Basic Electronics

By Ken Fischer

I must be going crazy! Every time I turn on the radio or MTV, I hear these voices asking me, "What's the frequency, Kenneth?" Fearing the worst, I contacted Dr. Terry Patterson of the Frankenstein Reanimation Project, at the University of Pennsylvania Medical Center in Philadelphia. Dr. Patterson told me he too heard these voices that call themselves R.E.M. Working with lightning and old body parts, he found the correct answer for these voices. The frequency of *Rapid Eye Movement* varies from .3 to 3 hertz depending on the individual. Ninety percent of people fall into the .3 to 1 hertz range. In fact the bulk of R.E.M. energy on spectral analysis occurs at one hertz. Now that I've answered R.E.M.'s question, maybe they can answer one of mine about their new CD, monster—"Who hid the vocal tracks, R.E.M.?"

Amplifier Modification:

I'm not going to give detailed amp mods here, instead I'm going to give you my thoughts on doing amp mods in general. Dave Funk, Gerald Weber, Dan Torres and others who write for *Vintage Guitar* publish excellent individual amp mods, and some can even sell you a mod kit.

Thought number one is do not attempt an amp mod unless you have the skills needed for such a project. Messing about inside a guitar amp without the proper skills or knowledge can leave you or your amplifier permanently dead. Use good judgement. If you want to learn how to mod amps, find a person who's qualified to teach you the right way to do it. To mod amps you must be good with hand and power tools, know how to solder, know how to use basic test equipment, and have a basic understanding of electronics.

Should you modify your amp?...

Almost every amp ever made can be modified to better suit your needs. However, before jumping into modification of your favorite amp you should ask yourself some basic questions. For example, how will modification affect the value of your amplifier? If you own a vintage Fender or Marshall or Vox, altering your amp from its stock form will reduce its value, usually by a large amount. Sometimes, in rare cases, it won't. Doing a proper top boost mod to a non-top boost Vox won't always result in a loss of value. This is due to the demand for top boost AC-30's. However, a factory top boost is worth more than a recent top boost add-on. A poorly done top boost add-on will surely reduce the value of your Vox. And if your non-top boost Vox is in mint condition, I wouldn't touch it.

On the other hand, recent, super mass produced amps, or older amps from smaller companies that never reached vintage collectable status generally won't have their resale value harmed by a good mod. Even companies that have made amps with collectable value such as Fender also made models that do not have collectable value at this time. You never really know however; who would have thought a 70's Strat would be collectable! Who knows what your silver face Fender amp will be worth in the future?

The other point of view is that you own a vintage amp, and you want to mod it to do what you want, and don't care about its resale value. That point is valid too.

Realistic Expectations:

If you decide you are going to modify your amp you should have a realistic view of what it can be made to do.

A classic example is, many people think a Fender Bassman head can be made to sound just like a Marshall. While a Bassman can be modded to a more Marshall like sound, owing to the different designs of the transformers they will never sound the same. If you own a 50 watt Marshall head and want to convert it to a jazz amp, that wouldn't be realistic. If you own an Ampeg B-15N and want to turn it into a heavy metal rig that's not going to happen either. With modification what you can expect is a basic improvement of tone and/or performance. Also, you may bend the amp a bit more towards the style of music you play. Of course some mods have other goals in mind. Some of these might include adding an effects loop, or reverb, or upgrading the transformers or speakers. You might be interested in cosmetic mods...a tweed Ampeg Jet anyone?

Start Small:

If this is going to be your fist try at amp modification I suggest you start small. Starting small can be looked at two ways. You can start with a small, simple amp like a champ, or you can do a small, simple mod on a big amp.

Think First:

It doesn't matter if you buy a mod kit, or do a mod out of a magazine article. You should study the instructions or article until you are sure you understand everything. If you buy a kit make sure all parts are accounted for, and if the kit states that additional parts are required, make sure you purchase them before you start the project. If you're doing the mod from an article, make sure you have all the required parts on hand before starting. There's nothing worse than getting half way through a mod and then figuring out you can't find a needed part anywhere, or that the part you need to finish the job and make your amp play once more is on a six month backorder. Also, make sure you have all necessary tools and hardware on hand before you start. I know this all seems like a lot to keep in mind, but once you get into it, you should find amp mods both easy and rewarding. "Now where is that .002 MF disc cap I just had my hands on?...Drat!"

I had a visit a few weeks ago from my friend, Glen Kuykendall. Glen was the 1990 winner of *Guitar Player* magazine's soundpage competition. If you have the August 1990 issue you can hear Glen and his 'Wreck in action. Glen brought up his Callaham "Strat" for me to check out. Callaham builds his guitars from scratch, no pre-made bodies or necks. Many custom builders buy their bodys and necks and are more of an assembly, finish, and set-up type of operation. Callaham guitars are true handmade instruments. The fit and finish on this guitar was first class. The guitar was equipped with Lindy Fralin pickups. I use Lindy's pickups in my Strats and Teles, so needless to say, they have the tone. This guitar also played very well. The maple V neck did not feel exactly like a Fender, but felt quite good in my hands. I compared it to the neck on a '53 Fender Tele and found the Tele neck had more meat and the Callaham felt a bit more modern.

I have since talked to people who own, or have played Callaham guitars. The opinion is Callaham does not seem to copy every nuance of body and neck contour of vintage Fenders, but everyone agrees his guitars play very well, have top quality workmanship, and have the original tone. I'd suggest he set them all up with string king Dean Farley's nickel guitar strings to get the very last degree of vintage. Anyway, his guitars cost no more, sometimes less than "you know who's" custom shop guitars. They may not have "the name" on the headstock, but I know which I'd try! Callaham Guitars, (703) 665-8045.

Want more?...According to Bill "Alligator" Holter of Vintage Sound, the Yardbox compares very well with an original Tone Bender. Speaking of Bender, I hope Bill is feeling better after his Z-car got wiped out with him in it, on the way to Gatton's funeral. To Danny's family, our deepest condolences from Trainwreck. To Danny, we'll all miss you, we send our love and respect.

To Kurt Cobain, there are some people who lack the human compassion to understand your body and soul were tortured to the point of taking your own life. These same people have no respect for the feelings of those who loved you. I just want you to know you've got them pissed off. I know that's just how you'd like it! Rock on! ...Ken.

Speaker Stuff:

People keep asking me, "What's the best speaker for my amp?" That's always a hard question to answer because speakers are so much a matter of personal taste. First, as most of you who read *Vintage Guitar* know, old Celestions are my favorite speakers. I was keeping up on current Celestion speakers, which were sent to me for evaluation by Steve King at Celestion U.S.A. Steve King left Celestion shortly after I wrote about the blue Alnico "Bulldog" reissue. Since then I haven't received any samples of new speakers, nor have I had any input on their new designs.

I have heard a lot of underground buzz that the Peavey Sheffield has a good British vibe. Haven't had my hands on one yet, but it might be worth a listen.

When picking out a speaker keep the power rating in mind. Many current vintage type speakers use a paper voice coil which makes for great tone but have a power rating of only 15 to 30 watts. When replacing speakers keep in mind speaker polarity. Most speakers use what is called "normal" polarity. That is, when you apply a positive voltage to the red or plus (+) terminal the speaker cone will move forward or away from its magnet. Some speakers such as old Jensens and JBLs have what is known as "reverse polarity." That is when a positive voltage on the red terminal causes the cone to pull in towards the magnet. If you mix normal and reverse polarity speakers in the same amp or cabinet and hook up the hot wire to all the red terminals you'll have some speakers pushing and some pulling. This is called "wired out of phase." The sonic result is low volume and a lack of bottom end. You can use both types together, but you have to hook the hot wire to the negative or ground terminal of either the normal or reverse group. Then you can make the entire cabinet normal or reverse by reversing the wires on the cabinet jack, or the plug that goes to the back of your amp.

To test polarity, put a 9 volt battery to the plug going to the speakers, with the battery's positive terminal to the tip. If the speakers move forward they're wired normal polarity. If the speakers move in they're wired reverse polarity.

Again, you can reverse the wires at the plug or jack to change the polarity of the whole speaker group. If any one speaker moves the "wrong" way, simply reverse the wires on that speaker. When replacing the speakers in a vintage amp that used Alnico Jensens, keep in mind they were reverse polarity and most current replacements are normal polarity. To keep the amp sounding vintage, reverse the wire going to the replacements.

For example in a 4x10" tweed Bassman, the white, or hot wire went to the red terminal on the Jensen and the black to the negative, or ground terminal. On a normal polarity speaker you must hook the black wire to the red terminal and the white to negative. Catch 22 ...some amps run a ground wire to the speaker frames and to the negative terminal of the speaker. Don't reverse wires on these amps or you'll short circuit the output. If you use an extension cabinet, you may want to check to make sure it has the same polarity as your amp's main speakers. If your amp has its original speakers, wired properly, don't change the amps speaker polarity, change the extention speaker polarity to match your amp.

Next issue...Hey, I didn't vote for him!

Ken builds his highly-regarded Trainwreck amplifiers in Colonia, New Jersey. VG

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