

the VCO and the 15.36MHz injection to the mixer on the board as shown in the appendix.

Various techniques are available for a variety of circuits but all follow the basic arrangement as outlined above. The stability attainable is well within required standards and is more than adequate for normal requirements.

To convert the AM to FM operation is again a straightforward task. A small FM modulator circuit is introduced in which the microphone input line is lifted from the board at point 2 and inserted into the modulator/discriminator board. The modulator used consists of a quad operational amplifier in which the first stage includes an adjustable gain stage followed by a diode clipper and a filter network using one active and two passive filters. The circuit and board layout for the modulator is given in the appendix and the output from the varicap point is applied to pin 2 of the 7310 when it is in effect in parallel with the VCO via the bridge of C308/C307.

The pre-emphasis achieved is some 6dB per octave and the first low pass filter give a roll-off of some 6dB per octave after about 2,800Hz. The other filters give an additional roll-off of some 12dB per octave so the audio response is as in Fig. 13.

The effect of using an adjustable gain stage in the initial part of the circuit followed by an amplitude limiter is to give a sensibly constant audio output over a range of inputs

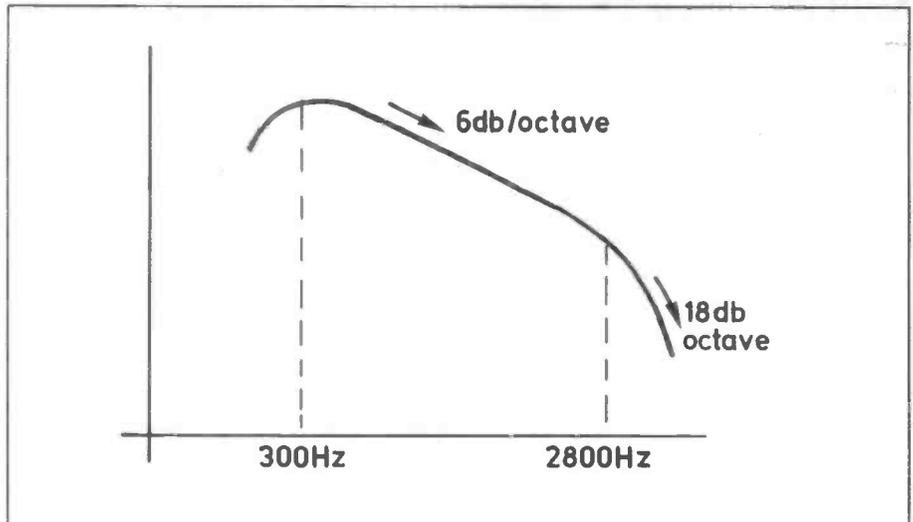


Fig. 13. Tailored audio response to achieve optimum value of modulation index at nominal 3.5kHz deviation max.

from some 20mV to 200mV. In effect the design operates as a very efficient speech processor with a high degree of distortion reduction at the output, and the audio quality obtained is of a very high standard indeed. The design is based upon a Motorola concept drawn around their MC3401 device, which operates very effectively at 9 volts.

The low capacitance added to the VCO by the varicap is compensated for by the control voltage so that at resting frequency the desired frequency is not pulled and audio variations across the diode cause a good quality FM signal to be created. The only setting up required is to advance the input pot to,

just below clipping level and to set the output pot to the required deviation level. In some circuits the amount of VCO swing may not be sufficient and in this case the output from the deviation control may be fed by a 1 μ F electrolytic to the TP1 connection at R201. In this case the deviation will require stepping down on the pot since it is now possible to get up to 15kHz deviation. The signal sounds very loud but could be frowned upon! Alternatively the 100k resistor in the input could be bypassed.

An audio oscillator of some 50mV output at 1500Hz connected to the mic input line acts as a suitable check for setting the deviation. Nor-

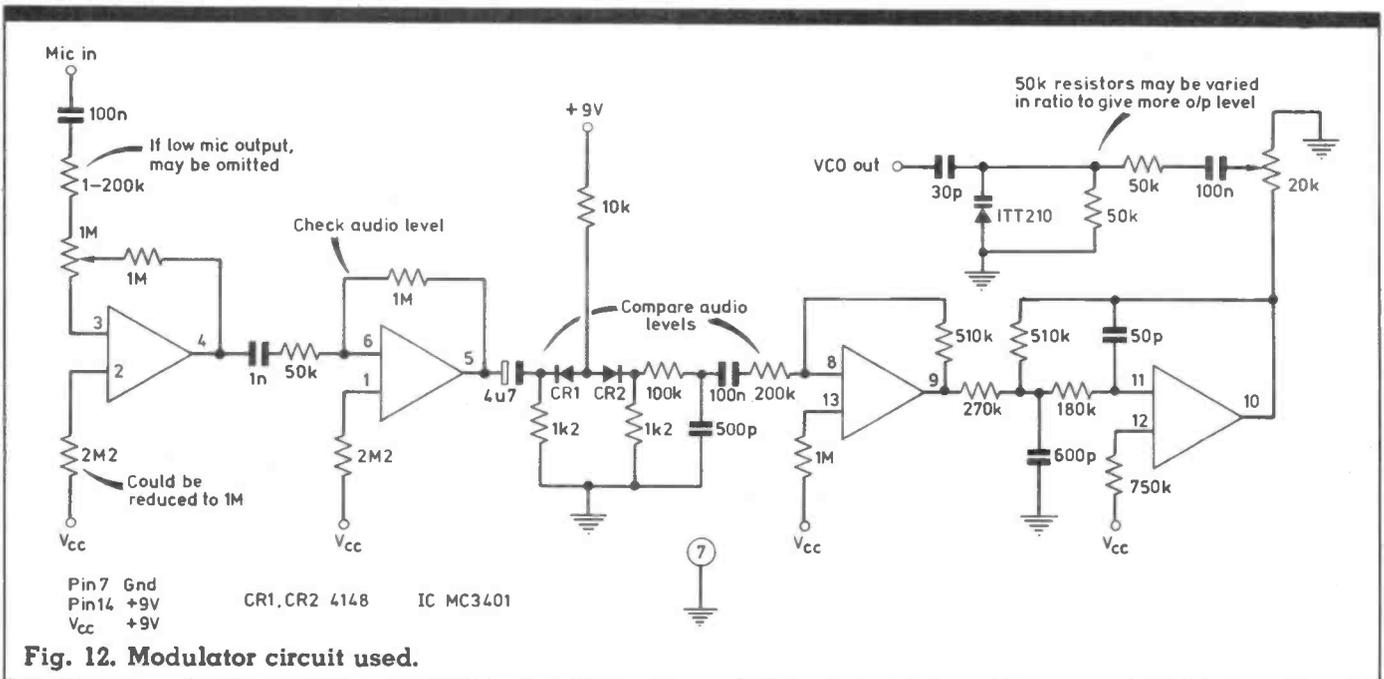


Fig. 12. Modulator circuit used.