

The Minimitter MR37 Communications Receiver

Reviewed by W. H. ALLEN, M.B.E. (G2UJ)*



THIS receiver covers the 3.5, 7, 14, 21 and 28 Mc/s amateur bands only and offers a new approach, at least in this country, to the problem of good selectivity without the use of a large number of tuned circuits or a crystal filter. This is accomplished by employing a Q-multiplier circuit in conjunction with a single 465 kc/s i.f. stage, adequate image rejection being provided by a first i.f. of 1.5 Mc/s. The degree of selectivity obtained by this method is extraordinarily high on both c.w. and telephony signals and in many ways the receiver is more flexible and easier to operate than many others with multi-stage i.f. amplifiers and crystal filters. Particularly satisfactory is the ability to vary the degree of selectivity from wide to the point where speech is rendered almost unintelligible by reason of sideband cutting without risk of losing the signal as so frequently happens when a crystal filter is switched in or the coupling between tuned circuits in an i.f. amplifier varied.

The MR37 consists of two sections each measuring 8½ in. by 6½ in. by 7¼ in. deep comprising the converter and i.f./a.f. units mounted on the top of a third section measuring 16½ in. by 4½ in. by 7¼ in. deep which contains the mains operated power supply and an elliptical speaker. Sockets at the rear of the first two units receive supplies from the base section. The converter and i.f./a.f. sections may be quickly detached and operated from batteries or other external supplies for portable or mobile operation: certainly the first attempt to design a receiver to fulfil the dual role which has come to our notice.

The Circuit

The eight valves plus metal rectifier and crystal diode are arranged as follows:

- (1) R.f. (6BY7) with variable cathode bias for gain adjustment.
- (2) First mixer/oscillator (6AJ8) converting to 1.5 Mc/s.
- (3) Second mixer/oscillator (6AJ8) converting to 465 kc/s.
- (4) I.f. amplifier at 465 kc/s (6BY7).
- (5) Q-multiplier and S-meter stage (12AX7).
- (6) Detector and noise limiter (12H6).
- (7) First audio amplifier and "squench" valve (PCL83).
- (8) Audio output stage and b.f.o. (PCL83).
- (9) A.v.c. rectifier (WG50 crystal diode).

The five bands previously mentioned occupy from 4½ to

5 in. each on the slide-rule type scale and the tuning rate is adequate even at maximum selectivity.

The Q-multiplier, brought into use by a switch centrally located on the i.f./a.f. section, is basically a regenerative circuit connected in parallel with the primary of the 465 kc/s i.f. transformer in the anode of the second frequency changer, the degree of regeneration up to and into a state of oscillation being controllable by means of a variable resistance in the cathode of the regeneration valve. Tuning over a few kilocycles either side of the nominal i.f. is accomplished by means of a small variable condenser and signals within the pass band may, by this means, be peaked as desired. The action of the Q-multiplier in offsetting the losses in the i.f. transformer results not only in a considerable increase in gain but a spectacular improvement in selectivity. By slightly detuning the Q-multiplier to one side of the passband and suitably setting the frequency of the b.f.o., c.w. may be received under real "single-signal" conditions normally associated with a good crystal filter.

Readers who have experimented with regenerative i.f. stages in receivers will know that although this can enhance the gain to a great extent, noise is seriously increased: the

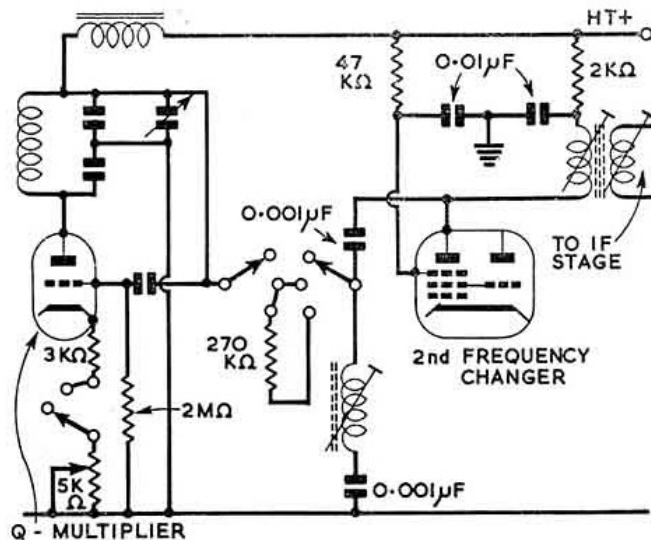


Fig.1. The Q-multiplier circuit and its connections to the i.f. amplifier.

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Q-multiplier in the MR37 not only does not introduce noise but *decreases* it by virtue of the narrowed bandwidth to the point where phone signals on the DX bands stand out from an almost silent background in a fashion that suggests that the band is sparsely populated. Switching out the Q-multiplier, however, will disabuse one of this impression on most occasions. The circuit is shown in Fig. 1.

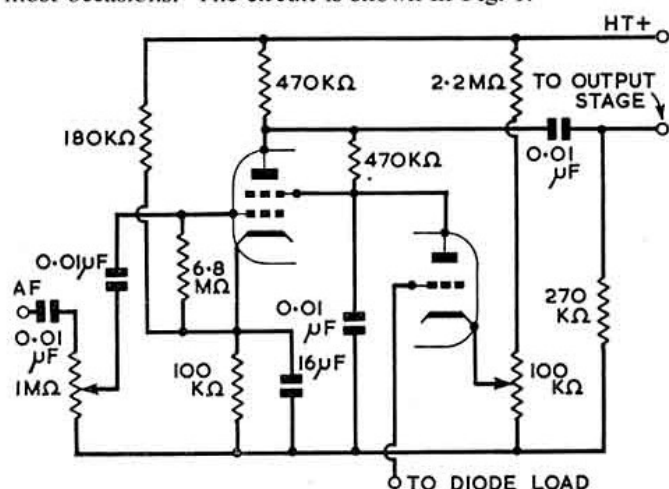


Fig. 2. The squelch control circuit.

The "squelch" valve, the triode part of a PCL83, has its anode connected to the screen grid of the tetrode section and its cathode to a potentiometer network between h.t. positive and chassis (Fig. 2). The setting of the potentiometer determines the grid bias on the triode, and if this is such that the valve takes current the screen voltage on the tetrode section will fall to a value where that valve no longer conducts, so cutting off the audio signal. The grid of the triode is taken directly to a tapping on the detector diode load resistance which (on reception of a signal) is negative-going with respect to chassis. As this negative voltage reduces the triode anode current, a point will be reached, dependent upon the setting of the potentiometer, where the tetrode screen voltage rises sufficiently to allow that valve to conduct and pass the audio signal. Due to suitable screen characteristics in the tetrode section the change from cut-off to conduction has a positive "on/off" quality which prevents distortion occurring at the point of change over. The "squelch" control enables the minimum readable signal strength in relation to local noise or interference conditions to be set so that all signals below that level will be prevented from reaching the output stage, giving a silent background between stations or during intervals in transmission.

The remainder of the circuit is conventional and consists of a further PCL83 with the tetrode section as output stage, the triode acting as b.f.o.

Other features include a calibration reset control operating on all bands and provision for remote control of the send-receive switching or, alternatively, control of the transmitter from the send-receive switch.

Performance

The receiver proved lively and stable in operation and oscillator drift on the two higher frequency bands was negligible after a short warm-up period. It was found, however, that there was some frequency shift on 21 and 28 Mc/s with operation of the r.f. gain control which could possibly be avoided by the addition of a stabilized h.t. supply to the oscillators. This is not a particular problem on 'phone reception but can prove troublesome when receiving strong c.w. The purity of note on c.w. reception was, however, excellent on all bands.

On very strong signals the a.v.c. action was insufficient to prevent some overload taking place unless the r.f. gain was reduced but this is not altogether unexpected when only two stages are available for control and does not represent a major disadvantage.

The screening of the receiver is above average and no signals could be heard without an aerial connection which, incidentally, is via a co-axial socket and arranged for 75 ohms impedance.

In all the receiver can be recommended and represents good value for money at its price of £52.

Teenage Amateurs

ALBERT DAVIS of Gillingham, Kent, who received his licence on his 14th birthday (January 5, 1958,) operates under the call-sign G3MGL and is a 25 w.p.m. c.w. lad. His mother is G3MER and his father hopes to be licensed shortly.

Another young licensee is K. J. Easty (G3LVP), also aged 14, who did duty on the Society's stand at the 1957 School-boys' Own Exhibition and helps to run the radio society at Aldersbrook County Secondary School, Wanstead, London, E.12. Lawrence Franklin (G3LWF) of Bath received his licence four days after his 16th birthday in August 1957. How many other teenage amateurs are there in the United Kingdom?

Jamboree-on-the-Air

AT an international gathering of radio amateurs at the Sutton Coldfield Boy Scouts Jubilee Jamboree in 1957 it was suggested that an annual event for amateurs interested in the Scout Movement should be held. The first such Jamboree-on-the-Air, as it is called, will take place on May 10 and 11, 1958. Further details may be obtained from the Honorary Organizer, The Boy Scout International Jamboree-on-the-Air, 965 Oxford Road, Tilehurst-on-Thames, Reading, Berks.

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