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Harp Player's Questions
Answers by Ron
All About YOUR Gear!

Distilled from e-mail questions about tubes, amp mods, Commanders™ and sound issues!

Lots of Useful Stuff Here!

By Ron Holmes, IEEE

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Answers by Ron
All About YOUR Gear!

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ABOUT THE AUTHORS

Ron Holmes started his first Tweak Shop in 1966 when he was a junior in high school. In 1997, he became a full member of *IEEE* (*Institute of Electrical and Electronics Engineers, Inc.)* Previously, he worked for the *University of Iowa Department of Physics and Astronomy* where he was on the team that created the *Dynamics Explorer I* which was launched into space in 1981.

Ron holds a lifetime *First Class Radiotelephone FCC License* and was a broadcast engineer in the *United States Air Force* and later in the San Francisco Bay Area.

As a consultant, he designed and fabricated the electronics for several commercial microphones, studio audio products such as precision preamplifiers, equalizer, processors and a CMOS drum counter. He is co-designer of the *Holmes-Powell Headphone Amplifier* which won the Golden Ear Award from *Absolute Sound* in 1999.

Currently, he designs and manufacturers his own products. He has been married since 1976. They live in Bakersfield near their four grandchildren.

Linda French Holmes holds a *B.A*. in English from California State University, North Bay and a *Juris Doctor* from the University of Iowa College of Law. She has been a licensed attorney in California since 1981. She has been an arbitrator for the San Mateo County Bar Association, taught classes at Santa Rosa Junior College and was the recipient of the California State Bar Association President's Pro Bono Service Award for the free legal assistance she provided. She is a trained mediator and a founding member of the Alternative Dispute Resolution Section of the Sonoma County Bar Association. She currently practices Elder Law in Kern County, California

Selected Customers/Colleagues of Ron Holmes

Kim Wilson, Charlie Musselwhite, Carlos del Junco, Harper, Freddie Vanderford, Rupert Oysler, Second Life's Komuso, Joe Terrasi, Ronnie Montrose. The Doobie Brothers. Tom Waits. Henry Kaiser. Rogers Stevens. Gath Powell. Steve Kimock. Bobby Vega. Rudy Trubitt. Prairie Sun Recording. Tchad Blake. Jeff Martin. Grubb Associates Records, Fat Daddy Blues Band, Kevin Mooney ("Agent Mooney"). Benny and Devon Reitveld (Santana). Robin Pfefer. Billy Mitchell's Royal Studios-Memphis, Mark Stafford, Morley, Accutronics and many others.

We appreciate the support and friendship of many creative artists with whom we have worked.

Table of Contents

Author's Note:

I built my first one tube amplifier using a 1H4 tube in 1957. I took it to 3rd grade class in a large turkey pan. The thing took many batteries to run and was not a thing of beauty-but-it worked! The batteries took a year's worth of allowances to buy!

Getting That "Old Tube" Sound

Question: Mr. Holmes.

Your commander products look good and have had some good reviews.

My question for you is will this product plug right into the PA and give you that old tube amp sound ?

Thank you.-Dave

Answer: Hi Dave,

All my Commanders have been designed to plug right into both combo amps and PA systems. The problem harp players have always faced was making all their gear work together.

They had communications mics from 30s-40s-50s-60s-70s, vintage tube amps from 1951 and Radio Shack PA systems from yesterday. Or nice house systems in better venues. Or pro mics like Shure SM57/58/Betas etc. Or nice boutique tube amps.

All have different source impedances, needed load impedances, different levels, etc. My goal was to build up a vintage sounding impedance matcher (5 megohms resistive) with vintage–sounding tone circuit and send that off at right levels and at low impedance to amps and PA mixers.

That was the missing piece. The best sounding audio gear ever was the single-supply, higher voltage discrete FET designs from later 60s used in much classic studio equipment. So, that's what I built. The Class A circuitry has a vibe of its own and is very musical. Quite unlike the harsh, odd-overtoned processing stuff of today built from IC op-amps and really low rent parts!

You can drag your music thru a $0.02 coupling capacitor-but it sounds like it. For the right compression, harmonic structure and general "tone" and sonic power everything has to be right. That takes expensive tantalum and film/foil chunk-o components. And good design from proven circuits not made from "a race to the bottom" architecture. Meaning a good design strategy and parts grade. Not created by a cynical marketing dept.!

Many guys use 2 year old solid-state amps they can afford. Nothing wrong with that. But, your 520 or Shaker or Astatic mic will die going thru the first preamp in the amp it sees. Wrong everything. The Commanders are a perfect mic termination so you get everything coming out of it.

The tone is massaged and contoured with emphasis on a huge, tight bottom end and tweaked highs so your mics are clean, clear, don't wimp out and don't

sound like broken glass. You hear what your mic element is working hard to make. Dialed your way without turning into mud or something even weirder.

The output levels are dead right for where they are going. This is both a live performance box as well as something that will reinforce or walk right into a studio. The line out from all units is at -10 dBu for typical settings. Exactly right to drive PAs. Same time level is right to feed a combo amp as well.

The Class A architecture has a similar compression make-up and overtone makeup as tube preamps and some of what the tube power sections do. It is not an emulator or mystical box. But, it will feed your un-messed up mic tone into about any destination without getting hashed. Or thinned out or generally gnarfed-up that is usual with mis-matched gear.

It's always about the tone and that arrives alive at the right levels to the gear where it needs to go. At the PA and amp at same time. That's it.

Princeton Amp: Correct Bias Setting

Question: As usual I have another technical question for Ron--what's the correct bias setting for the 6V6's in the Princeton?

I did a bias check earlier tonight and found that the tubes are currently idling at 48ma and 46ma respectively--the plate voltages are in the 450V range. From

what I've read on line the bias level on the 6V6's is running a bit on the high side at 48ma--am I correct on that? Could you suggest a bias level that would be the most desirable for the amp?

Also--the Princeton doesn't have a standby switch like most amps--is not having the ability to put the amp on standby a bad thing for the tubes? I replaced all the tubes in the Princeton and I'd like to make them last as long as possible. Is installing a standby switch a practical idea and if so what's the correct point to wire it in?--is it the B+ voltage that I want to interrupt while the amp is warming up?

I forgot to mention this--after the mod I disconnected the stock Fender speaker and plugged in the speaker cabinet of my "Sonny Jr.1 amp"--(which has "4" 10" Jenson ceramic 8 Ohm speakers wired for an 8 Ohm total load). With the after modification Princeton driving those 4 Sonny Jr. speakers the sound is just great. So, I know the Princeton is capable of producing great tone with the right speaker.
Thanks-Brian

Answer: Hi Brian,

Well…..here is the whole story. As usual-it all depends on everything else. The first problem is that line voltages are higher now than when that Fender was born. Then, 114-117 were more typical. Now they generally hover around 122-124 VAC. Stepped up by the transformer step-up ratio, the rectified B+ is now at least 50 volts too high.

That tube was designed for auto radios in 1935 and according to RCA design limits 335 Volts DC was maximum. That meant the tube current had to be limited so Safe Operating Area of tube curve was observed in terms of volts X current = power input maximum. That's total power into each tube.

In push-pull one tube's drive increases as the other decreases simultaneously. One tube is pushing-one tube is pulling. Each's current stays the same but peak plate signal amplitude changes in sync with each other. The magic limit is the MAXIMUM INSTANTANEOUS POWER IN EACH TUBE. That current is normal range but plate voltage is TOO DAMN HIGH.

That's engineering speak for "too damn high". What to do? That's always the question in old amps. Leo Fender figured tubes were cheap, well made, and completely expendable. So, he ran plate voltages over the edge and choked back current to just this side of meltdown. And sold lots of tubes. There were circuit differences that also created tonal differences-but voltages were a major part of the sound.

That's why his amps always sounded "Fender" because he ran everything that way. It was ok for guitar but terrible for harp. That's where the harshness, over-bright quality and "thinness" came from. Some from components, some from the high voltages.

First, don't use a "hot rectifier" tube like 5AR4. Use only 5U4. Everything you do to push up B+ makes it worse. Like bigger filter caps, etc. I generally will

use stock filter caps-no higher. You can run the B+ to plate (pin 3) too high IF you throttle down screen grids (pin 4) by increasing the first dropping resistor value from 1 Khoms, 1 watt to 18 Khms, 2 watt. By bringing the screen grid down, the tube is in a safer place to survive.

No Princeton came with a bias adjust, and usually the stock bias circuit parts are fine-just make sure each is in stated tolerance. If someone modified bias circuit to "soup it up" he made it worse. Ultimately you have to adjust bias ONLY WITH A PRECISION DUMMY LOAD USING A SCOPE AND PURE SIGNAL GENERATOR. Bias is set for suitable cross-over distortion on a waveform.

You can't guess. Setting only a voltage can toast tubes or leave them over biased and weak-powered. You cannot set bias by guessing, using current meter or waiting until it smokes. Even listening won't work unless you have done it for 40 years. You can't tell.

Here's your answer:

Make sure all filter caps, bias caps and resistors in power supply are stock value. Use 5U4 only. Leave first B+ alone-it is what it is. Increase dropping resistor from 1 Kohms to 18 Kohms on screen leg of resistor string. That will bring everything down after that. You want no more than 380 volts DC on screen pin 4 of 6V6 tubes. Anything under 400 Volts DC will be fine.

Leave bias resistors alone but make sure they are stock values and not drifted from heating. Generally bias at 6V6 grid 1 (pin 5) is around 28-34 VDC,

negative polarity. Bringing down screen grids generally will reduce operating current in 6V6 tubes enough. The higher both screen and plate voltages-the more it is forced to draw current. Bring down those voltages and current will drop.

Now-doing this will lower all the sting voltages so that may be to the good. Everything in Fenders is too damn high for harp. The older vintage amps from early 50s sounded good because current and voltages were lots lower. Stretch a rubber band harder-the thinner it gets. Same goes for sound. Leo was going for sheer wattage for marketing-not for good "harp" sound for you.

You have to corral these guys for harp. But, follow the above plan and you are fine. The existing voltages will give you harsh tone and very short tube life.

You can add a "standby" switch, but you have to do it properly. Leo was just cutting corners here. You need a Carling spst and break circuit between rectifier out/1st filter section (20 @ 450) and load side with current 1 Kohm, 1 watt resistor and red lead to plate transformer center tap. So-rectifier out and 20 uF tie together at one side of standby switch. The other side goes to resistor and red lead of output trans. Just do it neatly and solder cleanly. And use isopropyl alcohol to clean switch body when you're finished.

Sorry you asked? This stuff is not hard if you do it thoughtfully. Your amp, tubes will last longer and sound will be much nicer. Too high of voltages and/or tube current produces heavy odd, high order overtones which cut like a buzz saw. And tubes last a week! Not good for harp. Let me know if you have more questions…..be careful, please.

Wrapping the Speaker To Reduce Feedback and Tube Microphonics

Question: Hi Ron,

There's something else I forgot to ask you--what's your opinion of using the metal shields on the preamp tubes? Do the metal shields prevent "microphonics" from occurring to any degree or are they for the purpose of reducing hum?

Also, as I recall you recommended wrapping the speaker in an amp with some sort of blanket to prevent sound cancellations--am I right on that? If wrapping the speaker is a good idea what's the best material to use, and to what extent should it be wrapped?

Thanks. - Brian

Answer: Hi Again,

The original ***steel*** shields protected sensitive tubes from mostly magnetic field noise (hum typically) as well as RF and impulse noise (electrostatic). Non-magnetic shields only protect from electrostatic noise-not magnetic noise. Best ones are steel. They help early preamp stages. After first two tube stages they mostly keep inverted tubes from falling out.

As far as microphonics go, they can lower tube rattle a bit. But, what you are hearing is the internal grids shake about from broken tiny welds mostly. They act like a microphone by altering the electron stream a tiny bit. Tube shields can't fix that. But, can lower noise from bar signs, motors, etc.

Yes, stock 10s in those sucked pond water. You want bigger magnet ceramic 10s there. Maybe even larger voice coil. The Alnicos are nice but that power is pretty small. You want the efficiency of a ceramic with a smooth response and not too bright.

Do all of everything before wrapping speaker. That is a trick to lower acoustic feedback. But it has to be done a certain way. Don't go there yet. Make everything else sound good first.

Princeton Amp Mod Using Old Type Zero Bias Preamp for Harp Use (1st input stage)

Question: Hi Ron,

I just completed the first mod you suggested--the one you referred to as--"zero bias". With the new 220 K plate resistor installed I read 105 Volts DC at pin 1--and 290 Volts DC at pin 6 of the 7025 tube. I fired up the amp and played it for a while--"quite an improvement". The mod sounds great but I can tell that the original Fender 10 speaker and the two original preamp tubes represent the weak link in the amp. I'm going to replace the original preamp tubes with two new 12AX7's and listen to the difference. I have three different Sonny Jr. amps on hand--between those three amps there's a total of 5 different 10 inch speakers that I'll be able to swap for the original Fender.

I have one technical question I need to ask you before I continue on with the final phase of the modification--when I install the "56K resistor" and the "20uF cap" at the B+ point, should I remove the 220K resistor I just installed and put the original 100K resistor back in, or should I leave the 200K resistor there? As I mentioned I'm getting 105 Volts DC at pin one right now with the 220K plate resistor--when I add the new 56K resistor will the voltage at the plate drop too low or will it be alright? What's the very lowest voltage I'd want to have at pin 1?
Hope to hear from you.
Thanks.-Brian

Answer: Hi Brian,

Leave the 220Kohm resistor where it is. The 56Kohm resistor will drop that a bit but that is all to the good. The first tube sounds sweet with plate voltage as low as 80 volts DC. 80-100 are perfect! On the Masco amps the plate voltage on the first preamp tube was about 60-70 volts. But it was a 6SJ7 pentode. The lower plate voltage gave it a warm, round sound.

Think of tube preamps as rubber bands. They behave similarly. The harder you stretch them-the thinner they get. Goes for overtones (harmonics) as well. But using screaming high voltages these stages get bright, hot, and strident with higher-order odd harmonics.

Dropping the plate voltage encourages lower-order even harmonics which are much rounder, fatter and “bigger”. That’s where you want to go. The zero-bias operation is a special one. Make sure socket is clean and tube reasonably good

quality. Only kids, high-end audiophiles, and drunks insist on screaming high voltages on preamp plates.

The results you get will speak for themselves! Have fun.

Mods and Microphones

Question: hey Ron it's me Mike from Canada.you modded my B.jr I recently acquired a couple of vintage mics aJT30 AND A SHURE BROWN BULLET which I installed a vol. pot and 1968 sure element wow I'm getting closer to that TONE [AND I'VE BEEN PLAYING ALOT MORE] YOUR HC JR. LOOKS VERY INTERESTING .....hope you're not mad, but am thinking of changing my speaker instead... which brings me to my question.

I've misplaced the some e-mails about what you did but all I need is the tubes you swapped and what they do i.e.; what is the power tube? [my amp is at the lake right now] I'm looking at Weber speakers probably

The 12a 150 or 12f150 been just reading about them so far if you have any information [or if you want to make me a speaker]or suggest any other speakers .thanks Ron all the best to you and yours.....cheers Mikeeeeeeeeeee

Answer: Hi Mike,

Well.....its your sound. It ain't me up there facing the audience! I sold you a 12AY7, a 12AU7, a 12AX7 and a matched pair EH 6BQ5/EL84.

Those power tubes make about 9-12 watts. Plus, the 6BQ5/EL84 are bright tubes. So, with that in mind you want a speaker rated 25-35 watts and not sizzling bright itself.

Since that's not much power, ceramic is good for efficiency. When I have more time I will go to Weber site and compare speakers. I don't remember all of the attributes. Ted Weber can assist with speaker choice.

You just want an efficient, smooth, low top end speaker rated in that range. Everybody wants a different tone so when you do a Franken-amp you change a lot of variables. That's why you just have to experiment and tweak for best sound for you. There is usually a best combination of tubes, speaker type and mic(s) for your playing style.

The Bullets are dark anyway (especially the newer Mexican made ones), so that balances a super-bright power tube. I have no problem with Weber speakers- they make nice products. I just think they are a bit expensive. But, anything good these days will cost. You usually get what you pay for! (I'm sure you've never heard that before!).

I hope this helps. I redialed the tone circuit in the new HCJr. For a darker, enormous bottom end. Tight but gigantic. For many players, NO boost on bass is

enough! I added and extra low boost section for even bigger bottom that goes nearly to DC on low end.

I increased tantalum cap size everywhere and went back to the vintage-style tone circuit but with premium parts. Gotta pay to play! For a simple rig my new HC is amazing (plug-plug!). The easy battery operation in new Jr is a big improvement over original.

Fact is the bass is so big and open on new HC that you could put your speaker cone across the room if amp is up too high and someone starts out with Jr bass control all the way up. Big.

Let me know if you want more info about your BJr. Have fun!

Vacuum Tubes, Blues Junior

Question: Ron,

You "tweeked" my Blues Jr. about a year ago and I love the tone. However, when I play and outdoor gig, I feel like a little more amp makes sense, so I have a Victoria 4x10. Although it has more volume I am not sure that I like the tone as well as the Blues Jr. Any thoughts.

Since the gig is this Saturday I could change tubes or simply see if running the mic'd Blues Jr. through the PA. The tone that I am not liking in the Victoria is a "harshness" in the lower frequencies. I am using a Green Bullet mic. Any thoughts? I would actually like have you tweek the Victoria after this gig?
-Doug

Hiya Doug,

Nice to hear from you. Always like compliments! There are huge differences between the modified BJr and the basic Victoria 4 X 10. Everything you do can help. The kind of tubes is important for tone. For smooth harp sound stay away from Soviet/Sovtek 6L6 or 5881. Their edge is good for guitar, but I think it's too bright for harp. One man's opinion.

Actually, the Groove Tubes Chinese ST bottle 6L6 sound very nice at slightly lower power. The JJ/Tesla 6L6 are clean and open sounding. They are nice. Medium gain. For harp overtone/harmonic structure is more important than actual watts. Avoid hot gain preamp tubes like Sovteks. If they use a 12AT7 as phase inverter like Fenders then use 12AX7 in its place. With harp: Less is more.

Try 12AY7 or 12AU7 in all small tube sockets excluding phase inverter moving towards input preamp. You want as low gain as possible which also broadens the bandwidth (usable response spectrum). Or, even try a Chinese Groove Tubes 12AX7 in first socket as well. Goal is to drop gain and clean up overtone structure.

What you are hearing is excessive odd, higher-order harmonics generated in part by rough-trade tubes. You want friendly preamp tubes with sweeter disposition. If there is and adjustable bias control for output stage negative bias it is set incorrectly with too much cross-over distortion. Many use metallized caps for cost and compactness reasons, but they can cause harsh tone also. A tech has to change those. The rest of mods require a tech

to change internal parts like resistors and caps. But, the tubes can make a really big difference. That's something you can do. Even borrow tubes to try from a buddy.

Keep in mind that the BJr uses EL84/6BQ5 small bottle tubes which have a sweet "sing" to them. They are very different than 6L6 tubes which are actually a pre-WWII design tube. So they will never be apples to apples. Experiment with the tubes first. The low end on your amp should be big, round. Sweet and tight. Nothing less.

The mentioned tube swaps can help improve the tone as well. Many 12AX7 tubes are sharper than a serpent's tooth! Find more mellow tubes for harp. Trade your hot 12AX7 tubes to your guitar player friends!

Let me know if I can assist further. Have fun. Don't get shocked.

Masco Amp: Hum Problems and Shield Telescoping

Question: Ron,

Recently on eBay I bought a Masco amp that you customized for harp. The tone is great, but when I run an external speaker there's significant hum after 10 o'clock on the volume knob, and when I run a line out to a PA or to a Champ or Blues Jr. amp, there's hum if I turn the line out volume knob past 9 o'clock. I'm using a customized Shure 520 SLB bullet (Low Z transducer with a High Z transformer). Any advice you have is greatly appreciated. - Sam

Answer: Hi Sam,

Sound's like a hum loop issue. Problem tends to happen when multiple things are connected together and each has its own grounding reference. That would be the AC cord and plug.

You have several chassis that have a grounded cord (hopefully) plus the signal is zooming about on shielded wire, grounded on each end at the chassis. Especially bad if the different amps are plugged into different electrical circuits.

That means that each chassis is at a slightly different voltage on its metal frame. A different shield voltage on each end means an induced 60 Hz voltage appears on inner conductor with signal.

This assumes all cords are good, all internal wiring is OK and there are no bad power supply caps. Those aggravate the problem. If Masco, one mic and one

simple speaker all plugged together sound OK, no significant hum is heard then basic system is OK.

Try that. Then, one by one add a line out or additional speaker. If hum or weirdness then appears you have the second grounding source and a hum loop. Always do this one step at a time until something appears.

The fix depends on what trouble is. For example- if Masco by itself seems ok, then a line run out to another amp can have its shield open at second amp's input jack if that piece is grounded. This is called "telescoping" the shield.

The shield actually only needs to be grounded at one end-usually at the "sending" end unless it is a mic cord. The grounded shield runs up right to jack. Then, it is opened and only the center goes into "line in" of connector. Again-not on mic cords which need both ends connected.

This only works if both chassis have a good grounded power cord and all grounds are intact. This technique can lower a loop-created hum level. Just one example.

So-try to determine if a simple, stand-alone setup is working. That rules out a failure in Masco. Things can happen and wires can break-solder joints go bad. Nuts loosen. Grounding requires all parts be solid. These amps are 50 years old!

Good luck. This is what I would do to narrow down trouble. Try to isolate it by when it starts. What piece causes it? Sometimes it takes some noodling. Have fun. Overlook nothing.

Another Masco Question

Question: I had a question regarding the line out on my Masco.

If I use the line out 1/4" and do not use the speaker out load, am I putting a load on the transformer?

In other words, is this leaving the transformer without a load?

Thanks, Mark.

Answer: Without a load attached to the back screw terminals there is no proper tube load. You can buy an 8-10 Ohm, 15 watt wirewound resistor and simply wire across speaker screws. **The output stage doesn't want to look into an open circuit**.

That way the power stage will act normal and sound right. Load matching isn't critical.3-6 ohms across 4 ohm terminals, 5-10 Ohms across 8 Ohm terminals, etc. Just something. Transformers "image" a source and load back and forth. The external load reflects back thru transformer to tube plates.

The current source in tube plates reflects into output load. So they are highly inter-dependent. That's why sometimes the power/sound seem to swell. It is a fluid and dynamic bounce back and forth. Both need to be close and present.

Hope this helps. Have fun.

How Do I Get Nice Tone Through the PA? Using Commanders?

Question: Ron. I have tried the following. I had my 73 Fender Deluxe Reverb tweaked for better sound. I bought a POD 2.0 (pain in the a**) .

I bought a small Squire Champ amp, I've tried Chorus pedals, delay pedals, octave splitter pedals. Most of the time I end up just plugging into the PA with one

of the many different microphones I own. I am looking for one simple device to give me a nice fat warm tone or a distorted honking tone.

Is the **Harp Commander™** the answer to guys like me? By the way. I have been playing for 14 years and I am 58 years old. Not your usual kid that blows blues harp. I just want to be able to have some nice tone when going through the PA. Help this old man before I get to old to play !!!!

PS. Other devices I am considering - Pig Nose 20, Boss '59 Bassman Pedal.

-Doc

Answer: Hi Doc,

That's a common set of gear and typical problem harp players find themselves in. I'm 57 and I don't pick up my old Twin Reverb I tweaked for shop test use. Otherwise I'd be spending time in a bed with cables and pulleys and weights! And my wife having the last word.

Playing right on top of a loud amp like any typical amp used for harp is certain trouble-even small amps. It is really an acoustic problem-not an amp problem. Harp has lots of lower register fundamentals and overtones lower than the cutting frequencies of guitar and keyboard. Acoustic Masking is part of the trouble.

Lower tones get buried and don't radiate into a space like guitar will. The speakers for harp reproduction need to be off the floor and above and to the side of the player. Not a loud point source at your feet. Then-you turn amp up and now all

the floor bounce is right into your mic and screaming like a Banshee. And the folks in back still can't hear you.

The second part of the problem is amp gain structure. Most use amps designed for guitar pickups. Almost every amp has way too much preamp gain for quality harp use. A player should be from 2/3 to 3/4 all the way up on volume control. Not 2. The unused headroom is actually bad because that's where feedback **gets its energy**. Unused headroom. Especially on hot, big bright amps.

So-my solution was to make a complete harp dialed preamp with low gain structure but with exactly the right knobs and joined to a dual direct-box output to feed PA reinforcement easily and provide an instrument amp feed for a small-ish amp used as a monitor near you so you can hear yourself play. With a nice balance

from both you can play anywhere. My Harp Commander™ is built from discrete FET transistors that sound much like tubes.

They are built using all Class A, single supply architecture and have similar compression and overtone structure as tube circuits.

Players have to hear themselves well to get right intonation and pitch. But not try to fill the Oakland Coliseum with the little amp. Let the PA do that much better and more efficiently. And have a small, local monitor such as a small amp. You can turn HC's instrument out level low and then crank amp volume control way up to push amp's preamp hard without amp being really loud. And have PA system fill the rest of room.

This resolves most of the “excessive amp gain issue” that is part of feedback.

This way you can hear yourself play and the crowd by back door can hear well. Multiple speakers not right behind player dispersing the harp effectively. It is all about efficient sound dispersion. This solves the “point source” feedback problem.

The HCIII has everything needed to play easily with all sorts of gear combinations. Any effects pedal or stompbox can be easily used with HCIII. Levels and adjustments and impedances are all right for their jobs. For studio use or live streaming use it is perfect. Right functions and right sound and right gain structure.

I have custom built tons of one-off recording preamps for high-quality studio use and this is a compilation of the best features I developed. The goal is to get good sound evenly dispersed without a big-deal setup and lots of cords. This is one stop shopping. You can crank up gain, crank up compression, turn down output level and get the great snarl of old.

All from the HCIII. Or, set gain low, set output levels to 12 to 2:00, compression low for clean, jazz voicing. One output and control for instrument amp-another separate adjust for line out to PA. Now with the full-time balanced line out driver and balanced line out you can go XLR right into PA line in XLR balanced. So you can easily go right to PA, use your EFX pedals and low-hum balanced line single cord to PA. And use any mic you own! One box.

Thanks for your interest and questions. Please let me know if you want more information. I am always available to help solve mic, amp and sound issues as well. Have run an amp tweak shop for 30 years and been involved with lots of live and studio work as broadcast engineer.

Harp Commander III™: Using the Computer to Record

Question: Ron: One last question, just out of curiosity -- part of the reason I'm interested in buying this rig is for use in recording directly to my computer.

Do you have any sense of how well it will function as a pre-amp connected directly to my electric guitar? I realize that's not what it's designed for, but it would be so darn easy to just switch back and forth between the harp mic and the guitar.

Thanks! - Michael

Answer: Hi Michael,

You can use the "unbalanced" input on front for any type of instrument pickup. It will sound good for guitar and especially for electric bass or any instrument using Piezo or other High-Z pickups. The tone circuit is a "musical" one meaning it will make nice sounds from any sound source. Your overtone structure will be clean, detailed and right for reeds or strings.

The origins of the Harp Commander™ were as a studio bass preamp. Similar harmonic range. To accurately reproduce the huge range needed for bass the whole spectrum has to be clean. Down to below 10 Hz or so. Otherwise disturbances are introduced into upper and higher harmonics (overtones).

For one studio I built an early tube version of the Bass preamp, the owner liked it so much he used it on all his tracks. Vocals, all instruments, and especially guitar and bass tracks. The tube version was a bulky but great-sounding affair. I took the basic form and built it with Field-Effect transistors instead of tubes. But, they sound and function very similarly and the FETs run on 18 volts instead of 350 volts.

All you will need is an adapter cord-probably 1/4" TRSs to 6 mm T-S mini plug or TRS mini. Some soundcards will take a balanced -10dBu signal. Use "Line" in and not "Mic" in. The HC puts out a line level signal. Although-since it is adjustable you can create any low-Z level you need to sound good. I had sound cards in mind when developing the HC. What you want to do is easy.

That was the whole point of the HC. Versatility. I encourage players to buy flexible, powerful tools and use them. You can use the HCIII for any mic or instrument and feed about anything. Good design can and should do that.

One last point. You can feed in a guitar/harp/bass into HC, feed an instrument amp to hear yourself and drive a record card track all simultaneously.

You could create a live-play, streaming audio to uplink, record that and play all at same time time. There's versatility! All with decent big sound.

Vocal Mics and the Commander

Question: Why can't you just plug the vocal mic directly into the commander without the tube transformer? I thought it could take any impedance mic (and I have used it between a low impedance mic and an amplifier to good effect)
-Rob J

Answer: Hi Rob,

The pro-type mics like SM58, etc have a low impedance, balanced out on an XLR connector. There are some optional versions that have an internal step-up transformer inside mic that convert low-impedance balanced (150 ohm) to higher voltage, higher impedance, unbalanced out. But, most pro mics simply have a low level balanced output. They are typically rated at -55 dBU/V and normal sound level.

That voltage is about 1/500 of 1 volt. Tiny.

The typical classic vintage mics like ceramics, crystals, controlled magnetic types were designed in the 40s/50s for communication use for PAs, 2 way radios, etc. They had a much higher output voltage and were unbalanced-hot + shield. Usually 1/4" plugs. Their output voltage is usually around 50-70 millivolt (1/20 of 1 volt). Most instrument amps want to see this level for a reasonable gain structure.

That's why Bullets plug right in to amps and Harp Commander™. That's about the same level as guitar pickups. That means the low output balanced pro mics with XLR connectors need a step up in voltage and impedance to work. From 1/500 of a volt to about 1/20 of a volt.

The transformer tube adapters do this step-up using an internal audio transformer. They have an XLR on one end and 1/4" male plug on the other. Balanced in, unbalanced higher voltage out.

But, this means using the adapter. The new HCIII solves this issue and has both an XLR low Z in as well as a 1/4" unbalanced mic input. More and more players are using the pro-type balanced mics so this will be a basic feature on the new HC and eliminate the need for a separate adapter. Originally my goal was to build a small preamp dialed just for harp players with basic controls but in compact format.

The upcoming HC has everything folks said they wanted even though the box is growing larger. Players will accept a larger unit if it means fewer accessories need to be carried with harp case. That's what the new box will do. Originally almost no players were even interested in using the pro mics. Now their use is common so the new HC will accommodate them.

I just now finalized the pro mic preamp circuit and will layout the new PC board. I do all CAD and PC design myself so hope the new units will be ready shortly. Maybe 30 days or so. I will have suppliers make and paint enclosures and

should have units stocked ready for sale. Was doing everything here and it was all taking too long.

That's my story....etc. If my explanation didn't make sense please let me know. As you know, Physics rules. The trick is to have it make sense without an engineering degree. Players just need the basic meaning to operate their gear. Thanks for your questions.

How to Fix Reverb Myself?

Question: Hi my name is Jeremy and I am 21 years old. I have a quick question. I want to know if you are able to tweak my FENDER 63 REISSUE REVERB UNIT? I'm looking for a better tone. Like a dick dale reverb sound, or if you can make it sound like a fender vibro king reverb. Like if take my unit and hook it up and crank the reverb all the way up, you don't really get that good reverb sound at all. if you know of any tweaks that I can do or if you can help me out in any way please let me know. I bought this unit brand new and I thought i would get a nice clean dick dale reverb tone. But I was wrong. please let me know what you can do. thank you for your time

Answer: Hi Jeremy,

I am not doing any amp repair work at the moment-sorry. There are several things you can do, however.

First obtain new tubes for all positions. Stock Fenders are Chinese or Sovteks which aren't very good. At least for the reverb sockets. The 12AT7 tubes die fast the way Fender runs them and the Chinese versions last for about 2 months. Max. Period.

Purchase all new 12AT7 and 12AX7 and whatever else it uses. Purchase JJ/ Tesla tubes or Groove Tubes. Try those first. Your reverb tank could have a bad coil or spring unit. They aren't very expensive to replace. You just have to get right model # off the tank top.

Replacement Accutronics reverb tanks are made by my friends at Sound Enhancements, Inc and are easily available at: http://www.accutronicsreverb.com

All this can be had online from Antique Radio Supply, Mojo Music, Ampwares, New Sensor, etc. All have online catalogs and you can order from there as well. Make sure tubes are good and your tank is OK. Weak tubes can make a reverb sound awful.

Check 'verb cables also to make sure none are cut, torn or have damaged plugs. Bad tubes are usually the problem. Yes, there are some tweaks an experienced tech can make to improve sound if everything else is good. But, you should start there. Replace tanks and cables when in doubt. Good luck!

Low End Roll-Off in Guitar Amps

Question: Hey Ron,

This is "Ronny T" from Luxembourg. I am here in the good ole USA or a brief spell. I wanted to know what is the perfect match amp for the HC. I have been finding lately that running into a PA is pretty amazing especially when the PA has effects and a good technician who enjoys experimentation. But, with amps, I continue to have problems.

So, why mess around, it's best to ask the expert. Which is the perfect match?

Please don't give me that stuff about which style of harp you play. I want to know from you whatever the best match is in your thoughts and mind. And, if you do need to know something about style, it would be hard drivin', up tempo blues. I'm looking for maximum overdrive, and power!- Ronnie T.

Answer: Hi Ronnie T,

Your playing style has less to do with do with it all than what the equipment does and how it does it. I think for many players that they need to learn more about acoustics and the more technical aspects of sound equipment just for their own self-preservation. They are not well served by the guitar player approach which is to simply get a bigger amp and peg the controls. Won't work for harp and a monster harp amp still might not get them heard throughout venue. My approach is to "think smart". I have many years in broadcast and recording engineering and know that it is good to use

the right equipment for the right job. Harp players throw tons of money at stuff they don't know will even work for them. Sad.

My concept is to use a preamp/tone control dialed for harp/dual direct box (which is all the Harp Commander™ is) to match the mics right, get sound tweaked for harp, and feed both an amp near you (as a near monitor) and PA at the same time. Let the many overhead speakers do the heavy lifting. Use your instrument amp so you and the bandmates can hear.

Small to medium amp, sound guy not stoned or asleep. Just balance the two and your life will get better! This is how the pros have done it for decades. I am trying to make this easy for the weekender who still wants to get heard without 10K$ of outboard gear. The HC provides a low impedance drive at right levels for the amp and sound system. That's it. The front end matcher finally gets all mics-all styles to sound good. Basic studio engineering.

A big part of the problem is that the mics don't match the amps well for level or impedance. This stuff was NOT designed to work together. Guitar amps load the mic wrong as they are for matching magnetic guitar pickup coils. That's why they all sound different. The mics have an internal impedance but have to be matched looking into a much higher resistance load. So the mic source and loading (terminating) impedances are very different.

Guitar amps all have slightly different input loading (to avoid patent problems!). That's one reason they sound so different. Their tone stacks are set

wrong for harp. EQ is in totally the wrong place. Guitars want a bump at 2-2.5KHz. That's terrible for harp mics. My HC has two tweaks-the very low end boost only and a high-cut high-end only. Flat everywhere else. That's what you want for harp. Closer to HiFi with high roll-off. Without a clean bottom your sound is thin, tinny, and gutless. No sub-harmonics and partial fundamentals. Bad and weak.

For harp mics, you want to get all the low frequency energy coming from the element. That's your power!

Guitars want roll-off at 200 Hz and down for less power loss on low end. Guitar cabs are designed to roll-off due to phase cancellation around sides of shallow open cab. Everything about guitar amps is wrong, basically, for harp playing.

That was the point of my HC-to help overcome some of those problems and be able to feed a PA amp and instrument amp together. Finesse.

Hope that helps a bit.

Changing Preamp Valves/Swapping Tubes

Question: Hi Ron,

I have a question about changing valves. I am a harmonica player and am still interested in your Harp commander but I have been told that in a Fender Pro Junior, the two 12AX7 preamp valves can be replaced with 2x12AU7 valves to get more volume and less feedback. Alternatively 2x12AT7 tubes can be used depending on the mike.

Is this true and if so is there any problem changing these valves if on 240 power in Australia? I would appreciate your advice.
Kind Regards. -Greg

Answer: Hi Greg,

Greetings from Bakersfield, CA. I wouldn't use 12AU7 or 12AT7 tubes. The power isn't an issue. With the right power transformer any 12XXX tube will get 12.6 volts AC which will run any one of them. Each was designed for a different use, though. The 12AT7 tubes sound best for phase inverters and industrial electronics.

Leo Fender used them 'cause he could get them surplus and cheap. But, I think that they sound bad for preamps. 12AU7 tubes are low gain and linear (flat)/ clean but amp needs to be redialed to use them properly. Still, you can always try one and see if you like the results.

I would buy some 12AY7 tubes-the perfect choice. Use them in first and second preamp positions. Chinese are fine or get NOS stuff. These are lower gain, very sweet, round fat tubes. The very best for harp.

All the newer Fender stuff is way too hot for harp use especially using 12AX7 tubes. Fender now thinks its Marshall with thin high voicing and fiery gain. Wrong for harp. If you can you should get your guru tech to increase all capacitor values in coupling circuits in your amp and widen tone stack from nose-bleed to broader. Part of the problem is with the parts values Fender used. Too hot! Too

Thin! Not enough bottom and low-end power. Too brittle. 12AY7 tubes will help. For harp, the low-end response needs to increase.

For phase inverter position use a medium gain 12AX7 Chinese or NOS 7025 tube. Unless you get amp dialed for 12AU7 tubes you are better off getting tech to increase caps and bandwidth, and use 12AY7 preamps. Lowish gain 12AX7 phase inverter. This can make your amp work well for harp.

When it sounds good by itself, then the Harp Commander™ will make it easier to use. But, your amp has to sound right to begin with or you'll never get the sound you hear in your head.

All the vintage gear used the simpler, fatter tone stacks and lower gain stages for the nice chunky tones they could get. You can, with some effort, get the new stuff to sound OK. Just not as it left the factory (in China).

Hope this helps a little. I have been designing tube circuits since I was 8 years old in 1957 and have a little experience with how these guys sound! Let me know if you would like further assistance. Thanks for writing.