Audio splitter

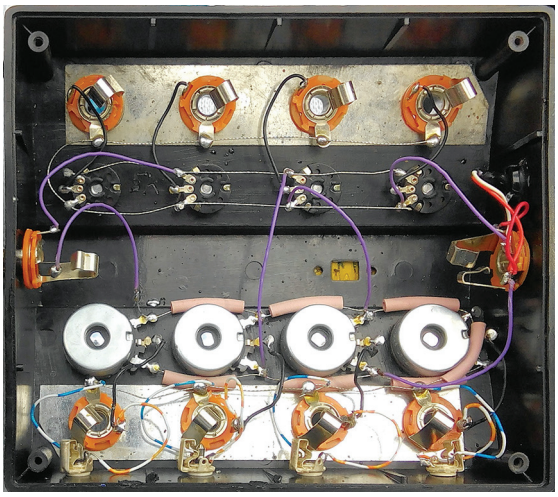


PHOTO 1: Inside the audio splitter showing two banks of variable resistors and socket sets (see text).

I am a bit deaf and at special events I can have trouble hearing incoming audio. This also happens when others are speaking nearby, for example at the club shack. So I tend to wear headphones – which are great for me but shut everyone else out from the receive audio. Not quite what you want when running a demonstration station.

The answer we found is the very simple audio splitter box described here. It takes high-level audio from the loudspeaker output of the radio and splits it into four (or more) mono outputs, each with its own volume control for convenience. In order to maximise flexibility, we put both 3.5mm and 1/4" (6.35mm) sockets on each output.

The circuit diagram is shown in **Figure 1** and **Photo 1** shows the internal construction. The device was built into an interestingly-shaped case from the junkbox that already had one 1/4" socket at one end. We added another on the other end, so that audio could be looped straight through. It was convenient to add eight outputs in this enclosure. The larger, metal-cased variable resistors at the bottom of Photo 1 are 100Ω and each is connected in parallel across the audio input. The wiper of each variable resistor feeds paralleled 3.5mm and 1/4" (6.35mm) mono sockets so that either size of plug can be used on each output channel.

As the variable resistors are driven directly from the loudspeaker output of the radio they act as four 100Ω resistors in parallel when no headphones etc are connected, meaning that the radio sees a load of 25Ω. When headphones or speakers are connected, the radio sees a lower impedance that depends on what's plugged in and the position of the volume controls. Most modern headphones are typically about 32Ω so if four sets are plugged in and all the volume controls are at maximum, the minimum load presented to the radio will be about 6Ω. This will be significantly less if lower impedance headphones, or loudspeakers, are used. Note that the variable resistors are only fairly low power devices so the audio splitter should not be used with audio sources capable of delivering more than a couple of watts or so.

Our prototype (**Photo 2**) also contained four higher resistance, physically smaller variable resistors (at the top of Photo 1) that are coupled to 1/4" mono sockets. This lets the device connect 'line level' equipment to the audio system. We have used this unit very successfully with a bhi noise eliminating speaker with internal amplifier when running demonstration systems: the operator can hear the full range of signals and noises, which their experience will let them filter 'by ear', whilst the public benefits from the noise reduction provided by the bhi system.

The great thing about the audio splitter is that I can use headphones at whatever volume setting I want without significantly affecting the audio fed to others. I get to hear just the radio audio, without distractions, whilst others can engage with visitors to explain what's going on. Once you get it all set up it works very well.

As described, this system uses mono sockets throughout. If you prefer you can wire up stereo sockets in 'mono compatible' mode, connecting just to the tip and ring, as shown in **Figure 2**. This will mean that stereo or mono headphones can be plugged into the socket and will work just as well. But be aware that you shouldn't use this method to connect to a stereo device such as an amplifier or sound card using a stereo lead because the wiring will be wrong. A mono to stereo lead should be used in this instance, with the mono side plugged into the splitter.

This project was developed by members of the Bedford and District Amateur Radio Club, with particular help from Vince Maund, G8CZP.

PHOTO 2: Outside view of the completed unit.

FIGURE 1: Circuit diagram of the audio splitter. Four output channels are shown but this can be extended as required. For (additional) high impedance 'line level' outputs described in the text, use variable resistors of anywhere between 1kΩ and 100kΩ or so – the value isn't critical.

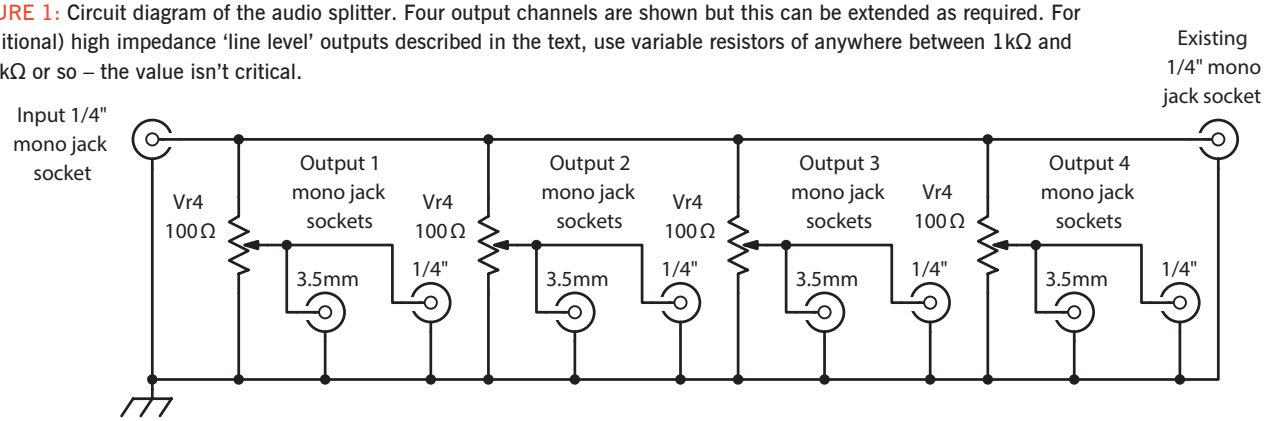
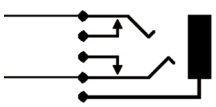


FIGURE 2: Wiring a stereo socket (with break contacts, not used) for 'mono compatible' mode. The connections go to the 'tip' and 'ring' contacts, leaving the 'sleeve' and switch contacts unconnected.



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