

Harp Commander
Questions, Answers by
Ron Holmes, IEEE



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Q. At the moment I play through the PA using an ART box but use a Beyer vocal mike with low impedance and XLR input and output. It actually works quite well.

I plan to use the harp commander for my high impedance bullet mikes and use your XLR output directly to the XLR PA input. Is this what it is designed for? Presumably the Harp Commander translates high impedance input into low impedance XLR output!

Would it be possible to build me an extra XLR input so that I can use my regular old Beyer vocal mike with low impedance and then the low impedance XLR output? This way I have better control, can use all your fantastic harp designed variations and get rid of the ART box system as above (asked about earlier version HC)?

A. The interconnectivity is always the problem. This stuff has been designed over the last 60 years and it all needs to work together. Big job. The Harp Commander does the basic job elegantly and simply in a little, rugged portable box that actually sounds good. Bullets work great thru HC-as they can be dark and murky- straight into amps and PAs. With the XLR line out you can directly feed any PA mixer, house PA system or recording device at very low impedance out from Commander.

The HCIII has all the stuff that I couldn't fit into the earlier Commanders and will quite literally connect anything to anything. The HCIII has XLR balanced mic in and line out, unbalanced in, full EFX loop out and return, and separate output level controls as well as gain controls for each mic. Studio friendly with discrete FET front end as earlier design Commanders.

My gear is designed with lots of input from my musician buddies and I try to put together a usable, compact kit of tone tools you can really. There is cheaper gear and it certainly sounds like it.

Q. Why is there a mic transformer used in HCIII? What does that do?

A. You have probably seen the inexpensive, inline balanced to unbalanced transformers available from Shure and other sound equipment companies. These are cylinders about 16 cm. long, 2 cm. diameter with XLR-3 female jack in one end and a male 1/4" (6 mm.) plug on the other end. These have a small balancing to unbalancing transformer inside and turn a 150 ohm low level balanced mic signal into a higher voltage, unbalanced signal out. In US they cost about \$25.

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Any balanced dynamic mic using one of these matching transformers will directly feed into Harp Commander Junior just fine. SM57, SM58, etc. The HCIII has this matching transformer built right in.

Q. I'm wondering if you can use a HC into a computer's line in? I have a Mac laptop with a line level in and figure I can use my HC's line-level out to feed a signal into the computer. I'm worried about overloading the input or otherwise damaging the computer. Any advice?

A. The Harp Commander is totally compatible with a computer sound card/recording input. There is not even an issue of crossed grounds as the HC's wall supply power supply is floating and referenced to whatever the HC feeds thru cable ground. This means no hum loops, zaps, etc. With battery operation HC chassis is floating and matches your computer cable shield. The line out is about -10 dBu which is 1/4 of a volt audio- a standard sound card level. Same as a DVD sound output.

The HC was designed to also feed a digital recorder or sound card easily without overload. There are several ways to get good sound into your computer for recording, editing, listening, etc. The basic element is a sound card that plugs into your motherboard. Many companies make sound cards with all sorts of features, abilities, and prices.

The simplest only have a microphone input and headphone output and are feature limited. You don't want to plug your HC line out into either one of those. You want to use a soundcard that has a "line in" probably on a 3.5 mm jack. You want to get an adapter cable that goes from 1/4" to 3.5 mm (approx. 1/8" diameter). Better grades can take a balanced signal on a Tip-Ring-Sleeve configuration. In that case you can use a stereo or T-R-S 1/4" to T-R-S, 3.5 mm adapter cable. But a mono Tip-Sleeve will work fine also.

Now, there are outboard adapter units using IEEE Firewire and USB interfaces. Those allow you to import a better quality sound into your computer. The ones that accept a line in generally have multiple input connectors for instruments, line in, etc. The HC makes your harp mic sound great so you want a decent audio grade system that doesn't chew up your tone. As always-you get what you pay for! Either Commander will get a good sound into your computer. The output level control makes setting a good level easy.

The goal is to get a clean level as high as you can without generating artifacts. Just be aware computer sound cards and processors don't have much headroom so

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they go from fat to overload pretty fast. That means mic signal control. With the level set right you can stay within a good level using good mic control techniques. The HCIII has a real compressor good for limiting peaks for recording digitally.

There is no way to damage your computer. The worst you will do is to overload the A to D converter and make audible mush of your sound. Just turn down level control.

Q. What does the Harp Commander really do?

A. The HC is basically just a mic preamp tweaked for harp mics. Depending on the vocal mic used the player can tune the tone controls for right sound. You can set the controls for a flat response or a sculpted response that favors harmonica reed fundamentals and overtones. Harp playing can overload the mic itself due to air pressure (a good thing) and the preamp (HC) captures this total sound accurately. We use expensive parts that actually sound good. In this throw-away age these will work for years to come.

The FET input and gain stages respond and can sound like an old tube PA compressing with mostly low, even harmonic distortion which sounds round, sweet and fat. The early, powerful players were overloading their mics- and the tube PAs added a bit of their own harmonic color.

The FETs in the Commanders are configured to compress with a mic pressure increases depending on control settings. You can set gain and output controls for a heavily compressed or a very clean sound. Very dynamic which is a great sound for harps. Snarly Blues crunch thru clean Jazz.

Q. Will vocal mics sound good? Hard to believe. Its hard to get good harp thru my PA.

A. Yes, the Commanders can dial in the right sound you want. Usually vocal mics like Shure Beta 58, etc are pretty sterile, boomy and bright. The HCIII has a good mic preamp in it and has a very good bottom, very tight response on chromatic fundamentals. You can dial the tone you want. All the low end power is there. The Commanders are good down to about 5 Hz. Make sure a PA mixer doesn't have a channel's low response rolled-off. Keep rumble filters and 80 Hz filters off. You can shake the roof.

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Q. Why does my mic sound thin when I use my pedals? Will your gadget fix that?

A. Here is the answer to using a pedal with Harp Commander. The input section of HC matches your microphone to preamp and tone section. Mics- especially crystal and ceramic sound bad when plugged right into any pedal because the pedals are designed to load (match) a much lower impedance guitar pickup. Usually the low impedance, "Instrument Out" signal from Harp Commander is perfect for driving a pedal with the HC Junior or use the Effects loop in HCIII designed to go to and return from effects equipment.

This means use the HC between your mic and anything else.

Q. What do you do when you want to use an effects pedal and both HC outputs-both line and instrument?

A. This is exactly what the HCIII was built to do with its Effects Loop built right in. A low Z (impedance), "Effects Loop Send" signal goes to pedal or rack, then that output returns to "Effects Loop Return". It is after the gain and tone controls and before output controls and driver amp.

Q. Is your Commander an anti-feedback thingie? How can it stop feedback?

A. The Harp Commanders are completely different from the Anti-Feedback filters and gizmos. The Anti-Feedback devices use frequency agile notch filters with a gain controller that supposedly detects feedback hotspots. Some players can make them work but there are some basic problems with the concept. Temperature changes can alter how they work and they can become unstable. Even when they work properly-they can stomp out overtones octaves up you don't want to lose. That's the nature of feedback filter networks. You don't want your notes to play and then suddenly vanish like a ghost.

The better approach is to deal with the issues that actually cause feedback. The Commanders have a low gain structure that gives enough range for compression, but without excessive gain. **Feedback starts and grows in unused gain.** Many experts have recommended lowering amp gain which helps. Swapping out high gain tubes for lower ones in you amp can help. The Commander does that by

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simply being used before your amp. It does help to lower amp's preamp gain if possible by swapping tubes to lower gain ones. That will improve your sound considerably.

Vocal mics can be bright and boomy and can cause feedback trouble. By dialing your tone for harp with Commander you can minimize the bumps found in guitar-related equipment response. We encourage players to be smart and play like the pros do. They use a PA system with multiple, off the ground speakers that diffuse acoustic sound better in a space. By using a PA and using your favorite amp and feeding both with a Commander, you can hear yourself as well as whole venue or room hearing you.

A combo amp sitting on the floor behind you cannot ever fill a room without dead spots and feedback howl. Use both a PA and an amp. Many groups now have their own PA and even those work well. Sound disseminates much better using speakers designed to do that.

With the HCIII, the phase control sometimes helps as well. By reversing relative sound phase, feedback can be lowered or stopped. You can also use Polyester batting loosely packed behind speakers in your amp cab can also help somewhat. That acts as a sound phase shifter and delay network. By reducing sound waves reentering behind speaker cones from the front, you can improve bass response a bit and reduce feedback a bit.

Q. Everybody says their stuff sounds like tubes. Then doesn't.

A. The Class A FET electronics come close to tube-like compression and harmonic structure. The gain stages are all single supply rail, full Class A design and can be pushed into compression with gain/output controls set high. When waveform compresses it creates very similar harmonics and tone. I have designed with both for decades and use them interchangeably. Tubes have a slight bit more air. The Commanders run on batteries!

Q. I don't understand impedance or what all these numbers mean. I have an old Shure Bullet 520 microphone data sheet and see all these numbers. What are you supposed to match? What is high and low?

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A. Thanks for your question. This really goes to the heart of the whole impedance matching issue with microphones. The basic sensor in the older Green Bullet is a low impedance controlled magnetic element. In the newer 520 DX it is a dynamic capsule. The transformer the mic element drives can be wired several ways to step up-or way up. The element itself is only about 15 ohms as the source generator.

That's pretty low as is all magnetic-type microphone elements. The transformer then steps up voltage and impedance to either 150 ohms or about 40 K ohms for "high impedance" out. They don't state it (and where confusion arises) but they are referring to the "loading impedance" or the actual load the mic is trying to power. Not the actual mic impedance itself. Its transformer is simply a mirroring device to reflect the 15 ohm cartridge "into" 150 ohms or 40K ohms. The load is reflected backwards into the cartridge by the impedance ratio of transformer.

The equipment companies don't standardize their information which further confuses this issue of impedance matching for guys who shouldn't need to be scientists to make their mics sound good. *What really matters here is what loading resistance/impedance makes the mic sound right?* The Commanders terminate the microphone input into a DC resistance of 10 megohms and an AC impedance of 5-7 megohms.

Q. OK, so what is impedance?

A. Impedance is a unit that is a compound factor of resistance (DC) and reactance (AC) into which audio frequencies and inductive/capacitive circuit effects are taken into account. I have found both the magnetic-types of microphones as well as the crystal types sound great with my Commander very high impedance input circuit. Even the 1 megohm load from amps is too low for crystal mics. That makes bass disappear. That's a typical load from a guitar amp.

Q. I received my copy of "Harp Players Survival Guide" and have a question. You state that the Shure current model 520 DX Green Bullet is a low-impedance mic. The current model has a volume pot which is parallel to the output and they state that it is a high impedance mic "minimum 100 K ohms". That certainly isn't the 5 megohms very high impedance of a crystal or ceramic mic, but it's not 150 ohms either. What's up?

A. The newer 520 DX Green Bullets are dynamic mics and not CR based mics like originals. The internal transformer steps up the internal 15 ohm (or so)

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element to much higher. The newer units don't step up nearly as high as earlier ones. It is still a low impedance magnetic mic from the mic standpoint. But it is rated as an "unbalanced", high-impedance mic. A 100K ohms load or less will color the mic's output.

This is where the source and loading impedance difference comes into play. Even crystal mics have an internal impedance of roughly 40 K Ohms. That is not high. BUT- it has to be terminated in a very high impedance for mic to work right. Otherwise output drops way down and lows disappear. So they call it a "high-impedance" mic.

I was trying to point out the differences. The very high terminating impedance of the Commanders means you don't need to worry about any of this. The marketing guys were never the engineers! If that Bullet were connected to too low of load (below 100K ohms) the response and output would change. The Commanders give you full mic output without coloration. That you can add with the controls.

The pro-type balanced mics like Shure Beta 58, SM57, and all older Unidynes, etc are typically 150 ohms out. That's low. The HCIII has a separate, balanced input for these mics. There is a matching transformer and high-gain preamp inside to bring level way up. Typical loading on the "150 Ohm" mics is usually anywhere from 10 times the 150 Ohms or 1500 Ohms up to 10,000 Ohms in some preamps. The "load" will always affect tone in some way.

Q. How come my SM57 doesn't sound very good when played thru our PA?

A. PAs are really made for vocal mics and have a flat, somewhat boomy response. They sound dead on harp. The reason vintage tube equipment sounds so good is that the gain is lowish and they create lots of nice fat even overtones (harmonics). They tend to have a big low-end and aren't overly bright. The tubes compress the signal and have a spring-like behavior players use. Solid state PA systems weren't made for crystal mics or even typical harp mics. They were made for low impedance balanced mics and line level inputs.

With the Commanders you take any kind of mic, tweak your tone, get nice compression, and feed a line out level directly into the sound reinforcement. Voltages, impedances, and control are all matched for using a PA perfectly. With the HCIII you just use a mic cord, XLR to XLR and go from balanced line out to balanced line in on snake or PA mixer.

The solid-state PA are very stiff and don't have the springy, compressible quality of a vintage tube amp. The Commanders give you a nicely compressed tone shaped right that has the tone and feel you want even through a S.S. PA..

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Q. I'm thinking I need a Harp Commander for when I play through the PA. I read somewhere that you don't connect the HC directly to a microphone channel on the PA. Is that correct? If so, how do you connect it?

A. The two problems that arise are 1) signal level (voltage) and 2) impedance. You want to use the "lineout" from HC to "line in" on a PA. It is right level (-10 dBu/250 mV AC) to feed PA. Don't use "mic in" on PA as that adds too much more gain and would distort. Those inputs are to plug a microphone directly into PA like a Shure SM58. Those have a low level signal that must be amplified considerably. The HCIII already has a built-in mic preamp for that type of mic. By boosting the level at Commander, you are more immune to noise and hum than a long mic run back to PA board.

The vintage "unbalanced" mics have an output of around 50 millivolts which is the same as roughly a guitar pickup. That's between the 2 millivolts of a pro mic and -10 dBu (250 millivolts) line level. The HCIII does all the level conversions for you. Or, use the Junior with an inline transformer adapter tube. Both match crystal and ceramic mics perfectly which a PA cannot.

Your RE10 puts out about 2 millivolts, balanced. That is about 1/500 of a volt audio. A guitar amp needs 50 millivolts of signal to work. The inline adapters and the HCIII can bring your RE10 up to a usable level-then feed it to an amp or PA at the right level.

Incidentally, you can purchase these inline transformer adapters from Shure, Radio Shack, and other sound reinforcement stores. They sell for around \$30. Their bass response isn't too good as they use a really tiny transformer inside.

Q. What about Mackie PAs. Are their microphone inputs the same?

A The Mackies add about 30-36 dB gain (about 30-55 times voltage increase) to mic inputs to bring them to the line level for internal use. If you plug instrument out from HC (50 millivolt) and put that into the Mackie mic input it adds way too much gain. That is why the Line Out is used directly into Line Input channel. That is the right voltage.

The next thing is the balanced or unbalanced form. The Mackie Line Input channels simply use a dual input IC preamp which will work for either a balanced

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signal or an unbalanced signal with pin 3 on XLR grounded to pin 1 which is shield. If you use the HCIII (that has the balanced line out transformer) it can drive the Mackie with a fully balanced, low impedance signal at line level (-10 dBu/250 millivolts AC). Pin 1 shield, pin 2 "+" phase and pin 3 "-" phase. Either instrument or line out would produce overload if put into Mackie mic input channel.

Q. Should I get hiss when using a PA with HCIII?

A. You seem to have a signal to noise issue so believe you need to lower the gain on PA side and raise the output level of Harp Commander. The hiss happens when the gain is too high at PA end and not high enough going out of HCIII. Typically you want to set HC line out to $\frac{2}{3}$ to $\frac{3}{4}$ all way up on control.

Then, set PA line in to something lower and adjust HC gain as needed. Under normal gain structuring the HC out on both instrument and line out hiss is not evident. *You might want to make sure the HC is not going into a mic gain channel. That would raise noise floor 30-40 dB (30 to 100 times the voltage). And probably distort signal as well. Use the "Line In" on your PA and not "Microphone In" channel. Check with factory if not sure. If your normal settings on your Commander and PA sounds distorted-you are likely using a mic channel and overloading it.*

Q. How do I get a good tone from control settings?

A. Generally, for good clean harp tone you want to use the least gain everywhere and push (or drive) the PA input as hard as you can. That always sounds best and lowers background noise and hiss. Too much high-end treble or a high-mid bump is not good for harp and also magnifies hiss from overall system. The HC can brown the tone without making it muddy. I use good tantalum coupling caps to keep definition detailed even when rolling off the high end (treble). You can push the Commanders' FET amps into compression just by gain vs level control settings. You can get nice crunch and compression without it all turning to mud.

Q. How do you really know how Commanders will sound?

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A. I test all Commanders on a super-tweaked Fender vintage BF Twin Reverb with more gain than normal amps. I do this so I can hear any trouble. They are electrically benchmarked and then tested thru my Fender BF. My Fender was carefully dialed and I can hear everything the Commanders do.

Q. What about using wireless mics with your Commanders?

A. You should be fine using a wireless mic with the Harp Commander. The only problem that exists IF you use both a wireless mic grounded receiver AND also plug HC into a vintage amplifier that is ungrounded. Most AC powered pro wireless mic receivers have a chassis that is grounded. Some only use batteries.

The vintage amplifiers that are not safety modified for a 3 wire grounded cord have a “hot” chassis. In the early days pre-1970 they used 2 wire cords and the chassis was frequently connected to metal chassis via AC coupling capacitors. (Or later amps with ground pin cut off- PLEASE don't do that). Electrical codes later required grounded outlets and 3 wire power cords on equipment. That is quieter and safer.

When using an ungrounded vintage amp the HC lies in the middle between a real ground and a hot or floating ground on vintage amp. The common point then is the metal chassis of the HC. That means all exposed metal parts. When you interconnect equipment using shielded cords, you are connecting all the metal chassis together. That is a good thing unless the chassis are at different AC potentials relative to actual ground.

The Harp Commanders' chassis (or cases and exposed metal parts) become tied to whatever grounds the cables connect to. That is not a fault with the Commander-it is a grounding problem with an amp. The wall supplies for Commanders are all floating. That means no direct connection to ground thru the Commander's wall supply.

So-the HC frame is at whatever ground potential (voltage) of the cable and anything else the HC is plugged into. Generally, you want audio gear to connect shields together in order of signal flow for least hum pickup. That means HC should float to the ground frame of the next piece it connects with. **Remember-the cable shields connect the grounds on both ends.**

Bottom line-if you use your wireless receiver and any modern sound gear whether PA or amp-there is no problem. The caution is for players using a wireless mic, a HC, and a vintage Fender Bassman **without** an upgraded 3 wire power cord. That is the only cautionary. I don't want anyone to get hurt. Please replace 2 wire cords.

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Q. What does “balanced line mean? Why should I want it?

A. For example: PA or recording board line inputs have a 3-pin connector like a TRS or XLR-3 connector. One pin is “+”, one pin is “-“, one pin is ground and shield. That means they can accept a "balanced" signal or one that uses two conductors to carry signal current instead of one conductor and shield. That is a pro system and is used for long, low-loss lines.

They are more immune from hum and noise creeping in along the shielded cable. Another example is an output from a pro mic like a Shure. The output signal is actually taken directly from the secondary winding of the little transformer inside. The ends of the winding go directly to pins 2 and 3, with 1 being shield and case of mic. That is a balanced mic output. Both ends of the driving transformer have to be connected to hear anything.

So, either an input or output can be balanced. An unbalanced signal just uses a single conductor and shield to make a complete circuit. For example: A classic harp mic like a JT30 simply uses a single conductor and outer shield to carry signal. Both work fine. A balanced signal is more immune to hum pickup and can be used on long mic runs. Unbalanced cords should limit to 15-20 feet or so. Highs can roll-off fast unless driven from low-Z (impedance) source.

Most PA mixers and recording boards can take either signal as long as the "-" pin is grounded or connected to ground. If you plug a guitar cord into line out on Jr. , and plug other end into a PA mixer "line in" TRS jack (3 circuit 1/4" jack) then the mono plug shaft shorts out the "-" phase input circuit to ground and that makes a complete circuit.

Q. What does “unbalanced mean?

A. The "tip" connects to “+” hot input and shaft connects “-“ input to ground which works fine. Some PA mixers have a "mono" line in which works fine also and does same job. PA manufacturers use all sorts of nomenclature. Think of the Commanders as an electronic funnel. On the Jr. all sound goes in on the unbalanced mic input jack. Everything goes thru all tone circuitry and all the FET transistors. They work exactly like solid-state tubes and sound very similar.

After all the tone tweaking the output driver feeds both output jacks with same signal at different voltage levels. The instrument out is at harp mic or guitar

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voltage level. The line out is simply 5-6 times hotter and is at a - 10 dBu level or a standard "line level".

The output control on Jr feeds output driver then both outputs, each at their own voltage. This is a typical signal path layout. In general, the less complex the sound path, the better it will sound. My stuff is pretty intuitive and works like you expect it to. I think some equipment companies make their stuff too complex and confuse the musicians who aren't gearhead designers. Players' job is to plug and play. Obviously it is to their benefit to grasp the basic stuff so they can use it to their advantage.

Q. I also would like to download your documentation in PDF format from your website but I cannot download anything. There is no response when I click on the link. I use Firefox and Safari on a Mac.

A. Some of the boxes you see are simple graphics boxes for cutting and pasting the URL sequence. They are not hyperlink commands. We have found different platforms and vintages don't work with Microsoft-composed URL links. Just couldn't fix those. The actual underlined links are really URL links that should work. There are both there.

Q. Do you need different supplies for older Commanders?

A. No. All model Harp Commanders can use the same voltage wall supply. We sell same supplies for all. But-the HCII, HC Junior and HCIII can use a lower voltage, easier to find supply as well. Those can run well on 12 to 24 volts, AC or DC supplies, same plug (2.5 mm X 5.5 mm round plug). Either polarity plug will work. Those also use 2 nine-volt batteries as well.

I wanted to keep the supplies the same for all models. Even though the II, Jr. and III work fine on lower voltages, they also work fine with original supplies. That means any of my supplies-either the 120 VAC model or 240 volt AC models will work for all. They are all 24 volt DC outputs on same connectors- 2.5 X 5.5 mm circular, positive center.

Now, that also means the Jr. and III will work on lower voltage supplies that aren't the ones I sell. Same power connector. But, I wanted to stock only one DC output supply voltage. The 240 volt international supplies were ordered for me. So, I

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stayed with same supplies for all. They are too expensive to buy different output voltages. That's why I stayed with 24 volts DC. Saves you money.

Q. I have an original Harp Commander but now the power supply has gone. My question is will the power supply for Harp Commander III be appropriate for the original Harp Commander?

A. Yes, they can all take same supply. See above.

Q. If I buy a HC Jr. will it work with an old Silvertone amp?

Q Quick question. I have an old Silvertone 30 watt tube amp that I wish had more tone/"Chicago blues sound". Can you use the Harp Commander Jr with only the amp or do you have to use with a PA to get desired effects of the Commander Jr? I'm a home harp player looking for better sound and think???
Does this sound like an appropriate use/application for the Commander Jr?

A. The HC Junior makes a great all-purpose preamp for any use including putting in the front of a Silvertone amp. The Junior is made from FET stages that are configured exactly like the preamp in a vintage tube amp. FETs work and sound like tubes only they can run on 16 volts.

The Junior was designed to easily compress if you set gain control high (3:00ish) and output low-maybe 10:00 for an instrument out to your Silvertone. That will give you a very squishy compression similar to a 12AX7 tube doing the same thing. For clean play just reverse the two settings.

You can tweak tone you like in either case. The Junior was made to crunch like a tube amp but straight into a PA system. You get same effect in a tube amp. You want to make sure your amp is working reasonably well or it will sound bad no matter what else you do. Silvertones can sound great-I have rebuilt and repaired dozens and dozens of them over the years.

That means the tubes need to be reasonably OK, speaker OK and power supply working well. No hum-lots of fast clean power. They do that when working right. Now-if your Silvertone had an effects loop with a jack from a "remote" or external amp you can use the Junior as the amp's only preamp and go straight into the Silvertone's power amp.

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That bypasses the Silvertone's preamp. Probably the weakest section in the amp. The Junior (or III) actually sounds as good or better than the stock preamp. That's exactly what Charlie Musslewhite does. He has a III and uses it as his tube amp's preamp. It has an effects loop in the amp and he can bypass his stock amp's preamp.

He likes the HCIII's tone much better. So that is his preamp and tone control section and he goes right onto his amp with the instrument out from HCIII. Same basic idea on the Junior. That works if your amp has an effects loop. Otherwise, just go right into input jack on amp. Set Silvertone's tone controls to flat or midway.

Then, use Junior's controls to shape tone and dial your sound. The HC Jr does that simply and well. But, your Silvertone has to be working reasonably well. If ya gots a blown speaker it will always sound bad.

The tunable compression circuit in Junior sounds fine and will get some nice, big tone in any amp. In the end it is always about the tone and not numbers. That's my job. The Junior has a vintage ca. 1952 tone circuit built from film and foil caps, FETS, and other good stuff and it sounds much like an early Ampeg working as new. Those were terrific amps.

It turns out that only an amplifier stage pushed into compression sounds that way. No "effect" can do that. This way you can put that sound and touch into any sort of amplifier or PA. Guys are stunned when they hear that really work. Makes a stiff S.S. PA or amp sound right, fat, and round. Or your Silvertone!

Q. I am thinking of buying an old tube PA on E-Bay and having it tuned up for harp. What should I look for? How much power? How can I power multiple speakers?

A. I get that question a lot. The early tube PAs using 6L6G Masco amps, etc. operated their early 6L6G tubes somewhere between 6L6GC and 6V6 in power and sound. You would get better performance (and power) with 4 ohm load (2- 8s in parallel). Speakers in parallel tend to sound better than speakers in series.

If you buy an old Masco or something from E-Bay, you'll still have to fix it/rebuild it. The amps there are mostly needing some, or, tons of work. No matter what they say. I have seen dozens and dozens of amps "in good working shape" that needed another \$200-\$300 to make them right. Beware. Those old parts are 50 years old and need loving, skilled care to bring fully operational. Many have had a

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hard life and bad service work done over the years. So, no matter what they say, assume the amp likely needs work. Plan for that when setting a price. Most can be made to work great. They just need some help by an experienced tech.
