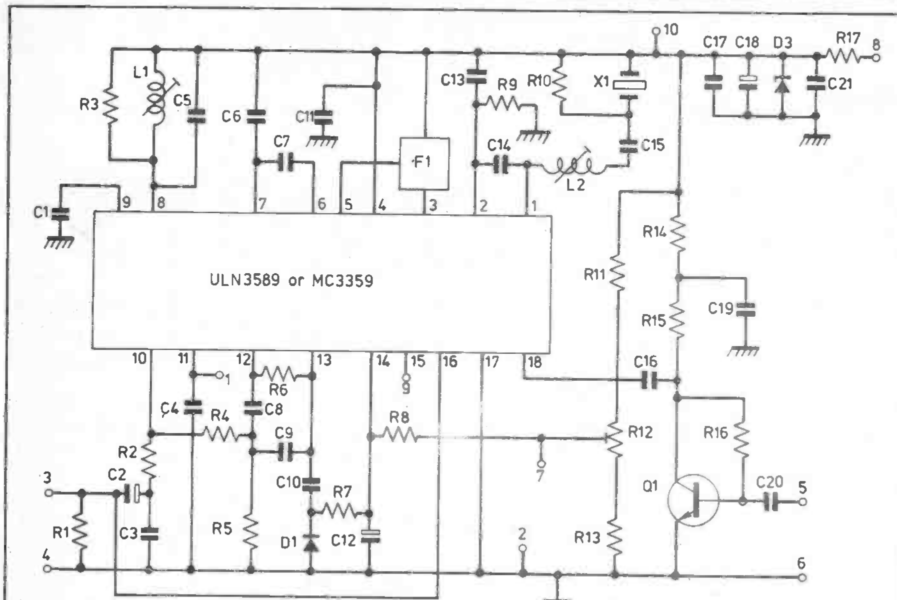


Discriminator circuit.

transistor and hence improves the noise figure and therefore sensitivity of the mixer, this modification is not necessary for *FRG7* use. The IF signal is filtered by a 4 pole ceramic filter connected between pins 3 and 5 of the IC. Quadrature detection takes place via the coil L1 and its damping resistor R3, C5 is used to pre set the coil from its nominal 470kHz resonance to 455kHz. The 455kHz signal is removed from the audio pre-amplifier via the RF stopping capacitor C1 on pin 9, and the audio output is taken from pin 10 via a 750μS de-emphasis network, consisting of R2 and C3. The squelch or mute is performed by looking at the noise spectrum produced by the discriminator around 9kHz. It can be shown that under weak signal conditions the broad band noise centred on 9kHz will reduce in level far more rapidly with increasing signal strength than any other frequency. Therefore a noise amplifier is built around the op-amp provided on pins 12 and 13. The filter components comprise R4, R5, C8, C9 and R6. The noise centred on 9kHz is then coupled via C10 to the detector diode D1 and smoothed by R7 and C12, this is applied to pin 14 of the IC which is the input to a Schmitt trigger. Also applied to this input is a preset DC level via R8 from the squelch control R12. Under no signal conditions maximum noise is produced by the noise amplifier and produces a positive voltage and in conjunction with the preset level voltage via R8 biases the Schmitt trigger into the 'on' condition. However, this in turn makes pin 16 go down to zero volts and shunts the audio output from pin 3 of the module so that under no signal conditions the receiver is muted.

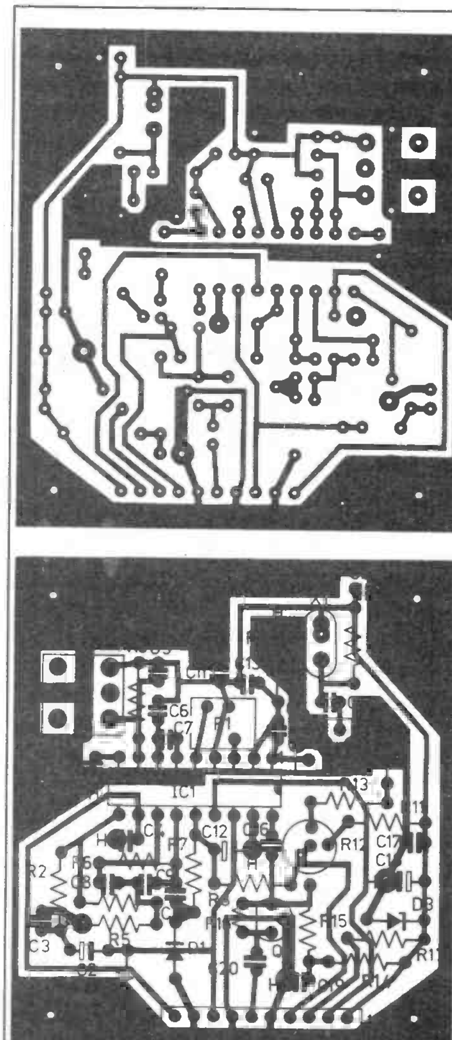
When a valid signal appears the noise amplifier output will significantly reduce and therefore the noise rectified via D1 will decrease and the voltage appearing at pin 14 will drop below 0.7V, therefore the Schmitt trigger will change state and pin 16 will go 'high', allowing the audio to pass out of pin 3 of the module. The mute may be externally defeated by grounding pin 7 of the module so that when tuning across a crowded band the mute will not open and close continuously.

The scan output of the IC which will source approximately 4.0mA is available on pin 9 of the module. An AFC output is available from pin 1 of the module. For applications where AFC is required it is advisable that two 100k resistors be put between it and ground as in the test circuit, it is essential that this pin always be decoupled at RF.

In the *FM42* applications below 18.0MHz a crystal and capacitors C13, C14 and C15 are fitted. The crystals should be fx±455kHz, L2 is linked out and R10 and R9 not fitted. C14 should be 47pF, C13 82pF and C15 in. For frequencies above 18.0MHz R9, R10 and L2 are fitted and the correct values will be dependent on the frequency of operation required, this is a standard Colpitts type oscillator and specific values may, if necessary, be taken from the necessary design tables. It is beyond the scope of this article to detail all combinations of frequencies, although the author's company will advise. For frequencies above 455kHz it is recommended that a coaxial cable is connected directly to the PC board from pins 5 and 6 rather than use the edge connector which is liable to IF breakthrough due to the high sensitivity of the module, it is recommended that the pins of the edge connector are cut off as well.

Assembly

The first items for assembly are the hollow metal rivets supplied. These are inserted through the top of the board and connect top and bottom ground planes together to ensure that the module is perfectly stable. It is necessary to top and bottom solder these before the components are inserted through them. The remaining components can be put in any order, although it is recommended that the IC is fitted first and the electrolytic capacitors fitted last. The link need not be



H = hollow rivet