A Crystal Filter for the R1155 Receiver

By G. B. HORSFALL (G3GKG)*

IN view of the congested state of the amateur bands, especially the C.W. sections, a crystal filter is a desirable, if not an essential, feature for any communications receiver. The R1155—probably the most widely used of all "surplus" receivers—does not possess any such refinement and few amateurs seem to have given much thought to fitting one, although many less useful modifications are carried out almost as part of the instalment programme. Although the filter circuit shown in Fig. 1 is by no means original, it has been adapted to suit the particular requirements of the R1155, and gives a very worthwhile improvement in selectivity.

Modifications

It is unlikely that a suitable crystal for the non-standard I.F. of 560 kc/s. will be immediately available. However, 500 kc/s. crystals are in plentiful supply from such sources as the dinghy transmitter type T1333 ; these can be easily ground to approximately 560 kc/s. with the aid of fine carborundum powder. Crystal grinding technique is well known, and the newcomer will find that low-frequency crystals are easier to handle than high-frequency ones.

The second I.F. transformer requires modification and should be removed from the receiver for this purpose, careful note having been made of all connections to it. On removing the screening can, all the associated components will be found mounted on the paxolin panel. The secondary coil and former are removed together with the fixed trimming capacitor, and the 2 $\mu\mu$F. coupling capacitor. To form an I.F. transformer of more orthodox design, a Litz-wound coil of approximately double the inductance of the primary should be mounted on the same former, spaced a fraction of an inch from the primary and sealed in place with a few spots of coil dope. A suitable inductance can usually be obtained from an old R.F. choke. Two 100 $\mu\mu$F. mica capacitors, C3 and C4, are fixed to the paxolin panel, all wiring completed inside the can, and the three output connections brought out to the tags at the bottom of the panel. The complete assembly is then remounted in the set.

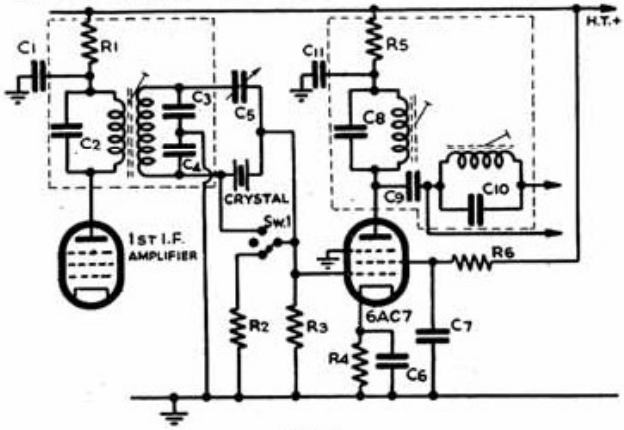

Fig. 1.
Crystal filter for the R1155.

Component Values:

C1*, C6, C7*, C11*	0.1 μF.
C2*, C10*	300 $\mu\mu$F.
C3, C4	100 $\mu\mu$F. mica.
C5	15 $\mu\mu$F. midget variable, air-spaced
C8*	600 $\mu\mu$F.
C9*	4 $\mu\mu$F.
R1*, R5*	2,200 ohms.
R2	150,000 ohms., ¼-watt.
R3	2 megohms ¼-watt
R4	330 ohms., ¼-watt.
R6	56,000 ohms., ½-watt.
Sw1	Single pole, three-way, midget Yaxley.
Crystal	560 kc/s. (see text).

* Indicates components employed in the original circuit.

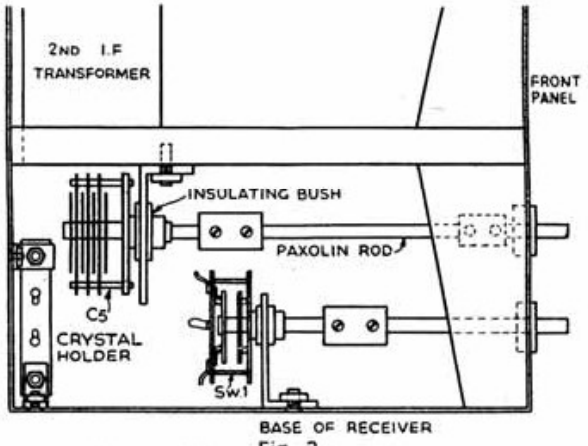

Fig. 2.
Suggested layout of main components.

The layout of the more important additional components is shown in Fig. 2. The crystal socket is mounted at the rear of the chassis directly below the second I.F. transformer on one of the supporting bands, which pass underneath the receiver chassis. By the side of the crystal is a bracket carrying C5, the 15 $\mu\mu$F. air-spaced phasing capacitor, which must be completely insulated from the chassis. A paxolin extension spindle, coupled to the capacitor by means of a flexible coupler, is brought out to a control on the front panel. The control switch, Sw. 1, is mounted just in front of the phasing capacitor, on a bracket fixed to the horizontal section of the supporting band. The extension spindle should be brought through a bush in the front panel using the mounting hole originally occupied by the B.F.O. switch, which is transferred to a position above the chassis. Incidentally, all screws used for mounting components on the supporting band should be countersunk to prevent difficulty in removing the set from its cabinet.

In order to keep the grid leads as short as possible the second I.F. amplifier valve is replaced by a 6AC7 which has all electrodes brought out to the base: this stage should then be rewired. cutting out the A.V.C. and using instead fixed cathode bias. Normal wiring precautions for an R.F. stage should be observed, *i.e.*, all leads kept short and rigid, etc. All I.F. circuits are then realigned to peak at the resonant frequency of the crystal. The centre position of the switch, Sw. 1, gives an intermediate degree of selectivity which will be found useful for reading telephony signals through heavy interference.

After the filter had been aligned and was functioning correctly, a need arose for something better than the original slow-motion tuning drive.

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* *Oaklands House, Stamford Road, Lees, nr. Oldham, Lancs.*

(4) Use of one paraboloid for different frequencies.

Plotting a Parabola

The curve a projectile describes in vacuo is termed a parabola, and in the world of plane co-ordinate geometry this is defined as "the path taken by a point moving in one plane, so that its distance from a given point, called the *focus*, is the same as its distance from a line called the *directrix*." If this curve is rotated round its own axis, a paraboloid is obtained, which is the shape of the reflector being sought.

For those to whom plane co-ordinate geometry holds no terrors, the plotting of the curve of a parabola will be a simple matter. All the information required is given by the equation $y^2=4ax$, x and y being the co-ordinates and a the distance of the *focus* from the *vertex* or origin of the curve. Values of a and x are taken in convenient units of inches or centimetres, the square-root of the product in the equation giving the value of y in the same units.

Fig. 1 shows a paraboloid derived from this equation with the *vertex*, *directrix* and *focus* indicated.

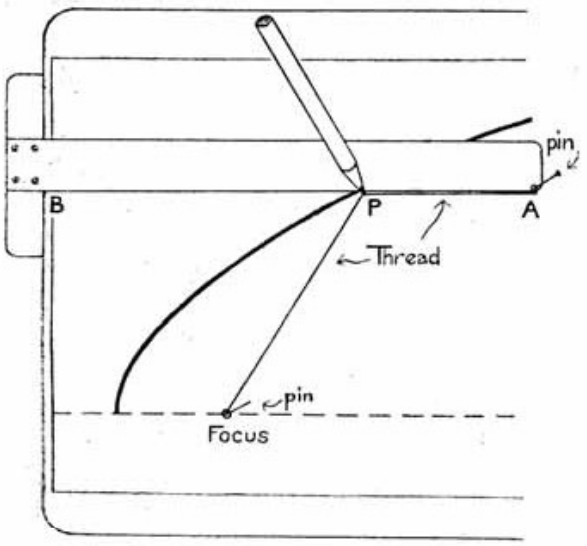

Fig. 2
Tracing a paraboloid section in the manner described in the text.

An alternative method of tracing a parabola, which involves no mathematical calculations, is illustrated in Fig. 2. The only equipment required is a drawing-board, paper, a length of thread, a T-square and some pins.

Having fixed the paper in position, place the T-square on the board, and insert a pin at the point A, as shown. Tie a thread to the pin, making the length of the thread AB. Now insert another pin in the drawing-board at a convenient point for the *focus*, and fasten the loose end of the thread to it.

With a sharp pencil take up the slack in the thread against the edge of the T-square, in the manner illustrated, then move the T-square up and down against the edge of the drawing-board, keeping the thread taut all the time by means of the pencil point. It will be found that with a little practice a perfect parabola can be traced without difficulty.

* * *

The next article will describe the construction of a paraboloid suitable for one of the V.H.F. or U.H.F. amateur bands.

London Members' Luncheon Club

THERE was an attendance of nineteen at the March meeting of the Club when Stanley Vanstone, G2AYC, taking the Chair for the first time, thanked Members for electing him to that office.

Specially welcome was Oscar Sandoz, VE1QZ, from Nova Scotia, who spoke briefly on V.H.F. matters. In his view the high standard of V.H.F. attainment in the U.K. is not given the publicity due to those who practice the art.

The Chairman then, on behalf of members of the Club, presented a leather handbag to Miss May Gadsden in recognition of her completing 21 years' service with the Society. Miss Gadsden made a suitable reply.

Annual Accounts for the year ended February 28, 1951, were submitted by the Hon. Treasurer and adopted. The meeting agreed to discontinue the existing annual subscription and to substitute a levy of 6d. per meeting.

With the coming of summer Club members hope to welcome many visitors from overseas and from the Provinces. Meetings are scheduled to take place on April 20, May 18, June 15, July 20, August 17. A telephone call to R.S.G.B. H.Q.s or to the Hon. Secretary (Ruislip 2763) is all that is necessary. G2FUX

Danish Summer Camp

DENMARK'S Amateur Radio organisation—E.D.R.—announce that their summer camp will be held this year at Korsør. Attractions will include excursions, a hidden transmitter hunt, and the usual short-wave activities.

Although guests are invited to bring their own tents, a few rooms will be available by advance booking. Board prices are D.kr. 9.00 per day for adults and half price for children. The camp will be held from July 8 to 22.

Inquiries should be addressed to the Chief of Camp, Paul Heinemann, OZ4H, Vanloese-Copenhagen, 100 Vanloese Alle, Denmark.

B.E.R.U. 1951

THE 1951 B.E.R.U. contest was supported quite as well as last year, although conditions were markedly different. Operations have moved to lower frequencies, 28 Mc/s. being hardly open except for a few African contacts. It was good fun and like old times to find 7 Mc/s. full of ZL, VK, African, and Far East signals, and great battles were fought on this band—especially when a Russian contest turned up and we had to split the band in half!

From all directions came reports of very poor conditions for the 'phone section. In the first C.W. weekend there was Aurora in Canada and a curtain across the Atlantic. On the last weekend there was an improvement, and the Canadians were able to step out on 3.5 and 7 Mc/s.

G6CJ

CRYSTAL FILTER FOR R1155

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For this reason two of the vernier drives, as used on the popular RF26 and RF27 units, were fitted in a series combination to provide a reduction of either 40:1 or 1600:1 without backlash, which was the main objection to the original drive. Since the filter was fitted C.W. working has become much more pleasant and many enjoyable contacts have been made with stations which would otherwise have been completely unreadable.