

# Guitar Technical Services

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## So you want a good amplified acoustic sound ?

### **Electrifying an acoustic:**

This information sheet is aimed at giving people who are searching for a good amplified acoustic sound some idea of what to look for. It is intended to educate, so that the guitarist makes an informed decision based on knowledge rather than being bamboozled by sales hype.

### **Matching Transducers and Electretic strips**

Transducers and electretic strips require a very high impedance amp to match the sound produced – getting a transducer fitted is only part of the equation.

Over the past 10 years, amp makers have spotted the gap in the market and produced the 'Acoustic Amp'. Before that, the only way to get a decent amplified sound from an acoustic was to use an interface 'black box' to match the impedance, particularly of PA systems. It was Gordon Giltrap who introduced me to this phenomenon in 1992 by explaining that his kit consisted of the 'Giltrap Pedal' <http://www.award-session.com/ap10.html> (made by Award Session) plus lead, tuner and guitar. He further explained that the way this system worked, he would go to gigs and ask for a LEVEL EQ from the PA mixing desk (i.e. every thing set at mid point) and then use his 'Giltrap Pedal' to get the sound he wanted. The sound man could increase or decrease the volume but couldn't alter the EQ. At that time, I was fitting many Ashworth transducers and this was a winning combination. Since then Fishman <http://www.fishman.com/products/details.asp?id=42> and LR Baggs <http://www.lrbaggs.com/preamps/para-di-acoustic-preamp> (to name just a couple) have also come out with 'black boxes' that match the impedance. The manufacturers actually now go one better and have two special features to deal with live performance which I will come back to once I have fully explained the need for a pre-amp. See (**Feedback**)

### **How do the Professionals get a Good Sound?**

Apart from microphones, the main reason that many Professional guitarists use acoustic amps or 'black box' pre-amps is because they deliver the full spectrum of sound from top (treble) to bottom (bass).

To test this out, a simple experiment can be performed at your music shop, just:

- a) Take an acoustic guitar and plug it into an Electric Guitar Amp with the EQ at the mid-point = level then play the guitar and listen to the sound. Next .....
- b) unplug the guitar and now put it through an Acoustic Guitar Amp with the EQ at the mid-point level. Play the guitar again and listen to the difference.

What you will notice is that there is a loss of the middle and bass when playing through the Electric Guitar Amp.

This problem will also occur on a PA system – even if it goes through a mixing desk.

I have had many people – for example people that play in churches – who only rely on a mixing desk for their sound. This is wrong, because no matter how much the mids and lows are pushed up & the treble lowered, it won't compensate for using the proper equipment with an impedance match.

There are other factors, such as speaker doping, that give different 'characters' to the sound but the bottom line is the sound has to be matched!



Most Transducers want 1 meg Ohms impedance (that is 1000 times 1000) so is it any wonder that the body of the sound is lost when plugging into the wrong impedance!

For example:

- Peavey Escort 2000 PA System Input Impedance: Mic: 2k ohms, Line: 12k ohms
- Peavey Bandit 112 Electric Guitar amp Input Impedance 470k ohms

### **The Answer**

Plugging into these will give a thin sound, which has no mid or low end, whereas the acoustic amp gives the full sound. The PA system is, as the name suggests, a Public Address system and the microphone is the instrument it was designed for. The most common mistake is for the guitar to be plugged straight into the mixing desk of the PA. The same result occurs with the guitar amp. The only way to resolve this is to put the sound either through an Acoustic Amp and use the 'line out' to the mixing desk or to use a Pre-amp like the LR Baggs/Fishman/Session to match the impedance and harness the full sound.

The advantage of an 'acoustic amp is that it can be used as a 'fold-back' or 'monitor' on stage and the 'line out' at the back of the amp goes to the PA to faithfully reproduce the sound, depending on your soundman!

### **Magnetic Sound-hole Pickups & Microphones**

Most of the sound-hole pickups do not have microphones in combination. Those that do will get a reasonably good sound because the Guitar Amp and PA are better matched for their impedance.

Now – here is an interesting thing! If an electric guitar is fed into an Acoustic or PA amplifier, the tone sounds very clean and 'woody' or acoustic. It's therefore no surprise that a sound-hole pick-up, which is nothing more than an electric guitar modified unit, will sound good through an ElectricGuitar Amp but better through the 'Acoustic' or 'Black Box' pre-amp'.

### **What is the difference – Sound-hole Pickup Verses Transducer?**

Let's leave out the microphone for the moment because both systems – Sound-hole & Transducer – use them.

**Sound hole pickup.** Relatively easy to fit.

This pick-up works by using magnets. Don't worry about what type of magnets are used, the sound is generated by ferrous strings vibrating above them, which in turn causes an alternating current and this signal is then amplified to give sound. I did say 'Ferrous Metal', so those who remember school will point out that the Brass, Bright Bronze and Phosphor Bronze strings are non-magnetic and won't pick-up the sound! True, but the inner core of the 4-wound acoustic strings are steel, so this is what produces sound. Some of the old sound-hole pick-ups had individual pole pieces. Those who think everything has to be symmetrical and have lined up all the poles to the same height will find that the 1<sup>st</sup> and 2<sup>nd</sup> unwound strings dominate the overall sound! When these have been correctly 'balanced' between poles, the first two will have to be wound so far down that the whole thing looks ridiculous! The other 4 will be wound up to the top of the coil to compensate for the sound loss. Pick-up manufacturers know this, and have designed the closed (cosmetically nice) unit so you don't see the varying staggered magnets.

#### **What sound do they deliver?**

Well, as described above, it's the alternating string directly above the pickup that is amplified. This means that the focus of the sound is at the pick-up – further away from the magnet yields less nuances. As I have said before, the sound of an electric guitar through an Acoustic amp or Pre-amp will make it sound very acoustic-like.

**Transducer and Electretic Devices.** More difficult to fit well.

Because these units are fitted directly under the saddle or as 'stick-ons' (under sound-board) they collect sound from the whole guitar. Transducers have been use by geologists and even the military to detect motion of rock or military vehicle or boat movement miles away through vibration! So, fitting a transducer will pick-up the vibration from the whole of the instrument – especially if fitted to the under-part of the string – as it will pick up the whole string vibration.



### **Finally – a note of warning!**

Cheap magnetic and acoustic transducers will sound cheap and nasty. When manufacturers have spent lots of time and research to deliver a good system they have to recoup their costs on the product and this means they can be expensive. On the other hand, just to make you cautious, not everything expensive is the best sounding – it's for the customer to listen and hear what they like the best before choosing what to purchase.

### **Feedback.**

Now that the pre-Amp has been explained, I referred earlier to two special features fitted to most Acoustic amps and 'Black Box' Pre-amps. These are **Phase Switches & Notch Filters**.

The cause of feedback in acoustics is the sound-board flexing as a direct result of the speaker cone's sound pressure. Once this has started, the guitar soundboard and speaker will oscillate in sympathy with each other, almost to the point of destruction.

#### **The Out of Phase Switch**

The out of phase switch works by moving the signal through 180 degrees. It doesn't affect the tone/sound. Instead of the speaker cone and soundboard moving in sympathy, the switch causes the speaker to move in the opposite direction, creating a buffer effect. It could be argued that it somehow dampens the sound but when playing at volume this hardly matters.

#### **The Notch Filter**

The Notch Filter does what it says, but I have found that few people know how to use it properly and some manufacturers fit it on the guitar but don't tell the customer how it works! Usually feedback is prominent at a certain bandwidth and each instrument has a nasty black-spot - for want of another word - which is the point that causes the soundboard to oscillate the most – this is what we call feedback. The way in which to use this notch filter knob is to allow the guitar to start to feedback and then turn the knob clockwise or anticlockwise until the narrow band is homed in on. Once locked onto in this way, the annoying feedback band is filtered out. Some people liken this process to dialling in to a radio station on an old radio. Whatever the explanation, the offending frequency is notched and filtered out. Some cheap pre-amps may have just a switch but this is a poor hit and miss way of dealing with a variable feedback frequency.

#### **The Sound hole Cover**

This cover is fitted to the sound hole and seals in the sound, which dampens the soundboard, thus reducing the feedback.

\_\_\_\_\_ known as a 'Feedback Buster Sound hole Cover'.

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Notes

#### **Personal Recommendations on Transducers -**

LR Baggs is my personal choice . Its an active system with discrete pre-amps and sound hole Volume - no cutting out.  
<http://www.guitartechnicalservices.co.uk/acatalog/B-BandPricesDec2007.PDF>

This Ashworth Transducers - AJ221 Microstrip - made in Cornwall UK - non-active is no longer available.  
<http://www.ashworthelectronics.co.uk/>

*I was told that the owner of 'Ashworth Transducers' had died and production stopped. There might be a possibility that these transducers may continue - let me know if they re-appear.*