sets the audio gain of the stage. It is this switchable gain that determines the level delivered to the balanced clipping stage, and therefore the amount of clipping introduced. The output of the clipper (pin 5 of IC3) is then fed to an active lowpass filter, that rolls off at approximately 18dB per octave. This removes much of the harmonic energy introduced by the clipper. By using a balanced clipping stage, even order harmonics are kept to a low level. Coupled with the good filter characteristics this gives an audio response that many stations have complimented over the air as being very clean and punchy.

The output level from the filter is adjusted by varying RV1 and this is fed via the output attenuator, R29 and R32, to the microphone socket of your rig.

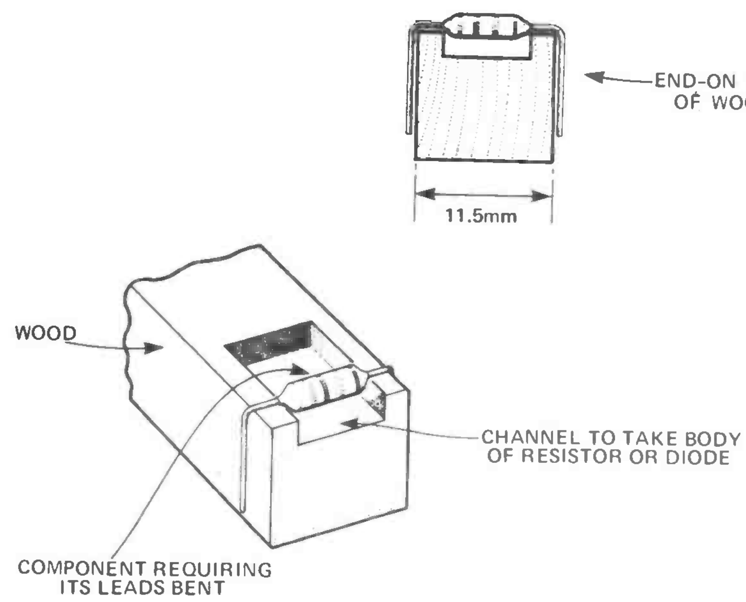

Fig. 2 Component lead bending tool.

Battery saving

TR1, a BC237, serves two functions. First, it acts as a voltage regulator in conjunction with a Zener diode D1. Second, it acts as an on/off switch in conjunction with TR2. It might be of interest if I go into the operation of this stage a little further as it makes a useful battery saving device, and I have not previously seen a similar circuit in print anywhere.

The operation of TR1 with D1 as a voltage regulator is quite conventional and has been seen in many designs. However, in this case the bias current is not simply fed via one resistor (R23), but also via a PNP transistor, TR2 in series with the resistor. R22 serves to bias TR2 off unless the PTT line is earthed. When the PTT line is earthed TR2 turns on and bias current flows to TR1 and D1, so switching on the regulated voltage for the processor. When the PTT line rises in voltage because the button on the microphone has been released, TR2 turns off, this in turn cuts the bias to TR1 and D1, R24 now keeps TR1 turned off.

"... you're lifting the squelch here ..."

The current drawn by this circuit in the off condition is smaller than I can detect with a 50 microamp meter, so a battery should last a long time. There is a snag however! If you leave this circuit connected to the PTT line of your rig, when you turn the rig off, the PTT line goes low and the processor switches on — net result a flat battery. However the simple additon of a diode in series with the PTT lead to the rig will cure this. Most rigs will tolerate a germanium diode in series with their PTT input without any problems. If there is any complication with your particular set, you can always fit a conventional on/off switch instead and forget the extra diode.

Construction

The speech processor can be bought in kit form from C.M. Howes Communications at the address given at the end of the article, or you could gather all the parts together yourself. The Howes kit contains all the board mounted components, a set of instructions, and a glass-fibre PCB which is drilled and tinned, and has the component locations screen printed on the component side for easy assembly. You could of course make your own PCB or wire the processor up on *Veroboard*. The latter method is fairly straightforward, but I find that things built on a PCB are more likely to work first time.

To assist in making assembly of the kit as neat and simple as possible, all the resistors require the same lead lengths. If you do not have a component lead bending tool in your tool-box, you may like to make a simple one as shown in **Fig. 2**. This tool helps make for neat assembly, but the kit will work just as well if you bend all the leads by hand! D1 and D2 require to have their leads bent at the same spacing as the resistors and can be treated in the same way.

I suggest fitting the resistors in the PCB first, then the capacitors, and finally the semiconductors. The layout is shown in **Fig. 3.** There are two links on the board to select gain and input impedance. There are easily made by using a couple of off-cut component leads when you have finished fitting the other parts.

The kit instructions include the