new effects to your current rig? Do you want to learn more about the equipment you're using? This book will tell you all you need to know, no matter which instrument or which style of music you play — from power ratings to preamps and pickups, from cables to cabinets, from microphones to monitors, from tubes to tweeters, and much, much more. Loaded with practical, musical tips and advice,* Tipbook Amplifiers And Effects *covers even the most technical subjects in a non-technical way.

After reading this book, you'll be able to get the most out of your equipment, to buy the gear that best suits your needs, your preferences, and your budget, and to easily grasp most literature on the subject, from catalogs, manuals, and magazines to books and online publications.

The first three

If you're a first time buyer, please check out the first three chapters. They will introduce you to the different types of amps and effects, and explain the basic terminology and features of this type of gear. Basic price indications and buying tips are included in chapter 3.

Features

Chapter 4 tells you everything about the main parts, the controls and the features that you'll find on this type of equipment, from

knobs and faders to equalizers, balanced and unbalanced inputs, DI, speaker simulation, loops, power conditioners, and numerous other subjects —all written for musicians, not technicians.

The figures

Dealing with amps is dealing with figures. You need to know a little about power ratings and decibels, and it comes in very handy if you know the basics about frequencies and Ohms. Chapter 5 reveals how accessible this type of information can be.

Amps

The next four chapters each deal with a certain type of amp, explaining their features in more detail, followed by a chapter on sound systems.

Effects

The intriguing subject of effects is covered in two separate chapters. The first one explains the different types of effects, from reverbs and wahs to jackhammers and ice boxes. The second chapter explains effect equipment in detail.

Microphones, cables and more

This book wouldn't be complete without special chapters on microphones and pickups, on cables and wireless systems, and maintenance. As an extra, there's a brief chapter on the history of live amplification, and one that introduces you to the main companies that produce amps, effects, microphones, and speakers.

Glossary and index

The Tipbook glossary briefly explains most of the terminology used in the previous chapters, and the index makes the information in the book really accessible. Enjoy!

— Hugo Pinksterboer

Contents

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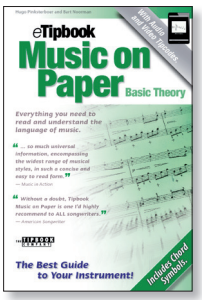
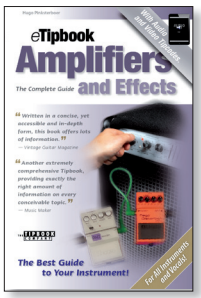
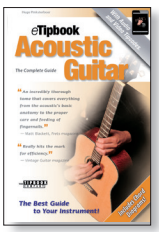
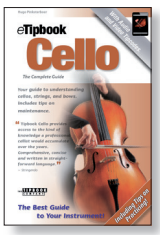
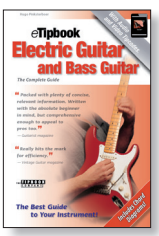
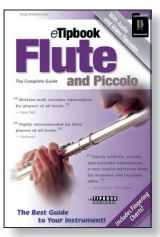


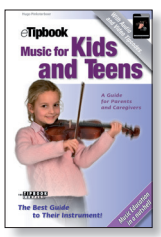


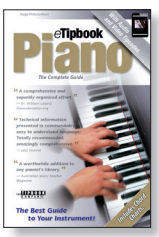


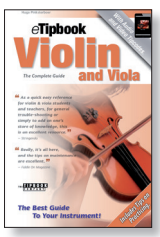


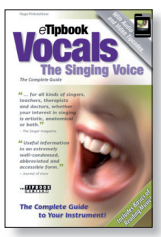








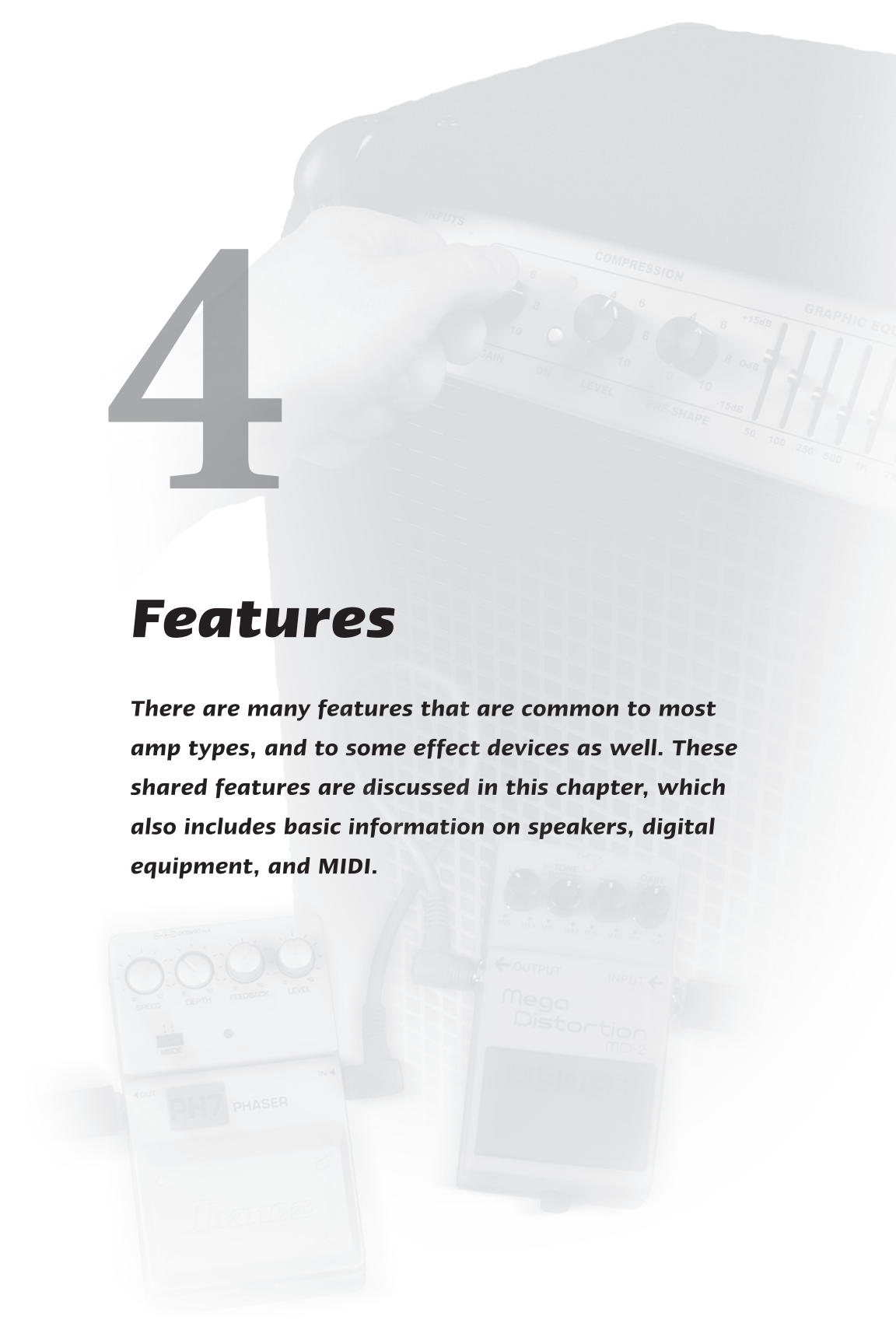




4

Features

There are many features that are common to most amp types, and to some effect devices as well. These shared features are discussed in this chapter, which also includes basic information on speakers, digital equipment, and MIDI.



First, the manual. Some amps and multi-effects units (especially programmable ones) have so many features that not reading their manuals will probably rob you of half the things you paid for. But even basic amps and effects may have possibilities that you'll only find in the manual, so at least take a look at it.

Your safety, your technician

When reading a manual, don't skip the safety instructions. This book doesn't replace them! A schematic diagram of the electronic circuit may be included too. Save it for your technician in case you run into technical problems.

THE OUTSIDE

Most amplifiers are taken on the road, so they need to be rugged and preferably not too heavy. Combo amps and speaker cabinets usually have a wooden enclosure. Birch plywood is a popular choice, but poplar and okume are much lighter. Wood thickness is usually around ¾" (19 mm).
Solid wood is rarely used; it is typically said to add some extra resonance and warmth to the sound. Many companies use MDF (fiberboard) or synthetic materials, from lightweight, environmentally friendly composite shells to reinforced polypropylene. The material of choice may have some influence on the sound, but it's more important that it is used to create a strong, stiff, acoustically inert frame for the amp and speakers.

Dimensions

Making a speaker cabinet is not simply a matter of building a box big enough to house the drivers. Many companies even use computer programs to calculate the dimensions of their enclosures, which have a direct result on the overall sound. Even the stiffness of the enclosure has its effect.

Covering

The outside is typically carpeted or covered with thick, strong

vinyl that is commonly dubbed Tolex. Vinyl is easier to clean, but industrial-grade carpet is more scratch-resistant. Black is the standard 'color,' but some companies make amps and enclosures with vinyl, carpet, or genuine leather coverings in various colors, or with a see-through lacquered, hardwood exterior, among other variations.

Not every company uses black... (Orange)

Corners

The vulnerable corners are protected by metal or plastic corner caps. Plastic feels and looks smoother; metal looks tougher. Cabinets may have stackable corners or top indents that receive the feet or casters of stacked enclosures.

Feet

Feet are usually rubber, which can make it troublesome to push heavy gear into position. Metal feet, on the other hand, may leave scratches — but if you like the stage to boost your low end, they may help a little.

Grille

The speakers are protected either with strong, acoustically transparent grille cloth or with a metal grille. If the grille's grid is too wide, objects may still damage the speakers. A grille that's wedged in (to allow for close miking; see page 59) rather than screwed on, may come loose by itself. Grilles shouldn't resonate or

TIP

Handles

The heavier the unit, the more important the handles will be. Heavy equipment preferably has a top handle as well as a pair of side handles. Some units have a bottom handle too. Well-placed handles allow for comfortable lifting and carrying, so check! Recessed handles, controls, and jack plates make things easier to handle, and they're less vulnerable.

rattle. A curved grille helps prevent denting. Metal grilles are also used to protect the vulnerable tubes or *valves* in tube amps.

Weight

Good amps used to be heavy due to their heavy speakers (with the magnets being the heavy part) and transformers, which can weigh up to ten pounds in powerful amps. Though new technology allows for high-quality yet lightweight components, a combo amp that's fit for rehearsals and gigs still easily weighs thirty pounds (14 kilos) or more, and a guitar speaker cabinet with four 12" speakers can be four times as heavy.

Casters

Heavy equipment is easier to move if it has wheels or *casters*, which are usually intended for smooth surfaces only. Stem-type removable casters can break or fall out, so some companies prefer plate-mounted casters. These are available in removable versions too.
If the casters come with brakes, don't forget to use them.

Dolly-style

Some amps and cabinets have two casters and a removable or telescoping dolly-style handle to facilitate transport. There are models that also feature a quick-release lid to cover the speaker and controls. Other companies sell amplifier bags with built-in casters. More tips on transporting and protecting your equipment can be found in Chapter 16.

Tilting amps

Tilting a speaker cabinet or combo amp backwards directs the sound toward your ears or your audience's ears. Some cabs and amps have tilt-back legs, a tilt hinge, a spring-loaded handle, a lifter mechanism, or a kick stand for that purpose, or you can rock them back by detaching the rear casters. As an alternative, there are amp stands with various tilt positions. Tilting an amp makes you lose the low-end coupling to the floor, however, which is why

some amps have an angled *baffle board* (i.e. the board onto which the speakers are mounted).

Wedge

Wedge-shaped enclosures allow you to position them at two or even three different angles, improving their projection. Angles vary widely per design, from 15° to 55° and up. Monitor speakers usually have a *wedge* format: They're floor-mounted, projecting their sound toward the band without blocking the audience's view. Various bass combos are designed to be used either straight up or 'kicked back.'

Kickback combo (Hartke)

Speaker stands

PA speakers and some keyboard combos and acoustic amps are pole mountable so their sound reaches the people in the back as well. The *pole sockets* are typically designed for standard 1⅜" (35 mm) speaker stands. Small (acoustic) combos and personal monitors can sometimes be mounted on microphone stands.

AC POWER

A detachable AC power cord makes an amp easier to handle and a broken cord can be instantly replaced, but it is a more expensive solution than fixing the cord inside the amp. The only advantage of a non-detachable power cord is that you can't forget to bring it. If the cord is non-detachable, see if the amp has *cable ears* to wrap it around for ease of transportation.

Three pins for a reason

Power cords with a three-prong plug should always be connected to a properly grounded AC outlet (see page 242–243).

High-end

High-end audio fans spend large amounts of money on power cords. Similar cords are available for musicians too. Can you hear what they do? Opinions differ. Got money? Check them out!

Switchable voltage

For international gigs, the AC voltage needs to be switched from 110 (US) to 115 (Japan) or 230 (Europe) volts. Due to safety regulations, this is usually not user-switchable, if at all.

Extra outlet

A few amps have an AC outlet on the back (also called a *courtesy outlet*), so you can power another device.

CONTROLS

Most amplifiers have a dedicated knob for every job, and some have one or more rotary controls that double as push/pull switches. On digital equipment, each control can have a multitude of functions.

Top or front

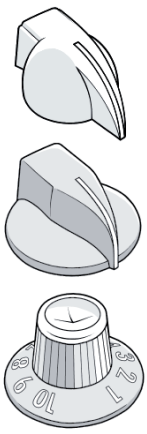
Controls on top (TC Electronic)

The controls you're likely to use most often are usually mounted on the front or the top of the amp. Top-mounted controls make the amp more vulnerable to spilled drinks, and the same goes for top-mounted jacks. When the amp is on the floor, however, top-mounted controls don't force you to kneel down to see what you're doing. The most user-friendly amps have self-explanatory controls

with easily readable texts and numbers, even on dimly lit stages (where small print can be illegible) or on bright stages (where the text on chrome panels can get washed out). Fantasy control names ('beef' for bass or 'shut up' for the headphone socket, for example) can make life more fun.

Quality control

The quality of the controls and switches, and the way they feel, can tell you a lot about the overall quality of the machine. Turning the knobs operates the *potentiometers* or *pots* on the other side of the panel, changing volume, tone, or anything else. Good pots make for knobs that rotate smoothly, but offer just enough resistance to prevent them from turning when you accidentally touch them. The knobs should not wiggle on their posts.



Chicken head, stove and skirted knobs

Chicken-heads and stoves

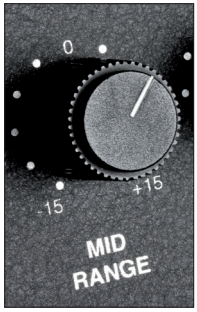
Rotary controls come in all kinds of shapes. Popular models include *chicken-head pointer knobs*, *stove knobs* and *skirted knobs*. Knobs may be one-piece affairs, or they have a separate cap or insert. Tip: If the cap or insert gets lost — and that does happen — you'll no longer be able to read the knob's position.

Center-detented

Some knobs have a center-detented position, so you can feel where you are. You'll find this feature on balance controls and EQ controls, which are usually flat (*i.e.*, not affecting the sound) in their center position.

Ranges

Volume controls usually range from 0 to 10 (or 11!), while EQ controls can range from 0 to 10, or from -15 to +15, for example. To indicate knob positions in a universal way, musicians often use clock positioning, e.g., 'At 2:00, the sound level is impressive.' Examples are shown on the next page.



From -15 to +15...

Clock positions: volume at 11:00, treble at 12:00, mid at 03:00, and bass at 02:00

FOOT CONTROLLERS

Guitar amps usually come with a basic foot controller, *footswitch* or *floor pedal*. Most have two switches: one to switch channels, the other usually to turn the reverb or another built-in effect on or off. Similar pedals can be included with other types of amps as well. More complicated — and expensive — foot controllers are available as options.

Basic footswitch

Functions

Extended foot controllers may allow you to set a tap tempo for delays or other effects (see page 177), to select presets, or to activate a built-in tuner or one or more effects, or any other feature that benefits from hands-free operation. These foot controllers can cost up to three hundred dollars or more. Tip: A *solo switch* switches between two preset volume levels. Hit the switch for that extra bit of power for your solo and change back afterwards.

Cable

As cables are vulnerable, it's best if the floor pedal has one that's easily replaceable. Some simple foot controllers use a basic instrument cable, so you're likely to have spare ones around. Others use a cable with special connectors. If so, it's wise to invest in a spare.

Spacing

If you have large feet, a relatively wide switch spacing will help prevent you from hitting more switches than you plan to.

TIP

(Non-)latching

Most footswitches are latching switches*: Like a light switch, you use it to turn things on or off.* Non-latching switches *are like door buzzers: They're on as long as you hold them down.*

EQUALIZERS

An equalizer is a powerful tone-shaping device. It can be used to even out things you don't like in the instrument's tone or the room's acoustics, for example, and guitarists typically use it to create their own sound. Learning how to tweak these tone controls takes time, practice, and patience, even if it's basic three-band EQ (treble, mid, bass).

Three-band rotary EQ

Suggested settings

The large variety of EQs (and amps, and instruments) doesn't allow for suggested settings in a general book like this, but manuals often list a number of sample settings, offering you some starting points. If you find an EQ setting you like, write it down. Also, check the tips under *EQ panel diagrams* on page 279.

Sound

Every note you play is made up of a number of frequencies, as you can read on pages 88–90. An equalizer allows you to influence the relative volume of certain frequency ranges, and that's what influences the timbre of the sound.

Room acoustics or timbre

An important function of the EQ is to adapt the sound to the room acoustics: Boost the treble range if the room sounds dead or wooly, or reduce the bass if the room is boomy. On keyboard and acoustic amps, EQs are mostly used for this purpose. On guitar amps, the EQ is primarily used to color and shape the sound.

TIPCODE

Tipcode AMPS-004

This Tipcode is a brief demonstration of various EQ settings for jazz, blues, and metal.

Rotary and graphic

Rotary equalizers, named after their rotary controls) usually have two to five bands. Equalizers with more bands often use faders that graphically show you the setting — hence their name, *graphic* equalizers. Graphic EQs on amps often have five to ten bands.

TIPCODE

Tipcode AMPS-005

For this Tipcode, we recorded a brief piano sample with different EQ settings.

TIP

More controls

More expensive amps tend to have a larger range of EQ controls. However, the number of controls has no bearing on an amp's quality: There are expensive guitar amps that have no more than a bass and a treble control. Most amps have a three-band rotary EQ, with controls for bass, mid, and treble.

Treble

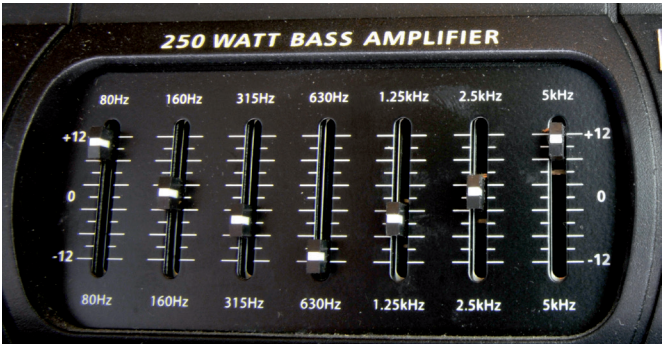
Opening up the treble control adds crispness to the sound. Opening it up too much can create hiss. Turning this control down cuts high frequencies, which may help to reduce the effect of high-frequency consonants, such as the sibilant 's' sound.

Mid

The midrange control can be used to boost important frequencies of vocals, horns, and many other instruments, emphasizing them and enhancing their clarity without drastically altering their sound. Extreme settings can make for a 'hollow' sound (by cutting mids) or a harsh and fatiguing tone (by radically boosting mids). As this frequency range is so important, many amps have two midrange controls: one for low mids, and one for high mids.

Bass

Boosting the bass makes music sound warm, loud and fat. Turning the bass level down helps reduce rumble and promote clarity.



Seven-band graphic equalizer in scooped-mid setting *(see page 46)*

Which frequencies

On graphic EQs, the frequency ranges of the various faders are printed on the panel. For example, a ten-band EQ typically has faders marked 31 – 63 – 125 – 250 – 500 – 1k – 2k– 4k – 8k – 16k respectively. The first fader then affects frequencies in the 31 hertz range; the highest is active in the 16 kilohertz band (see pages 88–90 if this doesn't make sense to you).

Octaves

If you look at the numbers in the previous paragraph, you'll see that the frequency range is doubled for each consecutive fader. That means that each consecutive fader controls a range that's an octave higher than the previous one. Studios and professional sound systems use 30- or 31-band equalizers, with each band covering no more than ⅓ of an octave. This allows for maximum control over the frequencies you want to cut or boost.

Volume control?!

Tip: When the EQ's controls are in their middle or flat position, they don't affect the sound. If you move all of them up or down the same amount, you will hardly hear the timbre change. Instead, the sound will get louder or softer: Boosting or cutting all frequency ranges the same amount has virtually the same effect as turning the volume control up or down.

Scooped mids

One of the advantages of a graphic EQ, as said before, is that you can clearly see what you're doing: It provides a detailed, graphic image of the sound. Terms such as a 'scooped mid sound' for settings with a cut midrange and boosted lows and highs, stem from the relative position of the EQ's faders, as shown on the previous page.

The choice

Hopefully, your amp's manufacturer has carefully chosen the adjustable frequency ranges so that they have the maximum effect. Both the instrument and the type of sound the amp is made for

play an important role in that process. On some guitar amps, the bands even vary depending on which channel you use: The clean channel EQ controls affect different bands than the lead channels controls.

Parametric equalizer

Some equalizers allow you to choose and adjust the midrange frequency band yourself. These are equalizers with a *parametric midrange*, featuring three controls for this one range:

1. The first control allows you to set much you want to boost or cut the midrange.
2. With the second control you can set that midrange from, say, 800Hz to 3kHz.
3. A third control, labeled *Q* or *slope*, enables you to also adjust the width of the range (the *bandwidth*) you want to affect.

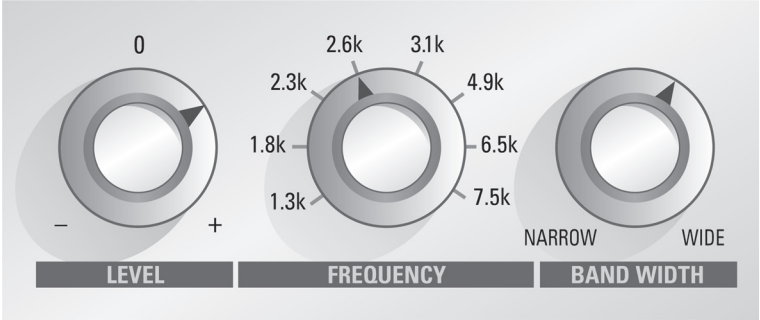
Semi, quasi, sweepable

A *semi-parametric EQ* has separate level and range controls, but

TIP

Fixed

On some amps, you have a choice of two fixed Qs, usually labeled 'narrow' and 'wide', and/or a choice of two fixed frequency bands, rather than having a whole range to choose from. This makes a parametric EQ easier to use, of course.



A parametric EQ allows you to set the EQ level, the frequency range, and the bandwidth.

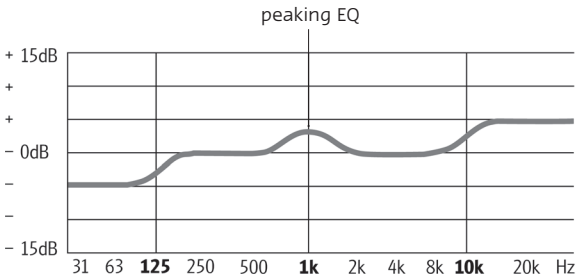
no Q control. Semi-parametric EQs are also known as *quasi-parametric*, *sweepable*, *sweep* or *swept EQs*. If there are separate sets of controls for the low and the high midrange, they may be labeled *low paramid* and *high paramid*, for example.

Time

Learning to use a parametric or semi-parametric EQ, again, takes time and practice. A good way to get started is to set the level control fully clockwise or counterclockwise, and then slowly sweep the frequency control. This way you can easily find the frequency range that needs to be cut or boosted — and adjust the level accordingly. Tip: With the level control in its center detent position, the range control has no effect at all!

Shelves, bells, and peaks

Three more terms that you may come across: A *shelving EQ* means that all frequencies below or above a point will be affected. On many equalizers, the bass and treble are low and high shelving EQs respectively. The mid control is a *peaking EQ* or *bell-shape EQ*. Opening it creates a bell-shaped 'peak' at the selected frequency. Both shelving and peaking EQs are shown below.



Shelving low (cut) and high (boosted) EQ, and a (boosted) peak mid EQ

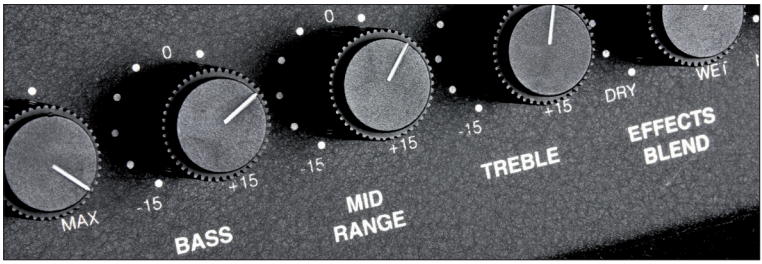
How much

How much an EQ control affects a certain range is expressed in *decibels* (*dB*; see page 81). This is usually indicated on both extremes of the rotary controls. If it says -15 on one end and +15dB on the other, turning the knob fully counterclockwise cuts the range 15 decibels and opening it up provides a 15dB boost.

Active and passive

EQs that can both cut or boost frequencies are known as *active*

EQs. The controls are flat in their center position, at 12:00. Passive EQ controls, which only cut frequencies, usually go from 0 to 10, like a volume control.



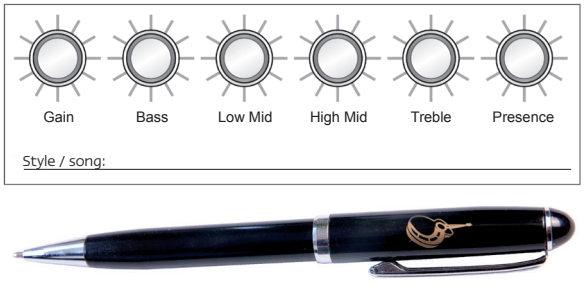
Active equalizer

Higher is more

When testing amps, trust your ears to find out how sensitive or powerful the EQ is, and how responsive the amp is to your settings. A tip: When using the EQ, adjust the treble first and the bass last. If you do it the other way around, a boosted bass often requires more mids, and more mids might require a higher treble setting — so you'll end up playing a lot louder than you planned to.

EQ panel diagrams

Another tip: If you've dialed in a perfect sound on your own amp, write down the settings. Some manuals provide you with blank *EQ panel diagrams* for that purpose, next to a number of sample diagrams. You can also make those yourself. Alternatively, you can mark your settings on a white strip of tape that you can stick under the controls, provided there's room to do so. If your amp has user presets, you can simply store your settings (see page 206). Tip: No presets ? Use the blank diagrams on page 279-281, or download them at www.tipbook.com.



Record your settings with blank EQ panel diagrams.

More EQ controls

Many amps have additional tone controls, such as switches that boost low, mid, or high ranges, or a rotary control that produces a variety of preset tonal adjustments that add to what the regular EQ controls can do. Such controls are usually labeled *shape*, *contour*, *enhancer*, or *voicing*. These controls often boost and cut ranges other than the ones you control with the built-in equalizer.

TIPCODE

Tipcode AMPS-006

This Tipcode demonstrates the effect of various shape settings on the sound of an electric bass guitar.

Tips

Stand-alone equalizer (Boss)

- To learn how to really use an EQ, you need to know the role that various sound systems play in an instrument's timbre. For example, a bass drum is a low-sounding instrument with a lot of 'oomph' around 80 to 100Hz, but to enhance its definition in the mix, increasing the lows won't help: Instead, you will need a boost in the 2.5 to 6kHz range. Likewise, boosting the treble will only increase hiss and noise if those high frequencies aren't present in the instrument's tone. Dealing with these subjects in more detail goes beyond the scope of this book, however.

- Boosting one or more frequency ranges too much may result in a distorted sound or speaker damage. A few amps have an EQ clip light that warns you if this is about to happen.

- Use your amp's EQ in conjunction with the EQ controls on your guitar, bass, or keyboard: The tonal possibilities are endless.

- And if that's not enough, you may want to get yourself a stand-alone equalizer (see page 184).

INS, OUTS, AND PLUGS

The number of inputs and outputs tells you something about an amp's versatility. A really versatile combo amp has a headphone jack for silent practice, an extra speaker output, a special output to connect the amp to a sound system or a recording console, separate connectors for effects and footswitches, and sometimes even more connectors.

Front, rear, or top

Most amps have front-mounted jacks. Others have all or some of the lesser-used jacks mounted on the rear. Rear-mounted jacks may look a bit neater, but front-mounted jacks are commonly easier to use. Top-mounted jacks, again, are most vulnerable for spilled drinks. Make sure the connected cables don't get in the way of the controls. Tip: On rack equipment it may be easier to have most connectors on the rear panel.

Quality

It's hard, if not impossible, to assess the quality of the jacks, but it's good to know that there are differences. Good jacks have a better, longer-lasting hold on your plugs and they are less likely to cause hum or drop-outs.

The combined weight of a plug and a cable shouldn't put too much stress on a jack. A cable that is jerked around a lot certainly does, so be careful.

Phone jacks

Most instruments use *instrument cables* with *¼" phone plugs* that fit the matching, small round phone jacks on the amp. They're usually mono. Stereo instruments such as keyboards simply use two mono cables and two mono inputs — one for the right channel, one for the left channel.

Mono and stereo 1/4" plugs

Stereo phone jacks

Headphones and other stereo devices have a stereo plug, which requires a stereo jack. Stereo plugs are easily recognizable, with two narrow (usually black) bands that separate their three contact points: tip, ring, and sleeve (TRS). They're also known as *TRS* plugs. Mono plugs (TS) have a single band.

Mini

Headphones usually have a 3.5mm mini-plug with an adapter that allows it to be connected to a ¼" (6.35 mm) phone jack. Mini-plugs are available in both mono and stereo.

Plug = switch

1/4" mono and 3.5mm stereo plugs

In some cases, a plug acts as an additional switch as soon as it is plugged in. For example, plugging in a headphone jack may switch off the speakers. If so, this may not function properly if you use a mono plug instead of a stereo one, or vice versa. Check your manual.

Hole plugs

At high volume levels, you may hear air rushing in and out of unused jacks, caused by the movement of the speaker's cone. This can be stopped with a set of *hole plugs*. Some amp makers prevent this type of noise by locating the jacks over a sealed chamber.

XLR connectors

Professional microphones are usually connected with *XLR connectors* or *cannon connectors*. The male version, used where a signal leaves a device or the cable, has three pins.
Female XLR connectors, with three matching holes, are used

where the signal enters a device or the cable. This is different from phone jack connections, where both input and output connectors are female.

Male output, female input

Balanced connections

XLR connectors are typically used for so-called *balanced* or *symmetrical connections*. This type of connection uses two symmetrical conductors. In non-technical terms, the second conductor cancels out interference that was picked up by the first. As microphone signals are very sensitive to interference, microphones often use a balanced connection.

Unbalanced to balanced

Long instrument cables (18 feet and up) are more sensitive to interference too. To prevent interference, you can turn the unbalanced instrument signal into a balanced signal by using a DI box (see page 60). This requires the use of a balanced cable out of the DI box.

Female XLR inputs and line inputs on a mixing console

Adapter?

Some devices have a balanced ¼" microphone input only. If your microphone cable has XLR plugs, use an XLR-to-¼" cable rather than using an *XLR-to-¼" adapter*: Adapters make the signal path more hazardous, and their weight puts extra strain on the jack.

Other uses

XLR and ¼" connectors are used for other purposes too, from connecting speakers to hooking up amps or effects. Tip: speaker cables with XLR plugs are unbalanced, using only two of the three pins. Conversely, balanced connections can also be made using TRS plugs, but this is less common.

Locking and combined

Combined locking socket; accepts both XLR and phone plugs

Tip: *Locking* XLR and phone plug sockets lock in the plug upon insertion. A push tab releases it. They're rare on combo amps. Another tip: There are space-saving *combined sockets* that accept both XLR and phone plugs.

CD players and other sources

RCA or phono plugs. Tip: use Red for the Right channel

Some amps have a special *auxiliary*, *aux* or '*jam along*' input for a CD player or a comparable sound source, allowing you to play along with pre-recorded music. The same input can be used for a keyboard or a drum machine as well. It may have ¼" phone jacks, mini jacks, or the same RCA sockets that your home stereo has.

Confusing

RCA plugs are also known as *phono plugs*. Confusingly, many people use this term for ¼" phon*e* plugs too.

Speaker out

Amps often have an output for an

extension speaker cabinet. This makes for a broader sound and may provide additional power, as you can read on page 84.

Speaker connections

Speakers should be connected with dedicated speaker cable, as described in Chapter 15. Amps and speaker cabinets usually have ¼" jack, XLR, and/or dedicated *Speakon* connectors. The Speakons have a number of advantages:

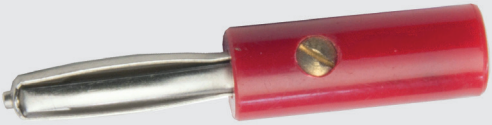
- You **cannot touch** the conductors (prevents hum and electric shock from high-powered amps).
- They're **rugged**.
- They offer a **stable connection** surface.
- They can't be **unplugged accidentally**.
- They're **airtight**, preventing pumping sounds (see page 130).
- They can handle **heavy cables**.
- They have excellent **strain relief**.

Speakon plugs

TIP

Bananas

Some amps still use banana plugs, or they have speaker terminals that are designed to receive the cable's bare-wire ends, like the terminals on most home stereo amps.



Headphone jack

Plugging in your headphones doesn't always automatically switch off the speaker(s). Why? Because the headphone output can often be used to connect the amp to a mixing board or a recording

Turn off the tweeter (HORN OFF) or both speakers (HEADPHONES)

system, and in those cases you probably still want to hear the built-in speaker. Amps that don't automatically disconnect the speakers either have a switch to do so, or the master volume can be turned down without affecting the headphone level.

Speaker simulation

Distorted guitar sounds often sound very thin and scratchy when using headphones. If they don't, the headphone jack probably has a special filter that mimics the sound of a guitar speaker (usually a cabinet with two or four 12" speakers). This is typically known as *speaker simulation*, *speaker compensation* or *cab emulation*. Such filters can also be found on other outputs and devices (e.g., DI-boxes and preamps), for the same purpose. The picture shows speaker emulation for both headphones and line out on a Marshall amp.

Which headphones?

You can use your regular headphones. Here are three tips:

- Models with an impedance lower than 75 ohms may **sound so loud** that you'll damage your hearing.
- For distorted guitar sounds, some players prefer to use really **cheap headphones**; good headphones may sound too clean.

Tips

- *The more expensive the amp, the less likely it is to have a headphone jack, as these amps are less likely to be used for practicing.*
- Never *turn on a tube amp with a disconnected speaker (see page 117).*
- *If you're playing late at night using your headphones, make sure the* speaker is really off!

- Bassists commonly prefer headphones with relatively **large drivers**, which improve the reproduction of their lowest notes.

Not too loud

Avoid high volume settings to prevent hearing and headphone damage. Always turn the volume level down before you put on your headphones, and gradually increase the volume as you start playing. Turn the volume down as soon as you hear a clicking sound, if playing with headphones makes you feel tired or if it causes ringing ears (and read pages 83–84!) Tip: Many amps have a separate level control for the headphone jack.

To tuner

Many bass amps and acoustic amps have an output labeled *tuner* or *to tuner*. It allows you to keep your tuner connected at all times without interfering with the signal path — and the shorter and more direct your connections are, the better.

Tuner output

Two tips

- A **tuner output** usually doubles as a line out.
- On bass amps, the tuner output may have a filter that cancels the bass' harmonic frequencies (see pages 88–90) that make it hard for the tuner to 'hear' the fundamental tone. This makes tuning **faster and more accurate**.

Mute switch

Plugging your instrument in or out may cause a loud pop, unless you turn all volume controls down. An *input mute switch* helps prevent these percussive noises. The switch should also mute the amp's line out. If it doesn't, and the amp is connected to a sound system, you will still hear the pop coming out of the system's speakers. Tip: There are special cables, plugs (e.g., Snap Jacks) and retrofittable items that help prevent those unwanted effects, allowing for silent instrument switches.

GAIN CONTROL

The preamp clip led lights up when gain is set too high.

Most guitarists use their gain control to get varying degrees of distortion. Chapter 7 tells you more. Other musicians use it to match the amp's input to their instrument's output. If this input control is set too low, the amp doesn't get enough signal. Turning up the master volume control helps, but will also boost unwanted hum or hiss. If the gain is set too high, the preamp gets too much signal. This will make it *clip*, resulting in unwanted distortion.

Clip indicator

A *preamp clip indicator* or *clip light* is a great help to set the gain control. Turn the master volume down. Play as loud as you normally play while slowly turning the gain control up until the clip light begins to flash. Now back off the gain control to the point where the indicator lights on loud peaks only, then open up the master volume control to the desired volume level.

AMPLIFYING THE AMPS

In larger venues, the keyboards, vocals, and other instruments will run direct into the PA system — but guitarists and most bassists can't do without the sound of their own amp. The solution is simple: You don't connect their instruments to the PA, but you use the PA to amplify their amps. An amp can either be miked, or connected directly to the mixing board.

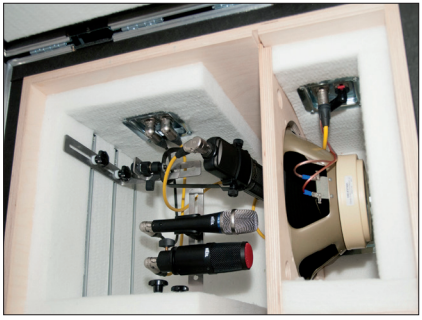
Miking

When miking an amp, the choice of microphones and their exact placement is crucial to the resulting sound: not only the distance

between the microphone and the speakers comes into play, but microphones can be placed off-axis or on-axis, they can be aimed at the center or at the edge of the speaker, and so on. *Tip:* Some amps have removable grilles, allowing for very close miking. The closer the mic is to the speaker, the denser and less ambient the sound will be.

Box of Doom

If your amp sounds best at extremely high volumes, recording will be hard (your sound will bleed into the mics of your fellow band members, i.e., *crosstalk*) and the sound pressure onstage may be too high for the PA system (and the ears of your fellow band members). The solution? The Box of Doom, a soundproof box with a speaker and a set of microphone holders that allow for exact microphone placement. Connect the mics to the mixing desk, crank up your amp to the max, and play!



Box of Doom

Line out or DI

While some can't live without the many options that miking an amp offers, others find it much easier to connect their amp directly to the PA. For this purpose, many amps have a *line out* or a *direct injection (DI) output*, also known as a *direct out*.

Balanced DI output

Inject

This output 'directly injects' the sound into a PA system or any other outboard equipment, from recording consoles to additional power amps. On some amps, the line or DI output level can be adjusted.

The difference

A DI is always balanced and typically uses XLR connectors;

line outs commonly have unbalanced jack connectors. Some companies use different names for these outputs, such as *recording out* or *auxiliary out*.

Speaker emulation

To make distorted guitar tones sound really good over the sound system or on the recording, the DI or line out needs to be equipped with a speaker simulation filter — just like the headphone jack on pages 56–57. If there's no such filter on your amp's DI, you can use a separate *DI box* or *direct box* that has one.

DI boxes

The main purpose of a DI box, however, is to turn an unbalanced instrument signal (such as a guitar signal) into a balanced signal, which can travel long distances — think large stages — without picking up unwanted noise, such as radio signals or ground hums.

Active or passive

There are *active DI boxes* with additional features like a built-in preamp, tone controls, and a notch filter to help fight feedback. Active DI boxes can be powered by an internal battery, phantom power (see page 164), or both. If you just want to send a balanced signal to the sound system or recording console, you can get by with a good *passive DI box*, which doesn't use batteries or a potentially hum-inducing adapter.

Active DI-box with ground lift switch and a choice of battery or phantom power (Samson)

Doubling

As mentioned before, the headphone output can sometimes double as an unbalanced line out, unless its signal is too strong. Other

outputs may be usable in more than one way too, so always check your manual. Combined outputs help lower production costs; dedicated outputs make for more flexible — and more expensive — equipment.

Ground lift

Balanced DI output with speaker emulation and ground (gnd) lift switch

When connecting amps to PA systems and other gear, you may hear a *ground hum*. This can be solved with a *ground (gnd) lift switch*, *ground lifter* or *earth lift switch*, commonly found on devices with a DI output. If there's no ground lift switch available, please check pages 242–243 for additional information. **Never** remove the ground pin of a three-prong power plug, or connect your equipment to a non-grounded power outlet; you risk electric shock if you do, as your manual will tell you.

Post or pre?

A DI or line out can be *pre* (before) or *post* (after) EQ. If it is pre EQ, your tone control settings will have no influence on the sound that goes into your recording device or a second amp, for example. If it is post EQ, sound engineers have to deal with your EQ settings, which they may not like. The perfect solution? An amp with a *pre/post EQ switch*.

Output select

Amps with an *output select* allow you to route certain signals. For example, you may have a click track (metronome) on one of your inputs that you want to route to your headphones or your monitor, but not to the PA or recording system.

EFFECTS LOOPS

If guitarists connect their stompbox effects between their guitar

and their amp, the effects will always be affected by the preamp's distortion and its EQ settings. After all, the effect is part of the input signal, and the entire signal travels through the amp. Some effects (see page 195–196) are more effective or they just sound different when they are inserted *after* the preamp and the EQ. This is what an *effects loop* is for. Many amps have one.

Send and return

An effects loop has an output that sends the signal from the preamp to the effect. This jack, usually labeled *send* or *to FX*, connects to the effect's input. From the effect's output a second cable returns the effected signal to the amp, using a jack labeled *return* or *from FX*.

Send and return connections for mono and stereo effects (Fender)

Serial and parallel

There are two types of effects loops.

- In a **serial loop** the entire signal leaves the preamp, it passes through the effect(s) and then returns to the power amp.
- A **parallel loop** has two signal paths: one that passes through the effect(s), and a parallel one that goes straight from the preamp to the power amp, bypassing the loop. At the return, the affected (*wet*) and the non-affected (*dry*) signal come together.

Parallel loops

Amps with a parallel loop have a *mix* or *blend control* to balance the *wet* signal (that ran through the effect) with the *dry* signal

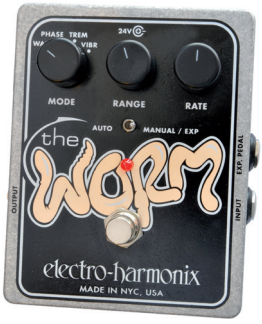
(that did not). In its middle position, you'll hear a balanced mix of both signals. With the blend control turned fully counterclockwise, the effect isn't noticeable at all. Turned fully clockwise, all you hear is the wet signal from the effect device — as if it were a serial loop.

Why?

Many effects units compromise the original signal to some extent, reducing low end, treble, depth of sound, and dynamics, while adding noise. A parallel effects loop reduces this effect as it allows you to add a bit of the original dry signal to the 'deteriorated' wet signal.

Serial loops

A serial loop is used for effects that need to process the entire signal, such as noise gates, equalizers, and volume pedals (and, occasionally, effects that typically go in the amp's instrument input, such as compressors, wah-wahs, tremolos and vibratos). Serial loops are also referred to as *inserts*.



Wah, phaser, tremolo, and vibrato in one stompbox

Parallel or serial?

If you're not sure whether you're dealing with a parallel or a serial loop, first check for a blend or mix control on the amp. This control indicates a parallel loop. If the sound stops when you insert a plug in the return jack, it's a serial loop. Tip: Some amps have both serial and parallel effects loops, and others have a switchable loop, or even two.

Tips

TIP

- *On some amps, the blend control doesn't allow for a 100% wet sound. Instead, the maximum setting is, say, 50% wet and 50% dry.*
- *Parallel loops are sometimes referred to as side chain loops or mixing loops.*

Preamp out, power amp in

Rather then using send and return labels, some companies label their serial loop jacks *preamp out* and *power amp in*. This shows that you can also use the preamp out to feed into another power amp, and that you can connect another (modeling) preamp to your power amp.

Main amp out, external amp in

A few amps can be daisy-chained for extra power: They will have sockets labeled *main amp out* and *external amp in*, for example. These sockets can be easily confused with the aforementioned preamp out and power amp in sockets. Don't.

More features

Here are some extra features that you may come across.

- Some effects loops have their **own send and/or return level controls**.
- Most effects units also have **level controls**, allowing you to adjust the level so that your volume doesn't go up or down when switching the effect in or out. On other units, you use this control to set the balance between the wet and the dry signal.
- Stereo effects will only be stereo if you have a **stereo amp** with a stereo loop. Some amps have both stereo and mono loops. An example is shown on page 62.

Level control on a delay pedal (Mad Professor - BJF Design)

- A **footswitch** to switch all the effects in the loop in or out simultaneously.
- Some guitar amps have **separate loops** for each channel, so you can use different effects for your clean and distorted sounds.
- You can use the send jack as an **unbalanced line out**. The return may double as an input for line-level signals from a drum machine or a CD player, for example. If you want to jam

along with a CD, the blend control of a parallel loop allows you to balance the volume levels of your instrument and the CD.

- Not every loop can deal with instrument-level signals from stompboxes and similar sources. **Some loops are switchable** between instrument-level signals and line-level signals (see page 86). Others accept both.
- A **buffered effects loop** prevents impedance mismatches.

TUBE, SOLID STATE, HYBRID AND MODELING

Bass amps, acoustic amps, keyboard amps and sound systems predominantly use the same solid-state technology (ss) that can be found in TV sets and other home electronics. Guitarists (and some bassists) often prefer amps that use old-style vacuum tubes instead. Why? Tube amps are heavier, more expensive and more vulnerable, and tubes age so they need to be replaced from time to time — but they do produce a warmer, smoother, more natural type of sound, especially when overdriven.

Tube amp (Hughes & Kettner)

Preamps, effects, and hybrid amps

Tubes are also used in separate preamps and in various types of effects, adding sweetness and warmth to the sound. *Hybrid amps* combine a tube preamp with a solid-state power amp, or the other way around.

... good tone...

Tubes?

As tubes have such a reputation for good tone, lots of amps and effect devices have the word 'tube' or 'valve' in the name, even though there's no tube in sight.

MOSFET transistors

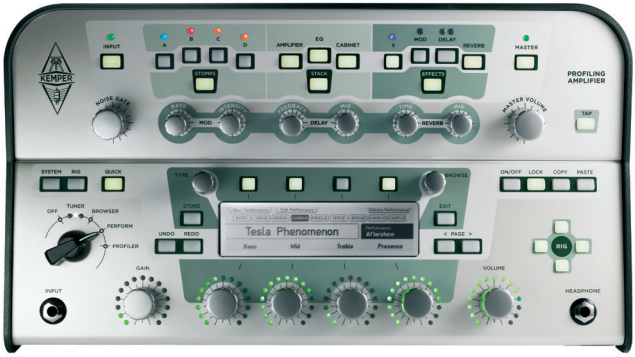
Some companies use MOSFET transistors, which some consider the solid-state equivalent of tubes.

Modeling and digital amps

Modeling amps use software to emulate the sound and character of a number of classic amplifiers. They're mostly used by guitarists. As modeling uses digital technology, modeling amps are often referred to as *digital amps*. Tip: Class D amplifiers are sometimes referred to as digital amps too, but the D does not stand for 'digital' (see page 126).

Convolution and beyond

Modeling, in very — very — basic terms, is a matter of calculating sounds. As an alternative, some companies opt for convolution or impulse response technology, emulating the sounds of amps and effects by using samples (digital recording). Kemper, a German company, developed their own technology for their unique *profiling amplifier*. This particular amp can also be used to capture the sounds of your own amplifiers — and those of your friends, of course.



Profiling amp (Kemper)

DIGITAL EQUIPMENT

A growing number of amps and effects use digital technology. They may be entirely or largely digital, and there are tube amps with digital components too, combining old and new technologies.

How it sounds

Digital equipment is often said to sound very clean, which has to do with the 'perfect' nature of digital technology. Many musicians prefer the 'imperfect', more organic character of analog amps and effects. Still, digital equipment is gaining popularity, helped by the fact that differences in analog and digital sound are diminishing.

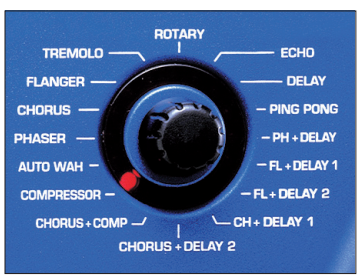
Why digital?

And there's more:

- Digital equipment allows for **larger ranges** in effect settings, as well as more precise settings, and you can store, recall, and edit your settings.
- Digital technology is **more controllable**, and often more affordable.
- The software can often be upgraded so you're always **up-to-date**.
- Digital technology allows for **all kinds of extra features** on (practice) amplifiers, such as jam-along loops, beats and grooves, music players for WAV, MP3 or other file formats, a tuner, phrase trainers (see page 212), and other extras.

Settings

Many digital devices use traditional knobs to tweak sounds and effects. If you recall a patch, these knobs will not reflect the actual settings. Some companies have solved this problem by using motorized knobs that assume the correct



A led shows the actual position of the control.

positions as soon as you recall a patch. Others do the same by using controls that are surrounded by a ring of leds, one led indicating the current position of each control.

How it works

To process sound (audio), a digital unit needs to convert the audio signal to digital information, turning it into *bits*. This is done by an *analog-to-digital (A/D) converter*. The digital information is then processed by a *digital signal processor (DSP)*. Afterwards, it is turned back into an analog signal by a *D/A converter* so it can be sent to a power amp, for example.

Sampling rate

To convert an analog signal into a digital signal, it is 'measured' or *sampled* numerous times per second. The higher this number — the *sampling rate* — the better the quality of the digital sample. For audio CDs, the sampling frequency is 44.1kHz (over 44,000 samples per second).

Bit depth

The sampling rate tells you how *often* a sound is measured. The *bit depth* or *resolution* tells you how *detailed* the sample will be. A larger bit depth (*i.e.*, more bits, or a higher resolution) allows for finer detail. CDs are recorded at 16/44.1; the bit depth is 16 bits. For digital amps and effects the numbers usually range from 16/48 to 24/96, the latter for professional equipment. These figures will be higher in the future.

Digital in and out

Digital devices often have special digital inputs and outputs (SPDIF or AES/EBU) that are especially effective in studio situations: They transmit the audio signal without any additional noise at all.

MIDI

Digital amps, effects, and instruments have one more advantage: They can communicate with each other, using a system called MIDI. These four letters stand for *Musical Instrument Digital*

Interface. MIDI allows you to send messages from one unit to the other. To do so, all you need is a MIDI cable and some patience to really understand how things work.

In, out, thru

Midi in, out and thru

MIDI-equipped devices usually have three MIDI ports, labeled *in*, *out*, and *thru*. Here are just a few of the numerous ways to use these ports:

- The **MIDI in** port on an effects unit can be used to connect a MIDI footswitch that allows you to choose presets, switch effects on and off, change their settings, and so on.
- If you want to store all your presets in your computer (so you can edit them there, using the software that came with the effects processor), you connect the processor's **MIDI out** to the MIDI in on your computer's sound card. Tip: If your effects device or amp comes with use USB, use those connections.
- **MIDI thru** ports transmit an exact copy of the information that was received at the MIDI in port to another device in a MIDI chain. An example: using the thru port, you can link a MIDI pedal board to a MIDI effects device and a MIDI amp, and operate both with the same pedal.
- MIDI can also be used to send individual presets to other devices, to exchange presets with fellow musicians, or to download new sounds, effects, or software updates, or even to control a light show — the possibilities are **endless**.

Five-pin MIDI plugs

Five-pin plugs or USB

MIDI typically uses five-pin connectors and plugs. Instead, USB can be used.

Important

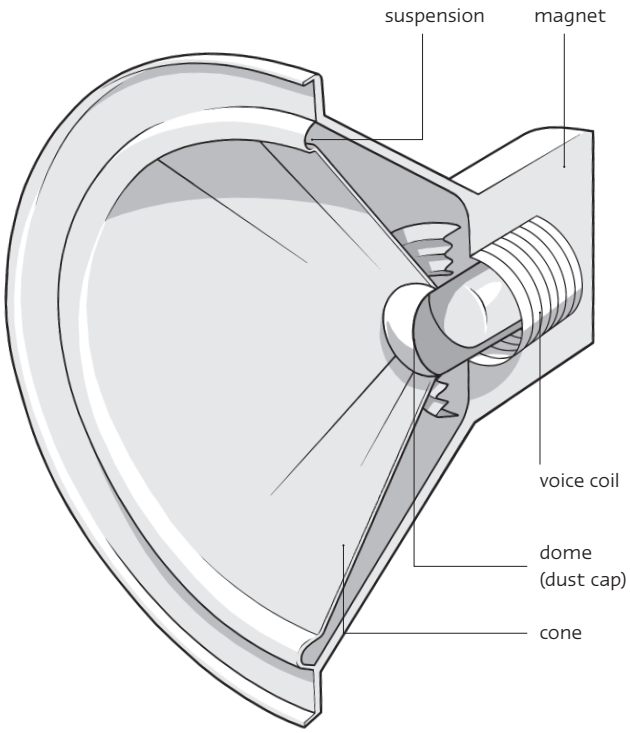
MIDI ports transmit messages only, and not audio signals. Never connect MIDI ports to other types of jacks or sockets!

SPEAKERS

Speakers are to amps what drum heads are to drums: They make the air vibrate, and vibrating air is sound. Therefore, the quality and characteristics of the speaker or speakers that you're using are of great importance. When you buy a combo amp, you can't choose your own speaker(s), so you have to work with the amp/speaker combination that the manufacturer came up with. That said, you can of course always replace the built-in speakers at any time.

How?

The most visible part of a speaker is the *cone*, which is usually made of paper. This is what moves the air. The cone is attached to a *voice coil*, which can move freely within the core of the big *magnet* at the back of the speaker. When the amp sends a voltage to the voice coil, it makes the cone move. The air vibrates, and that's what you hear.



The flexible suspension (surround) allows the cone to move back and forth.

Too much

If too much signal is applied to the speaker, the cone is forced to make a bigger move than it actually can. This produces a cracking sound, and might actually burn the voice coil!

Large or small

Generally speaking, larger speakers move more air, making for a larger sound and a better reproduction of low notes. Small speakers can move faster, so they're usually better at reproducing higher frequencies. They also offer more control and better attack, but they're less efficient than large speakers (see page 83). Enclosures with two or more small speakers offer speed, control, and attack while moving as much or more air than a single large speaker. Chapters 7 through 11 offer information on speaker sizes and combinations for specific applications.

Long excursion

Bass and subwoofer speakers are typically long-excursion *speakers: They need to make large movements in order to produce the lowest notes.*

Magnets

The magnet is an important part of a speaker. Even its material plays a role, which is why it is often specified.

- Many guitarists prefer speakers with **Alnico magnets**, which were also used in vintage guitar speakers. As one of the elements for this type of material (Cobalt) became rare, these speakers have gotten quite expensive.
- Other speakers — for any kind of application — often use the more cost-effective **ferrite and ceramic magnets**.
- **Neodymium** is yet another material, featuring an equally strong magnetic field at a much lighter weight, so good speakers don't have to be very heavy anymore. With two 10" neodymium speakers, even a 300 watt bass amp can be quite portable.

Cone material

Speaker with paper cone

Though speaker makers have come up with various alternative materials (that may sound better or different, last longer, or both) most cones are still made of paper. Paper deteriorates with age, and cones can get damaged quite easily, so it's good to know that you can have your speakers re-coned. The suspension and other components can be replaced too.

Replacing speakers

Don't like your combo's speaker? Get a new one. Different speakers have very different sound characteristics. The main speaker makers (see page 259) offer information on the characters of each of their speakers, and some have a CD with sound samples. Still, you can't really judge what a speaker will do for you until it's installed. Apart from the sound you're after, you need to take several other things into account, ranging from the speaker's power handling (see page 80) to the size of your enclosure, so ask for professional guidance.

TIPCODE

Tipcode AMPS-007

Play this Tipcode to hear the sounds of five different speakers in the same combo amp.

Tweeters

Tweeters come in all shapes and sizes, often attached to a horn that helps disperse their focused high frequencies.

Piezo tweeters are commonly said not to perform too well at really high volume levels, producing a less dynamic, thinner sound than *cone tweeters* and other *dynamic tweeters*. *Slot tweeters* have a vertical slot with a metal lip, replacing the traditional horn to disperse the sound.

Too many

There are more types of tweeters than you will be able to remember. Don't pay attention to their often impressive and confusing names, but listen to what they do.

Degrees

A horn's dispersion pattern is expressed in degrees. A 60°x40° horn has a narrower dispersion than an 80°x60° horn, but the first one will probably have better projection. Some horns are designed to have equal horizontal and vertical dispersion, e.g., 65°x65°.

Dual cone

In a *dual cone* speaker, the high frequencies are taken care of by a *whizzer cone* — a tweeter that is centered in the woofer. This space-saving design is also known as a *(dual) concentric, twin cone*, or *coax(ial) speaker.*

PROTECTION

Easily replacable fuse on a bass amp

Amps and many effect devices have one or more *fuses* that blow in the case of an overload or a short, reducing the risk of further damage to the equipment or yourself. Fuses that are located on the outside of the amp, usually under a plastic cap on the rear side, can be easily and cheaply replaced — so always have a spare fuse of the required rating with you. (This rating or value is printed both near the fuse holder and in the manual.) Equipment that has the fuse on the inside should e taken to a technician.

More fuses

Powerful amps may also have a *heat (HT) fuse* that blows if you drive the amp too hard for too long. *Thermal protection circuits* shut down the amp when it gets too hot.

Resettable

Tweeters and other items can be protected by a *resettable circuit*: Rather than replacing a fuse, you just press a button if the circuit gets overloaded.

Fans

Amps that generate a lot of heat have one or two fans, which usually switch on automatically when the temperature gets above a certain point. Some fans produce more noise than others, which is no problem on loud stages where such powerful amps are generally used. A noisy fan in a studio doesn't work, so check if you can turn it off. When you do, be careful not to overheat your equipment. Amps can reach operating temperatures of some 190°F (90°C)!

Power conditioner

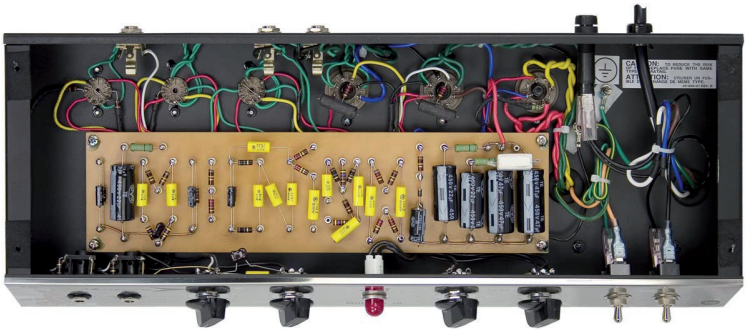
A power conditioner is a separate device that you may want to check out if you gig a lot. It protects your amp and effects from voltage overloads (which can fry your equipment); it lowers AC line noise; and it may improve your amp's sound, adding bite, attack, clarity, and punch, as well as increasing dynamics — though some experts deny all those benefits. A power conditioner typically has multiple AC power outlets so you can use it to power various amps and effects units.

THE INSIDE

Other than what you can see when taking a look inside an open-back guitar combo, there's not much to judge when it comes to an amp's innards. Still, there are two 'inside' topics you often read about in bass or guitar amp reviews.

Circuit board or point-to-point wiring

The large majority of amps have their electronic circuit 'printed' on one or more *circuit boards*, which allows for an efficient and consistent mass production process. In expensive handmade bass and guitar amps, however, the electronic components are usually connected by *point-to-point wiring*, a very labor-intensive process. Note that there are high-end amps with circuit boards: As long as high-end components are used, the overall quality doesn't have to suffer.



Point-to-point wiring in an Ampeg amplifier

Resistors

Guitar amps are the most colorful amps out there, at least soundwise. This explains why many savvy guitarists tend to favor amps that use *carbon film resistors* rather than modern *metal film resistors*: The latter are sometimes said to produce a cleaner sound, and that's not what most guitarists are after. Do note, however, that you're quite unlikely to ever hear the difference between the two, and that there are plenty of other parts that are far more important for the sound of your system.

TIP

Smartphone connection

Check if your amp has a special connector for your smartphone or tablet, allowing you to play back music from those devices, to record your performance, or to edit settings on the amp. There's no generic name for this type of connector.

The Tipbook Series

***Did you like this Tipbook? There are Tipbooks for your fellow band or orchestra members too! The series features books on musical instruments, including the singing voice, in addition to* Tipbook Music on Paper *and* eTipbook Music for Kids and Teens.**

Every Tipbook is a highly accessible and easy-to-read compilation of the knowledge and expertise of numerous musicians, teachers, technicians, and other experts, written for musicians of all ages, at all levels, and in any style of music.

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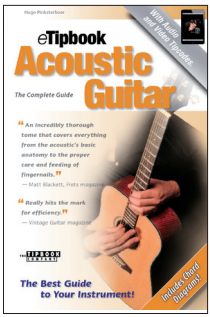
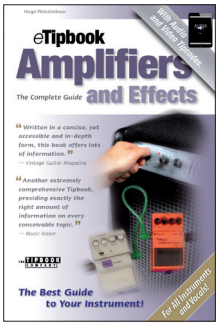
Instrument Tipbooks

All instrument Tipbooks offer a wealth of highly accessible, yet well-founded information on one or more closely related instruments. The core chapters of these books turn you into an instant expert on the instrument. This knowledge allows you to make an informed purchase and get the most out of your instrument. Comprehensive chapters on maintenance, intonation, and tuning are also included, as well a brief section on the history, the family, and the production of the instrument.



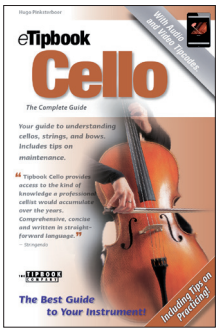
Tipbook Acoustic Guitar

Tipbook Acoustic Guitar explains all of the elements that allow you to recognize and judge a guitar's timbre, performance, and playability, focusing on both steel-string and nylon-string instruments. There are chapters covering the various types of strings and their characteristics, and there's plenty of helpful information on changing and cleaning strings, on tuning and maintenance, and even on the care of your fingernails.



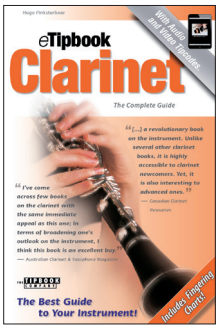
Tipbook Amplifiers and Effects

Whether you need a guitar amp, a sound system, a multi-effects unit for a bass guitar, or a keyboard amplifier, *Tipbook Amplifiers and Effects* helps you to make a good choice. Two chapters explain general features (controls, equalizers, speakers, MIDI, etc.) and figures (watts, ohms, impedance, etc.), and further chapters cover the specifics of guitar amps, bass amps, keyboard amps, acoustic amps, and sound systems. Effects and effect units are dealt with in detail, and there are also chapters on microphones and pickups, and cables and wireless systems.



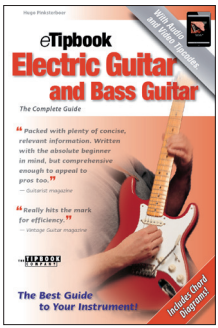
Tipbook Cello

Cellists can find everything they need to know about their instrument in *Tipbook Cello*. The book gives you tips on how to select an instrument and choose a bow, tells you all about the various types of strings and rosins, and gives you helpful tips on the maintenance and tuning of your instrument. Basic information on electric cellos is included as well!



Tipbook Clarinet

Tipbook Clarinet sheds light on every element of this fascinating instrument. The knowledge presented in this guide makes trying out and selecting a clarinet much easier, and it turns you into an instant expert on offset and in-line trill keys, rounded or French-style keys, and all other aspects of the instrument. Special chapters are devoted to reeds (selecting, testing, and adjusting reeds), mouthpieces and ligatures, and maintenance.

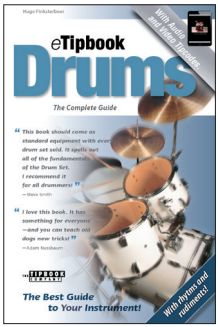


Tipbook Electric Guitar and Bass Guitar

Electric guitars and bass guitars come in many shapes and sizes. *Tipbook Electric Guitar and Bass Guitar* explains all of their features and characteristics, from neck profiles, frets, and types of wood to different types of pickups, tuning machines, and — of course — strings. Tuning and advanced do-it-yourself intonation techniques are included.

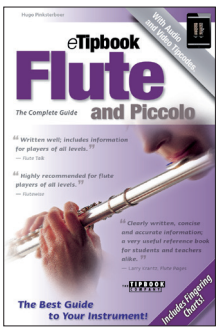
Tipbook Drums

A drum is a drum is a drum? Not true — and *Tipbook Drums* tells you all the ins and outs of their differences, from the type of wood to the dimensions of the shell, the shape of the bearing edge, and the drum's hardware. Special chapters discuss selecting drum sticks, drum heads, and cymbals. Tuning and muffling, two techniques a drummer must master to make the instrument sound as good as it can, are covered in detail, providing step-by-step instructions.



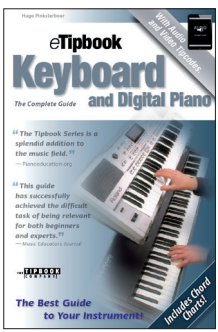
Tipbook Flute and Piccolo

Flute prices range from a few hundred to fifty thousand dollars and more. *Tipbook Flute and Piccolo* tells you how workmanship, materials, and other elements make for instruments with vastly different prices, and teaches you how to find the instrument that best suits your needs. Open-hole or closed-hole keys, a B-foot or a C-foot, split-E or donut, inline or offset G? You'll be able to answer all these questions — and more — after reading this guide.



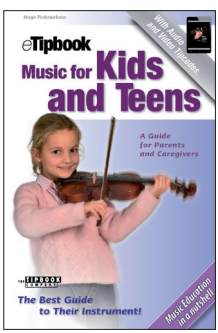
Tipbook Keyboard and Digital Piano

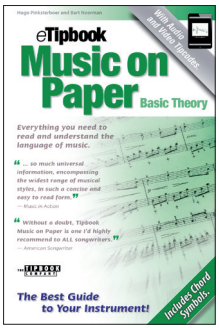
Tipbook Keyboard and Digital Piano explains digital lingo in a very easy-to-read fashion — from hammer action and non-weighted keys to MIDI, layers and splits, arpeggiators and sequencers, expression pedals and multi-switches, and more, including special chapters on how to judge the instrument's sound, accompaniment systems, and more.



Tipbook Music for Kids and Teens

How do you inspire children to play music? How do you inspire them to practice? What can you do to help them select an instrument, to reduce stage fright, or to practice effectively? What can you do to make practice fun? How do you reduce sound levels and prevent hearing damage? These and many more questions are dealt with in *Tipbook Music for Kids and Teens – a Guide for Parents and Caregivers*. The book addresses all subjects related to the musical education of children from pre-birth to pre-adulthood.



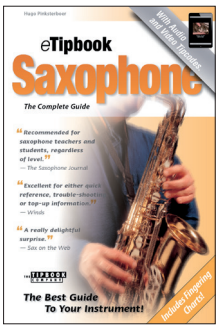


Tipbook Music on Paper

Tipbook Music on Paper – Basic Theory offers everything you need to read and understand the language of music. The book presumes no prior understanding of theory and begins with the basics, explaining standard notation, but moves on to advanced topics such as odd time signatures and transposing music in a fashion that makes things really easy to understand.

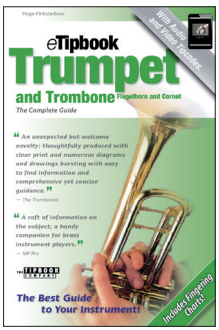
Tipbook Piano

Tipbook Piano makes for a better understanding of this complex, expensive instrument without going into too much detail. How to judge and compare piano keyboards and pedals, the influence of the instrument's dimensions, different types of cabinets, auditioning pianos, the difference between laminated and solid wood soundboards, accessories, and why tuning and regulation are so important: Everything is covered in this handy guide.



Tipbook Saxophone

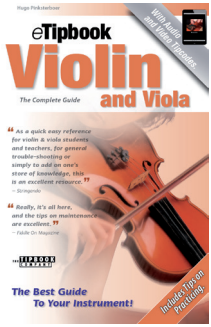
At first glance, all alto saxophones look alike. And all tenor saxophones do too — yet they all play and sound different from each other. *Tipbook Saxophone* discusses the instrument in detail, explaining the key system and the use of additional keys, the different types of pads, corks, and springs, mouthpieces and how they influence timbre and playability, reeds (and how to adjust them) and much more. Fingering charts are included!



Tipbook Trumpet and Trombone, Flugelhorn and Cornet

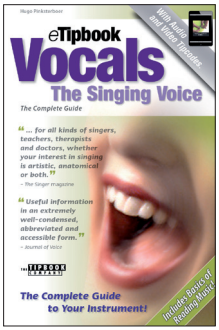
The Tipbook on brass instruments focuses on the smaller horns listed in the title. It explains all of the jargon you come across when you're out to buy or rent an instrument, from bell material to the shape of the bore, the leadpipe, valves and valve slides, and all other elements of the horn. Mouthpieces, a crucial choice for the sound and playability of all brasswinds, are covered in a separate chapter.

Tipbook Violin and Viola



Tipbook Violin and Viola covers a wide range of subjects, ranging from an explanation of different types of tuning pegs, fine tuners, and tailpieces, to how body dimensions and the bridge may influence the instrument's timbre. Tips on trying out instruments and bows are included. Special chapters are devoted to the characteristics of different types of strings, bows, and rosins, allowing you to get the most out of your instrument.

Tipbook Vocals – The Singing Voice



Tipbook Vocals –The Singing Voice helps you realize the full potential of your singing voice. The book, written in close collaboration with classical and non-classical singers and teachers, allows you to discover the world's most personal and precious instrument without reminding you of anatomy class. Topics include breathing and breath support, singing loudly without hurting your voice, singing in tune, the timbre of your voice, articulation, registers and ranges, memorizing lyrics, and more. The main purpose of the chapter on voice care is to prevent problems.

International editions

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