

Electric Instruments

Our Pickup System

When people try to amplify an acoustic violin they are faced with a few problems. The best way to achieve a good representation of the original sound is to use a microphone of some sort. These work well at relatively low volume. The problem is, as the volume is increased, the microphone picks up some of the sound coming out of the speakers and causes feedback. If higher volumes are required the next choice is the bug or pickup attached to the bridge. These devices are based on piezo crystals either mounted in a small holder that is clipped to the bridge or in a strip slid into the side of the bridge. The acoustic instrument bridge, being a rigid piece of maple, is very good at transmitting the string vibrations down onto a large resonate plate, the soundboard. They are not very good at transmitting these vibrations to a small strip of piezo crystals stuck to the side of it. The result is a shrill, unfocused sound which tends to be thin and lack any of the hollow sound box type subtleties. This type of pickup can reach higher volumes than the microphone but eventually also starts to feedback.

Feedback will always occur with an acoustic stringed instrument because the soundboard picks up some of the sound waves coming from the loudspeaker of the system. These are then transmitted back to the pickup device which sends them back to be amplified again and back to the loudspeaker. This process goes round and round each time slightly out of phase with the last time resulting in the high pitched squeal or howls known as feedback, looping or howl round.

So to get rid of feedback problems it is necessary to get rid of the soundboard and sound box. Unfortunately by replacing the sound box with a solid body all the beautiful woody hollow tone and subtleties of sound are lost leaving just the string vibrations to pickup and amplify. The majority of electric stringed instruments do just that and then try to add back in some of these properties for instance by using a preamp to colour the sound. These instruments sound like electric versions of the instruments they are trying to replicate.

Most bridge pickup systems for solid body instruments use piezo crystals mounted inside the bridge or under it. When we first started making electric instruments we used a pickup system that had a small piezo element mounted in separate segments under each string. This bridge worked fine but we thought that it could be improved on and so in 1995 began a partnership between ourselves and Ashworth Electronics.

Our pickups have been designed and developed on our instruments. When we decided to make our own pickups we quickly discover how important the design of the body is in the quality of the sound. For these pickups to work correctly they need a large stable mass of wood under them, but the body of a violin needs to be extremely lightweight. This almost contradiction in terms has played a large part in the design and shape of our instruments. Our bridge pickup design works on the opposite principle to that of an acoustic bridge. Instead of transmitting the string vibrations down onto the soundboard or body the top of our bridges is allowed to move whilst the bottom is firmly anchored. By mounting the piezo elements in a different way they are able to monitor this difference in movement. Instead of using one element per string where it is very difficult to get outputs balanced (in fact if the outputs are equal you get a bass heavy sound) we use a blend of two elements to produce a sound that is completely even over all the strings. To impart that hollow woody characteristic to the sound we incorporate a series of specially shaped hollow chambers to 'fool' the elements into thinking there is a sound box.

All the processing is done in the bridge using the wood and hollow areas and results in a bridge system that has a natural acoustic like sound without the need to process the sound further using electronics. With this bridge system mounted on our skeletal body, there is no possibility of feedback and therefore no upper limit of volume.

Because the output from the bridges is clean and natural they require minimum EQ – we do not believe in having any electronics or preamp on board the instruments. Any tone control should be done at the desk or amplifier which has a much more sophisticated and expensive preamp than the type fitted on board instruments. Sound engineers usually hate volume and tone controls on instruments which allow the musician to tweak (never in a good way) the sound after the engineer has spent ages getting it just right!

Another reason some makers fit a preamp is to match the impedance – the impedance output from this type of piezo elements is very high, too high for the inputs on most amplifiers and especially sound desks. This mismatch results in a thin shrill sound with no bass extension. Impedance matching is better handled by an active Direct Injection (DI) box which is designed for the purpose. The lead from the instrument is fed into this before carrying on into the amplifier. We supply an Orchid Electronics DI box as standard with our instruments.

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