device which offers precise control of an audio frequency passing through it in the manner of a very comprehensive tone control network. I must add that the one I borrowed was intended for hi-fi applications and only had about four process bands in the frequency spectrum of interest. Even so, it produced very encouraging results and had at least as much good effect as a simple speech processor.

I am convinced enough of the value of graphic equalisers when used for radio transmission that I have commissioned a special *Ham Radio Today* design optimised for the purpose. We hope to bring you the project shortly. The biggest plus in favour of equaliser against the standard type of processor is that the equaliser beefs up the audio without introducing any distortion and therefore makes the resulting sound far more pleasant to listen to. Having said that the clipping type processor, power mic, call it what you will can make a valuable contribution to long distance audio when used correctly.

Clipping speech

Just about everyone will have looked at speech displayed on an oscilloscope at sometime or other. The thing that stands out about such a trace is the presence of high peaks of short duration — transients — set against low level signals which make up the majority of the trace. It is the low level stuff in between the transients which carries most of the information in the sound. The peaks just get in the way. If the background is amplified more than the transients, the effective talk power will be lifted in proportion. This is exactly what the simple processor (block diagram **Fig. 1**) does. It amplifies the mic signal to a level far higher than the transmitter can possibly use and then clips the tops off the peaks reducing them to much the same level as the background. The process effectively boosts these all-important low level signals to an amplitude which will modulate the transmitter fully.

By definition, this process is non-linear which means that the processed wave now contains components which weren't present in the original. Generally speaking, these 'intermodulation' products have no value in the sense of conveying information and can swamp the wanted signal if present in large enough quantities. This is why all clipping type processors use filters in the output.

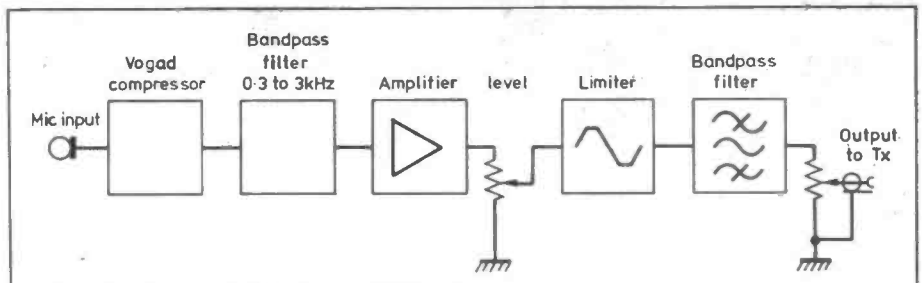

FIG. 3. Auto levelling baseband speech processor.

Crucial filters

The conventional wisdom dictates the use of filters in the output of a processor to avoid the 'splatter' produced by high order harmonic products while leaving the frequencies of interest — 0.3kHz to 3kHz — a straightthrough path to the transmitter. This is the purpose of the block marked 'lowpass filter' in **Fig. 1**. Note though that the unwanted intermod products are produced by a mixing process. For instance, if there are separate high level speech components at 5kHz and 4kHz they mix together to produce unwanted outputs at 9kHz — outside the passband of the filter — and 1kHz, most definitely inside. In this case, the 1kHz intermod product was derived from speech components nominally outside the response characteristic of the filter. This is the reason that simple speech processors are not

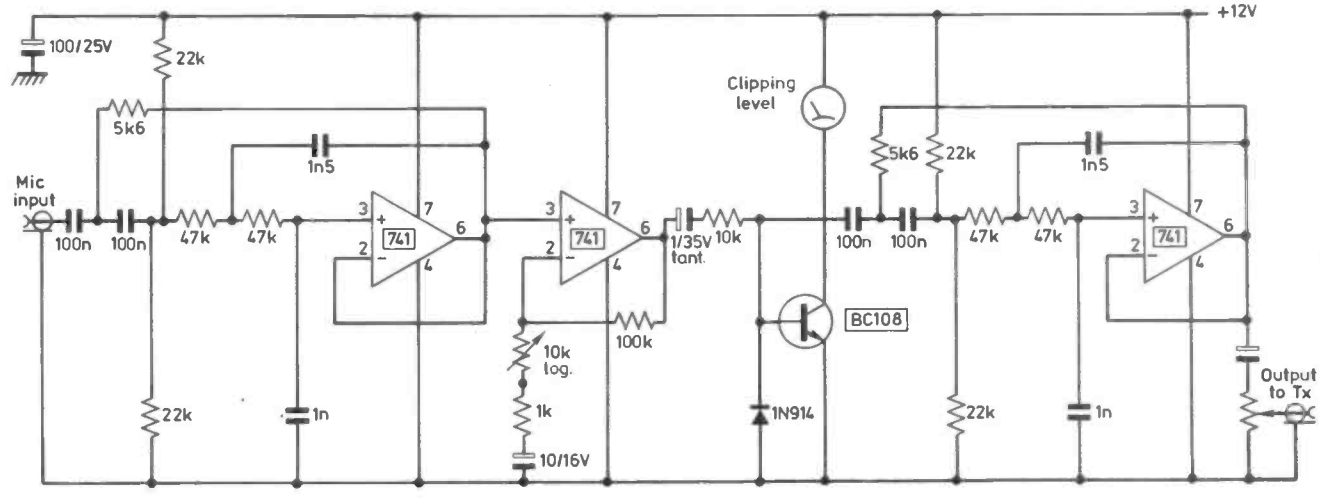

FIG. 4. Improved baseband AF processor.