

In the beginning, guitar strings were amplified by the hollow wooden body of the instrument. Amplification changed not only how loudly a guitar could be played, but also how it sounded and the way it was treated by performers.

There are now thousands of pieces of equipment and an enormous variety of setups that professionals use to create their sounds. This is a basic guide about the fundamentals of creating the most common and useful tones.

The most basic and often used sounds are those that come from a good guitar plugged directly into a good sounding amp, and mic'd by a sound crew when a larger room needs to be filled. A Strat (Fender Stratocaster) plugged into a Fender Twin amp is a typical combination in most styles of music - blues especially. A Tele (Fender Telecaster) is used often in country for its more "twangy" (trebly, jangly) sound. A Les Paul plugged into a Marshall stack is common in rock, and with players who want thick distortion sounds. Hollow body instruments like the Gibson "F-hole" L-4 archtop plugged into a clean sounding Roland JC-120 or Polytone amp are common in jazz. Heavy metal guitarists usually use instruments with humbuckers and modern body styles (descendants of the Gibson Flying V and Explorer), and Floyd Rose type locking tremolos. Classical guitarists typically use nylon string instruments with no amplification. Semi-hollow guitars like the Gibson ES-135 are another common form of instrument used particularly in blues, jazz, and traditional sounding rock. Finally, dreadnaught steel string acoustic instruments are the kind used for strumming chords around the campfire and in pop songs. Those made by Martin, Gibson, Taylor, and new acoustic-electric models by Takamine and round-backed Ovation are especially popular among professionals.

The amp plays a large part in creating the sound of an instrument. Two of the most fundamental sounds in modern guitar music are often created directly by the amp: distortion (overdrive) and reverb. Distortion was originally created by turning up the volume all the way on early tube amps. Modern tube amps typically have two separate sets of tubes - "preamp" and "power amp" sections. The preamp tubes are smaller, and are used to provide an overdriven ("high gain") sound while keeping the output volume quiet. The power amp actually drives the speakers and provides volume. By mixing preamp and power amp signals, both clean and distorted sounds can be produced at all volumes.

Solid state amps copy the basic functionality of tube amps, with many variations. Many professional players prefer the "warm" sound of a tube amp (especially at high volumes), although modern technology has created solid state tones which are as classic as earlier tube amps.

Most modern amps made for performance come with a footswitch controller made to switch between clean and distorted sounds. The front panel of the amp usually has knobs to control the amount of bass, mid, and treble, and volume settings for the clean and lead "channels". Typically, the distortion channel has separate controls for gain and volume - so that you can have a lot of distortion at low volume, and visa-versa. Modern rock sounds typically use a lot of distortion - turn up the "gain" or "pre-gain" all the way to get this kind of thick sound - you can turn down the power amp volume, and keep the distortion heavy at a quiet volume. Bluesy sounds typically have less distortion, with just a bit of gain to overdrive and fatten up the natural sound of the instrument.

Guitar amps often have "reverb" to create the sound of room or hall ambience. Originally, reverb was created using springs inside the guitar amp. Many modern tube amps still use spring reverb, and accidentally bumping this type of amp during performance will create an enormous racket as the springs vibrate loudly. Turning off the reverb creates a very flat sound that is often used in heavy rhythm guitar and other percussive kinds of playing. Reverb makes the guitar sound a bit more distant (as if it's in a large room or hall), and helps to fill the gaps between notes. Used tastefully, this helps to create a more singing, smoother type of tone in which notes appear to be more connected. On some amps, there is often the option to turn reverb on and off with a footswitch.

Foot Pedals:

In the 1960's, players started to use footpedals separate from the amp to change their sound. Ever since then, pedals have been made to create every type of sound used by guitarists, including overdrives and distortions, reverbs, EQ (bass, mid, and treble adjustments) and other time and pitch effects. The cable from a guitar plugs into a pedal, and then an additional cable goes between the pedal and the amp. Pedals can be strung together between the guitar and amp, with a cable separating each. Each pedal has knobs to adjust its sound, and a footswitch to turn it on and off. Because each pedal can add a bit of noise to the guitar sound, many players use pedalboards (or "effects processors") which combine a variety of effects in one unit. Most pedalboards have a format which allows the user to program a combination of effects settings (i.e., distortion, reverb, volume, and EQ settings), and save that program as a single "patch". The pedals are used to switch between program patches and completely change the guitar sound with one tap of the foot. Many professionals use racks of effects put together in a case mount, with a programmed pedalboard controller switching between sounds made by several units.

Popular distortion/overdrive pedals include the Ibanez Tube Screamer (used for light, bluesy overdrive), the Boss Super-Overdrive and DS-1 distortions. There are literally hundreds of other distortion pedals made by Boss, DOD, MXR, Marshall and others that have various tone qualities from light overdrive to over the top grunge (the Ratt, Fuzzface, Big Muff are some of the classics).

Many performers like the distortion sound of their amp better than those created by pedals. This causes a problem, because if you plug an effect in front of the amp, and then put it through the amp distortion, the sound gets garbled. To solve this problem, many amps have an effects "send" and "return". In this case, the effects are not put in front of the amp (i.e., not hooked up between the guitar and amp). A cable goes from the amp effect send to the input of an effect unit. A second cable goes from the effect output back to the amp "return". When using this type of setup, the guitar cable plugs directly into the front of the amp. From there, the signal goes through the amp (so that the preamp creates the distortion and clean sounds). That sound travels out of the amp's effect send to the external effects unit, gets processed by the effects, and then goes back into the amp through the return jack, and is amplified by the power amp and speakers. This loop allows the pre-amp sound to create distorted tones, without garbling the sound of the effects - the effects come after the distortion in the chain. This is one of the most important setups to understand if you want to copy the sound of your favorite players (most professionals use the distortion sound produced by their amps, especially tube amps).

Most hobbyists, and many professional players, keep things simple by using a simple effects processor to create their sounds. This makes things easy because all of the effects sounds are contained in one box - with one cable going from the guitar to effects box, and another going from the effects into the amp. Each unique sound can be changed by pressing one pedal on the foot controller. If a separate amp needs to be used, the switch is easy - just plug the effects unit into the new amp. In addition, most modern multi-effects units contain a tuner, which allows you to turn off the sound of the guitar with a footpress and tune silently, without having to unplug and plug into a separate tuning unit in the middle of a performance.

Most modern effects pedals ARE capable of creating useful "meat and potato" types of professional quality sounds. Unfortunately, the effects companies tend to display all of the not-so-useful sounds these things can make, so the presets are usually less than usable. Because multieffects processors are so popular, the rest of this guide is about how to setup a multieffects processor to get the sounds you really need.

Start with a clean "direct" sound:

If your effects have a "bypass" switch, use it as a starting point to create your programs. With the bypass enabled, none of the effects are in use - it is as if your guitar is plugged directly into the amp. This should be your reference sound. If you don't have a bypass switch, unplug your guitar from the effects and start by plugging directly into the amp (do NOT use a generic "clean setting" on the effects unit - go directly into the amp). Set up your guitar and amp with a clean sound that sounds full and rich - if this clean sound does not have body, presence, and warmth, then nothing you do with the effects processor will sound good. The typical setup should start with all amp EQ settings (bass, mid, and treble) set at their mid point (i.e, halfway up), and the guitar tone and volume knobs turned all the way up. Experiment with getting a good sound by adjusting the volume, gain, and EQ settings on the amp.

### Making The Three Most Basic Patches:

You should have three basic sounds that cover most musical situations: clean, rhythm distortion, and lead. Turn off your bypass and start the process by creating a patch that mimics the "bypass" sound *exactly*. Start with a clean sound and turn off all your effects, including any noise gates, compressors, or sound models that effect the pure sound of your guitar. Switch between bypass and your clean patch and make sure the volume and tone is exactly the same on both. Save this "straight" sound as a program and copy it to three blank patches. Make a backup in one of the memory banks so that you can use it to create other programs.

To make a basic clean sound, add reverb to the straight guitar tone. Most effect units offer a choice of "room" and "hall" reverbs. Try using the hall setting at a low to medium level. Some processors will allow you to set the brightness of the reverb tone, the length of its decay, and other parameters. Start with a preset setting and adjust the sound to your taste. Just be sure not to "wash out" the sound of the guitar with reverb. Adding too much reverb makes the guitar sound distant, and it loses its percussive "punch". Add just enough to give the guitar a gentle ambient sound that connects the notes smoothly. Save your patch, and give it the name "clean" if your processor display supports it.

Some players like to add a bit of "chorus" effect to the clean sound. A light chorus adds some depth and thickness by mixing a slightly detuned pitch with the main tone. This is meant to recreate the sound of several guitars playing together (as two instruments will produce tiny differences in tuning and timbre when played together). Chorused clean sounds "shine" a bit more than straight clean tones, and are common in pop music.

Next, move to your second blank patch and turn on a bit of distortion or overdrive. This sound will form the basis of the rhythm distortion tone. Most processors offer a variety of distortions and overdrive effects. Choosing a "good" distortion sound is one of the most important and difficult tasks in setting up your guitar rig. As with any other effect or sound, the choice between "good" and "bad" is largely subjective. Furthermore, certain sounds are appropriate for given types of music, and there is no one perfect sound that will be right for every person and every musical situation (i.e., blues and classic rock tones tend to use much less gain than modern rock sounds - a guitarist playing Chuck Berry tunes will opt for much less distortion than one playing Metallica covers). There are, however certain fundamental guidelines that you can consider to help narrow the wide variety of choices.

Look for a sound that has body, punch, clarity, and presence. One of the biggest problems in sitting down with an effects box and an amp is that all the sounds start to sound the same. Also, the tone that sounded great in your living room may be harsh or insignificant sounding when you play with drums, bass, and a full band. These kinds of problems are hard for inexperienced performers to conceive and prepare for until after having played in different environments.

The best thing to do when setting up your distortion sounds is to compare them to the straight sound of the guitar. First, the volume should be relatively even. You should be able to hit a chord using the "bypass" sound, and then play the distortion sound - and not be blown away (turn down the distortion volume until it MATCHES the bypass volume). Next, the distortion sound should have a similar sonic character as the "bypass" sound:

- It should not be significantly brighter or duller.
- It should have the same clarity between notes when hitting all of the strings together.
- It should not sound as if parts of the straight sound are missing (i.e., the bass, mid, and treble frequencies should all be there completely - no squished bass resonances or razor sharp highs).
- You should be able to hear the pick hitting the string, and you should hear all the sonic characteristics of your playing with the distortion sound turned on.
- The distortion sound should get quieter and "clean up" (sound undistorted) when you play more quietly.
- The sound should change tone appropriately when you change pickups on your guitar and when you play differently on the strings.
- The tone should not be any harsher or more mellow than the clean sound in term of EQ.

The distortion tone should react and respond to your playing in basically same way as your clean sound - just with the sustain and added harmonics that distortion provides. Look for the sound that behaves and reminds you of your clean sound as much as possible, and you will most likely find the distortion that has the integrity required to mix well with other instruments in a band and cut through, without any unexpected problems such as washed out tone, squeals, or uncontrollable feedback.

Try to avoid distortion sounds with enormous amounts of "white noise". Those types of overly fuzzy sounds tend to sound great in front of a lonely amp, but they lose their impact when combined with other instruments ... and effects processors or notorious for filling up on presets with a lot of white, fuzzy sound (because they show well in the quiet of a retail showroom). You may have only one distortion type in your processor that is actually good for performance use. As a general rule, stay away from the descriptions that say "fuzz", "metal", and other "over the top" styles - they tend to lose integrity and punch in performance settings. Look more for "overdrive" and lower gain types. These tend to sound more mellow at first, and they may not appear to provide the gain you need. At higher volumes, however, you will find that they are full, and that the fuzzed out settings tend to get screechy and unbearable. Volume has a huge impact on tone quality and sustain, and experience is really the only thing that will provide a solid understanding of how your instrument sound mixes with that of a loud band.

With all that said, choose a distortion you like, make sure the volume is near that of your clean sound, and save the patch with the name "rhythm". You can experiment with adding a bit of reverb, but the more you add, the less punch your sound will have.

Next, save the above rhythm patch one more time into the third blank patch spot. Use this as the basis for your lead sound. You'll want to add a bit more gain to the lead sound and turn up the volume so that it is louder than the clean and rhythm sounds. More gain gives the lead sound additional sustain, and makes it sound thicker, fuller, and even heavier than the rhythm distortion sound.

To create a heavy ambience and even more sustain, turn on the "delay" effect in the lead patch. Delay creates an echo sound that makes your lead tone sound as if it is in a large hall or canyon. Much like reverb, it fills in the gaps between notes and makes single notes appear to sing and sustain more smoothly. Set your delay so that it decays after approximately 4 taps (repeats). Set the time between the repeats to approximately 400-450 milliseconds. Set the volume of the taps so that they mix well with the notes you play. The echoed notes should not overpower the notes that you play - that tends to sound sloppy and confusing. Use just enough delay to create a "bed" of sound that your lead lines soar above.

#### Other Effects, Sound Techniques, and Equipment Concerns:

**Wha-Wha:** wha-wha units have a pedal that is rocked back and forth to make the guitar sound like it is articulating the word "wha". The guitar part in Jimi Hendrix's "Voodoo Chile, Slight Return" is a classic example of wha-wha tone. In the seventies, wha-wha became very popular in funk and disco guitar styles. Slid chords and strummed muted strings articulated with the wha-wha create a "whaka-chicka" sound typical of those styles. Modern guitarists continue to use the wha as a popular expressive device, especially to add character to lead guitar lines. When experimenting with a wha-wha pedal, be sure to experiment with its placement in the effects chain (the order of effects). Wha-wha placed before distortion, for example, sounds very different when arranged in the opposite order. Most modern effects processors allow you to set the position of the wha-wha sound to take full advantage of this variety.

**Equalizer:** similar to the EQ controls on a stereo, these are not "effects" per se, but they provide a very important sound sculpting tool in the effects chain. Equalizers allow you to change the basic sound of your instrument by boosting or cutting individual frequency ranges. Controls for "bass", "mid", and "treble", for example, are found in the most basic equalizers. More advanced equalizers have controls that separate each frequency range into more specific bands. Players and recording engineers with well developed ears know exactly which bands need to be boosted or cut to sculpt the tone into a sound that is beautiful, warm, riveting, harsh, intense, or otherwise appropriate for a given musical style. There are a variety of common

approaches to sculpting sounds appropriate for different musical styles. The “scooped mid” sound was popular in the heavy metal guitar sound of the 1980’s. To create this type of sound, the mid frequencies were turned down, while the bass and treble frequencies were boosted. Blues lead sounds tend to emphasize more midrange (exactly the opposite of heavy metal sounds). Acoustic guitars tend to be EQ’d with less emphasis on the midrange and more presence (high treble). As a general rule, high frequencies add more brilliance (shimmer) and bite to a guitar sound, allowing it to cut through a mix of instruments, but too much high end can create a harsh, biting sound that is unpleasantly piercing. Bass tends to add a “boominess” to the guitar, which sounds thick and full when played alone (without other instruments). Be careful not to add too much bass, though, because it often has no effect, other than to muddy up the sound when mixed with other instruments (the bass instruments and low keyboard notes often occupy this frequency range). Too much bass in an amplified acoustic sound often creates uncontrollable low end feedback. Midrange is often cranked up (boosted) in lead guitar sounds because it makes the guitar sound “beefier” – thicker, fuller, and more intense. Too much midrange in an acoustic sound, on the other hand, can make the instrument sound harsh and unnatural. These are just general guidelines – the sound every performer uses typically changes according to the type of room being played, the number of people in the audience, the volume of the event, etc. Factors such as this dramatically change the sound the guitar and the instrument mix.

**Vibrato:** an effect which varies the volume of the guitar at a regular rate, so that it “fades” in and out quickly, creating a subtle “vibrating” effect. Vibrato is most often associated with the “surf” sound of the sixties, and many amps made during that era had the effect built in. Vibrato typically has settings for rate and depth. The rate is the speed at which the volume is fluctuated, the depth is the degree to which the volume is increased and decreased.

**Flange:** creates a swooshing “jet engine” sound used most in heavily distorted lead guitar solos. The sound is created by sweeping across a series of pitch frequencies as a background to the basic pitch produced by the guitar. As with most pitch based effects, flange units typically have settings for depth, rate, and mix. Depth is the pitch range of the sweep (i.e., how high and low the “swoosh” moves). The rate is the speed of the sweep, and the mix is the volume or level of the sweep, as compared to the straight guitar sound.

**Phase:** similar to flange, but less intense. Phasers can be used to create an organ-like sound that approximates the character of a rotating Leslie speaker. Eddie Van Halen made the MXR phaser very popular by using it to bring out the high frequency shimmer of his lead tone.

**Chorus:** (covered earlier) is very popular in acoustic guitar sounds, especially in pop/rock. Chorus adds a bit of shimmer and thickness to the sound by doubling the sound of the instrument with multiple additional slightly detuned signals. This is meant to mimic the sound of a double tracked sound produced in the studio, where one guitar part is recorded several times and layers are placed on top of itself to create a thicker sound. Chorus is intended to mimic the sound produced by the very slightly different tunings found in each separate layer.

**Pitch Shifting:** an effect which changes and/or doubles the pitch being played by the guitar. Pitch shifters are often used to play octaves above or below every note played on the guitar. This creates a very unique and thick doubled sound – almost as if two performers are playing the same line. Intelligent pitch shifters can create harmonies that come from a specific scale, allowing one guitarist to play harmonized solos that would typically require two performers to play together.

**Compression:** also called sustainers and limiters. Compression helps to increase sustain (the length of time for which a note rings), and even out volume peaks played on the guitar so that successions of notes sound more consistent and fluid in terms of loudness and articulation. Distortion tends to add a bit of natural sustain and compression to the guitar sound, evening out the volume. Compression has a similar effect on clean sounds, and is often used along with distortion to improve the sustain at lower gain settings. Although appropriate for particular sounds, using too much compression all the time can have the effect of making your sound very flat and bland (because it removes the dynamic effects created by playing more quietly/loudly). It should be used only where necessary.

Noise Gate: Not really an effect, but a tool used to help lesson the noise created by other pieces of equipment. Noise gates are set to shut off the sound of the guitar when the volume goes below a set threshold. This can be helpful to reduce the buzz that is often created when a series of effects, especially distortion, are all turned on.

#### A Word About Amps, Speakers, and Combos:

Guitar amplifiers come in a variety of sizes, styles, and types. The most common is the “combo” amp, which includes the amplifier, speaker, and often rudimentary distortion, reverb, and equalizer (bass, mid, and treble) controls in a single cabinet. Often, combo amps come with pedals that allow the player to switch between distortion and clean sounds (and sometimes to control reverb). Combo amps typically have one or two 10" or 12" speakers. As a rule, 10 inch speakers typically have a “tighter” sound, with more high end definition and clarity, and less bass response. 12 inch speakers can reproduce bass frequencies better, because they can move larger volumes of air (required for low frequency reproduction), but less clarity in the high frequency range.

Most combo amps are rated between 30 and 100 watts. In general, a higher wattage rating will produce a louder sound, but these ratings can vary wildly between brands because of variations in speaker efficiency and cabinet design. Just be aware that if you are going to be performing with a live band, you will need to be heard above a loud combination of live bass and drums. A small amp can be easily washed out in a setting where the “stage” volume is that which is heard by the audience (i.e., if there is no P.A. system). In larger rooms, halls, and outside concerts, each instrument is typically mic'd and run through a large PA system with enormous speaker that amplify the whole band. In this type of situation, you still need an amp that is loud enough to be heard among the other instruments on stage, along with the vocal mix in the onstage monitors.

Practice amps are typically rate less than 30 amps, and usually have 6” or 8” speakers. They are made to play at home or in garage practice sessions, when high volume levels are not a requirement. Practice amps typically do not have send and return jacks for effects (as described earlier), often do not have foot pedals allowing channel switching between distortion and clean sounds, and are usually too small and thin sounding to use in a live band performance (the bass and drums are too loud, and drowned out the sound produced by small speakers).

Many players, especially rock and heavy metal guitarists, use a “stack” amplifier for performance. In this type of setup, the amplifier and speaker cabinet are separate units. The amp “head”, which is the actual power amplifier, sits on top of the speaker cabinet, which typically contains no other electronics but the speakers. The guitar is plugged into the amp head, and a speaker cable connects the amplifier to the speakers. This type of setup allows you to combine various amps with a choice of speakers. Amp heads can also drive several sets of speakers in stereo, and can be lined up in series (as is familiar in the “wall of amps” setup used by many large rock groups). Speaker cabinets typically come with 4 speakers, most often of the 12” variety, but can also be found with 10” speakers, and in combinations of 2 or 6 speakers.

#### Conclusion:

While the guitar and amp are still the most important part of any guitarist’s sound, understanding effects, EQ, distortion, and logistical setup concepts is important in creating the wide variety of tones used in modern music making. Finding your own unique sound is not only a process of listening carefully, but also of recreating favorite setups already in use by other players. Knowing the fundamentals will allow you to experiment with increased understanding, but no book knowledge will take the place of experience performing in a variety of locations and situations.