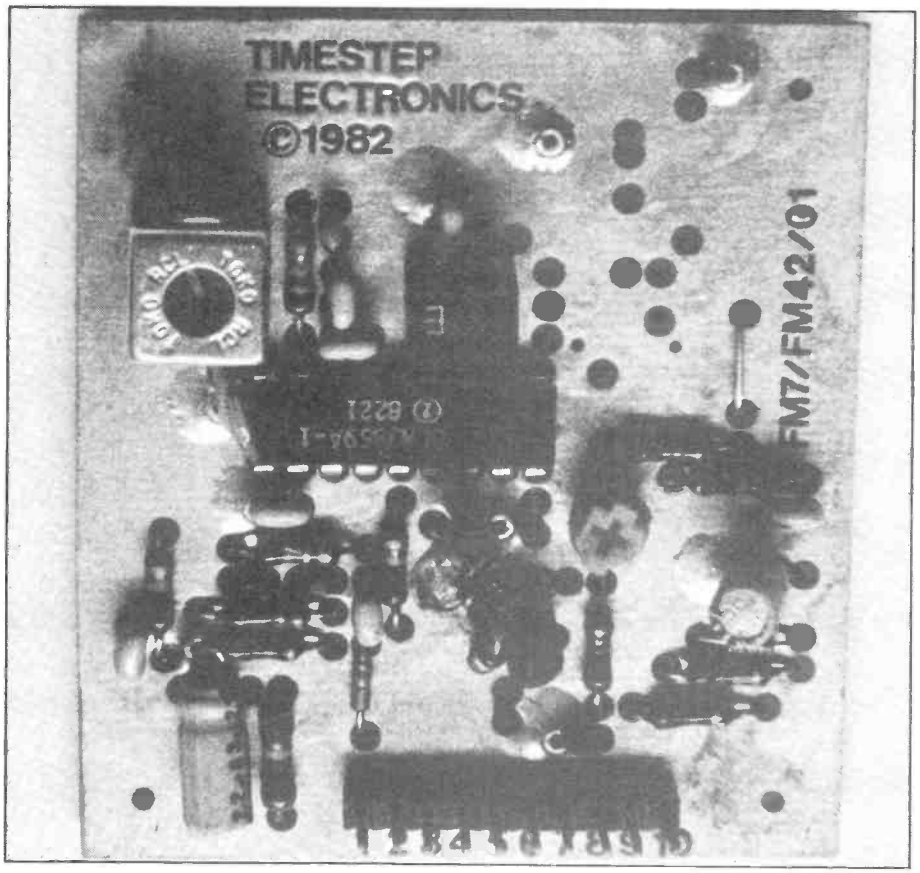
Add-on FM for HF receivers

FM Discriminator FM42 & FM7

By Timothy Edwards

With the advent of legal FM CB many HF receiver owners are disappointed that their receiver will not demodulate FM correctly. More recently there has been a tremendous upsurge in 10 metre FM operation where mobile to mobile contacts of 50 miles are not exceptional and on good days it is possible to work from even a hand held into one of the American repeaters. This too, of course, needs an FM discriminator. It is, of course, possible to slope detect narrow band FM by tuning to one side of the IF filter but the resulting distortion and very bad signal-to-noise ratio gives a totally wrong impression of the high quality signals available via FM. Using this adaptor produces perfect demodulation of narrow band FM signals and will give 12dB SINAD for only 0.1μV input. This is more sensitive than the majority of receivers currently available and many times more sensitive than slope detecting. Of course the ultimate sensitivity will still be dependent on the receiver in use.



Different modules

There are two separate models, the printed circuit board is identical only the components fitted change. The *FM7* is designed primarily for use with the *FRG7,* although it is also a very useful 455kHz FM demodulator with built in IF filtering and squelch. Its sensitivity of 0.5μV for 12dB SINAD at 455kHz makes it one of the most sensitive discriminators currently available. It may be fitted to a variety of receivers other than the *FRG7*. The *FM42* will operate over frequencies between 455kHz and 50MHz by fitting the appropriate mixer crystal and pulling coil if necessary. Values are given to operate the *FM42* at 10.7MHz as this is a common IF, other frequencies can be used and Timestep Electronics will supply the necessary data if an SAE is sent.

The fitting of a squelch to the modules eliminates the tiring continuous noise when no signal is present. Most other commercial detector modules do not have squelch and tend therefore to be rather useless when used in monitoring applications. The squelch circuitry used is of the 'noise' type which inherently rejects signals other than FM. The attack and decay times have been chosen for rapid two way communication and will give noise free monitoring. The squelch level is adjustable so that barely detectable signals will open it, or so that only very strong signals will open. A pin is available on the module so that the squelch may be defeated so that very weak fluttery signals may be heard without squelch chopping or for tuning across the band without the squelch continuously opening or closing. All the functions necessary for a communications FM IF strip are available on the 10 way edge connector and it is interesting to note that several of these modules have now found their way into professional communications systems.

Circuit description

Q1 is the RF pre-amplifier which is a low noise transistor characterised for IF application and accounts for the very high input sensitivity. In the *FM7* application the onboard mixer is used as a straight forward amplifier and no oscillator components are connected to pins 1 and 2 of the IC. If a very sensitive 455kHz detector is needed then short pins 1 and 2 of the IC with a wire link, this reduces the noise level produced by the oscillator