snag is that a larger value may lead to the RF stage becoming unstable on 28MHz. A suitable component for this purpose is a Philips 'Beehive' trimmer, the central part being soldered to the earth tag adjacent to V6 on the side of the screen across the valveholder adjacent to pins 1 and 3. These two pins should be linked with a short piece of tinned copper wire and joined to the remaining terminal of the Beehive trimmer. To adjust after modification, tune up on transmit on 28MHz in the normal way, and do not touch the pre-selector after this. Switch to receive, tune to a steady incoming signal or inject a weak signal into the receiver, and set the trimmer to about half value. Adjust L5 for maximum signal as in the alignment procedure, and then check the operation of the preselector control to see whether its adjustment on receive seems to be unduly sharp. If so, reduce the capacitance of the Beehive trimmer, readjust L5 and try again. If, on the other hand, there seems to be little improvement in RF gain, increase the value of the trimmer, readjust L5 and try again. Note that the preselector peaks on receive and transmit should coincide. A convenient signal to use for these tests, particularly in the South of England where the writers live, is the GB3SX beacon. After finding the correct setting for the trimmer the operation of the receiver on 21 and 14MHz should be checked, adjusting the appropriate coils as described in the alignment section. The modification should have little or no effect on the performance on the other bands.

Improving the selectivity on CW

Two methods of improving the CW selectivity have been tried. The first, which is relatively cheap and simple, uses a single crystal and two miniature DIL relays, and despite its simplicity is fairly effective in use. To carry out this modification the coupling capacitor C21 between the mechanical filter and the grid of the first receive IF amplifier V13 is disconnected at the valveholder, and the circuit of **Fig. 104** is inserted. A convenient method of construction is to assemble the components on a piece of *Lektrokit* board and mount this board on a small bracket adjacent to the mechanical filter. It is also necessary to provide a switch on the front panel of the *KW2000* to switch the filter in and out of circuit. Since this switch only has to carry DC to the coils of RLA and RLB its position is not critical, and a convenient way of avoiding the necessity of drilling extra holes in the panel is to replace the calibrator push-button by a miniature three position toggle switch. This is wired so that the 'up' position activates the calibrator and the 'down' position switches in the CW filter, the centre position being for SSB operation. The relays RLA and RLB should be separate, rather than a single double-pole relay, in order to minimise signal leakage around the filter. The type used by the writers was RS Components type 349-399 in form C. No mechanical layout is given, since this will, to a large extent, depend on the components available, but it is advisable to keep all leads as short as possible, and to separate the input and output connections.

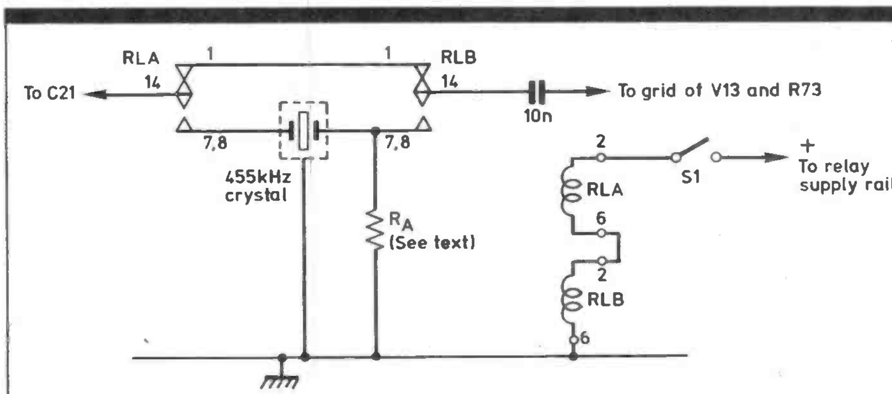
Once the filter has been installed, a temporary resistor of 4.7k ohms should be wired into the R_A position, the rig switched on and allowed to warm up. Tune to a CW signal of reasonable strength and switch the filter into circuit. A definite peak in signal strength should be found as the receiver tuning is varied. The width of this peak will depend on the value of R_A. Reducing the value narrows the peak and increasing the value widens it. There is, however, a tradeoff between selectivity and sensitivity, since reducing the value of R_A increases the insertion loss of the filter. The best value will usually lie in the range 1k to 10k, and will depend on the activity of the crystal, so some experimentation will be necessary. It is as well to note that some use of the IRT control may be necessary in practice since the filter peak may not be at quite the same frequency as the transmitted signal. Until the modification to improve the keying characteristics (described later) is carried out, the exact transmitted frequency is dependent on the frequency of the sidetone oscillator since, as mentioned in part 1 of this series, CW is generated by keying this oscillator and feeding the resultant audio into the transmitter AF section.

The filter as just described was used for about a year by one of the authors and, whilst not perfect, it was found to be a vast improvement over having no filter at all. If CW is not your main mode you may find that it is adequate; however, if like both authors, you operate mainly on the key, you may well wish for something better, as is now described.

Fitting a mechanical filter for CW

The second, more complex method of improving the CW selectivity uses a Collins 455kHz mechanical filter of 500Hz bandwidth, and is definitely the better method of the two. The drawback is that the insertion loss of this type of filter is about 10dB, and some method of replacing this lost gain must be found. The writers used a dual gate MOSFET amplifier for this purpose; **Fig. 105** shows a block diagram of the final set-up, and the circuit details are shown in **Fig. 106.**

A short note on the design philosophy behind this filter system may be of help at this point for the



S1 = Extra cw/ssb switch on front panel (see text)
XTAL = 455kHz HC6U etc. but preferably in metal can. (Earthed)
Note: Numbers adjacent to RLA, RLB on circuit diagram refer to pin numbers of RS. DIL relay, do not reverse pins 2 and 6 as a diode is mounted across the coil in the DIL package.

FIG.104.