Automatic audio processor

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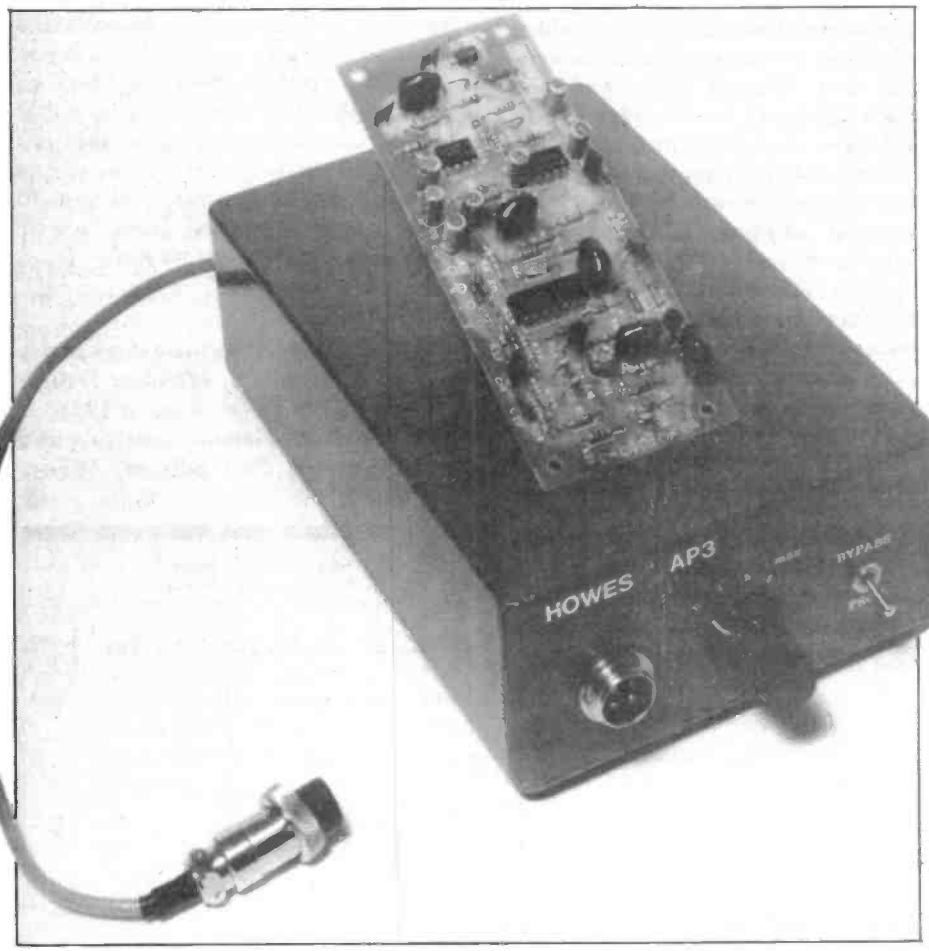
Most amateurs from time to time wish they could put out a stronger, punchier signal, often when having failed to work some exotic DX after hours of trying. Their thoughts often turn to big linear amplifiers, but there is a much cheaper way of adding extra punch to your signal.

If you were to examine undistorted human speech with an oscilloscope, you would notice that the peak level of energy in the voice is very much greater than the average level. The ratio of peak to average level varies from person to person, but research work points to a value of around 14dB as being typical. This variation of amplitude of the human voice helps us to be expressive with our speech and adds some individuality to the speaker, but nature has not optimised our vocal chords for communication under low-level, or noisy, radio conditions. It is easy to see that with a weak SSB signal being received on a communications receiver, the peaks of speech could be above the background noise level and the average speech level below the noise, and therefore inaudible. As a large amount of the information is carried in the lower level sounds, this signal would be difficult to copy. To effect an improvement, we could amplify the total transmitter power to overcome the noise level at the receiving end — but this is expensive and could lead to TVI problems. Now if we could raise the level of the quieter vocal sounds nearer to the level of the peak amplitude, our weak signal would have more energy above the noise level, and we could copy it a lot more easily. So without transmitting any higher peak power we could, with the aid of a suitable box of tricks, transmit a signal that is effectively stronger than before. The piece of equipment described here sets out to achieve this.



A device that modifies speech to make it more intelligible under difficult radio conditions is usually referred to as a speech processor. There are different methods of speech processing, but basically they fall into two camps, compressors and clippers. Compressers are simply a type of automatic volume control that keeps the transmitter fully modulated for a larger proportion of the time. A clipper does what its name implies and clips off the peaks, leaving a signal that has a much smaller ratio of peak to average level. The processor described here combines both techniques, along with some frequency response tailoring and filtering, to give a really punchy signal with a useful increase in intelligibility under difficult signal conditions, and let's face it, the weak signal QSOs are often the most interesting ones. The Automatic Speech Processor described here really can make the difference that enables your signal to get through.

Features

The processor is automatic in