The SHORT WAVE Magazine

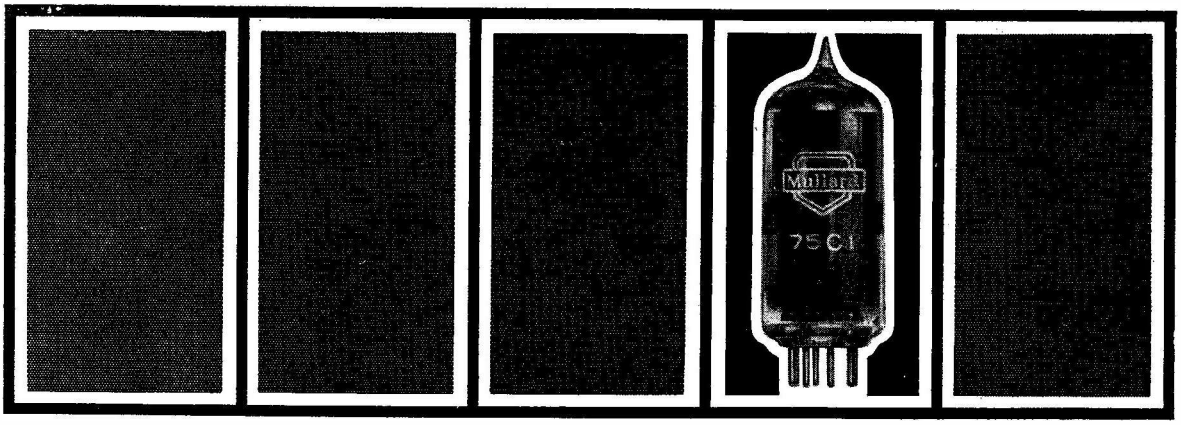
2/6

VOL. XIV DECEMBER, 1956 NUMBER 10

WORLD WIDE COMMUNICATION

High Stability plus Low Regulation Voltage

STABILISER 75C1



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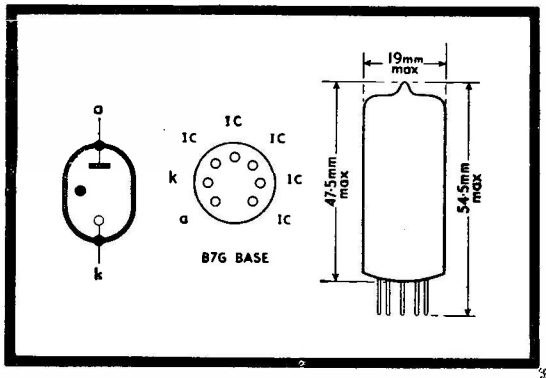

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SHORT WAVE MAGAZINE

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AUTHORS' MSS

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT WAVE Magazine

Christmas

As the 12th Christmas after the last great war approaches, our country once again faces a situation of great danger. Unnamed fears are in the minds of all those who have a mature recollection of the 1939 period—those, perhaps, who are now about 38 years of age, and older. The season of "peace and goodwill" sounds as a mockery while the leaders of the Western nations, charged with great and urgent responsibilities, strive to arrest and divert the course of events.

As individuals, whatever we may think, there is nothing we can do about any of this—we can only carry on with our work, whatever it may be, in the hope and with the belief that in the end, all will turn out well. While facing a dolorous prospect, there is no need to be gloomy or full of woe. As a nation we shall, as so often before, adapt ourselves to whatever may have to be faced—and, as always, win in the end.

Christmas is coming. It is the season of good cheer and goodwill among friends, if not among nations. So once again it is our privilege and our pleasure to send Season's Greetings to all our readers at home, in the Commonwealth, and among those nations who stand with us.

From the Managing Editor and Staff

SHORT WAVE MAGAZINE

A Franklin VFO Unit

CIRCUIT AND CONSTRUCTION

P. LUMB (G3IRM)

One of the earliest circuit designs for high oscillator stability, the Franklin should not be overlooked as a VFO for amateur band operation. All users of the Franklin are unanimous as regards its simplicity, ease of construction and adjustment, and inherently stable output characteristic. The secret of success is to keep the feed-back capacities as low as possible. With good, solid construction, the result should be a VFO box capable of producing stable drive and a T9x note under all normal conditions.—Editor.

AN analysis of the types of oscillator used by various stations worked by G3IRM reveals that the Clapp is by far the most popular, with the crystal oscillator coming second. At the bottom of the list, included in a "Miscellaneous 5%" item, is the Franklin oscillator. Of the stations worked which gave the type of circuit used only a very few admitted to the Franklin—why, it is impossible to say. A few notes on this circuit are therefore offered, and these will be followed by a description of the actual miniaturised Franklin unit used by the writer. The circuit discussion is included for the information of those not wishing to follow the actual method of construction adopted.

The Franklin oscillator consists of two resistance-coupled valves which can be triodes, pentodes, pentodes strapped as triodes, or even a double-triode of the 6SN7 or 12AT7 variety. In this particular version of the circuit, the use of two valves may seem extravagant, but very few other components are needed. The phase of the voltage at the anode of the second valve is the same as that at the grid of the first and so conditions are ideal for positive feedback. Very little coupling is needed and the tuned circuit determines the frequency of oscillation. The buffer stage which follows is coupled to the second grid and so variations in loading are isolated from the tuned circuit by the two oscillator valves. The following ten points should be born in mind when designing a Franklin oscillator.

(1) The effect of valve changes and changes in feed voltages is very slight due to the light coupling to the tuned circuit; valves can be changed and supply voltages varied widely with very little effect on the generated frequency. As a result voltage stabilization is unnecessary, but may be added if desired.

(2) Still further to reduce the effect of what valve changes there may be, miniature types can be used, so that any change in inter-electrode capacities is small. 9002 type valves are ideal for the oscillators but 6C4's can be substituted though they draw more current, are more liable to hum effect and do not produce any better results.

(3) The grid leak of V1 should be high to reduce damping of the tuned circuit and a

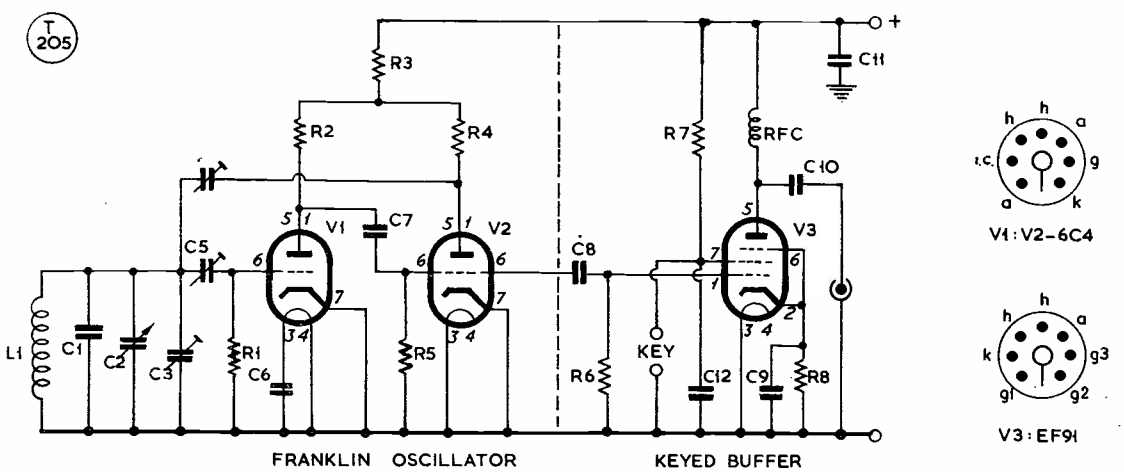
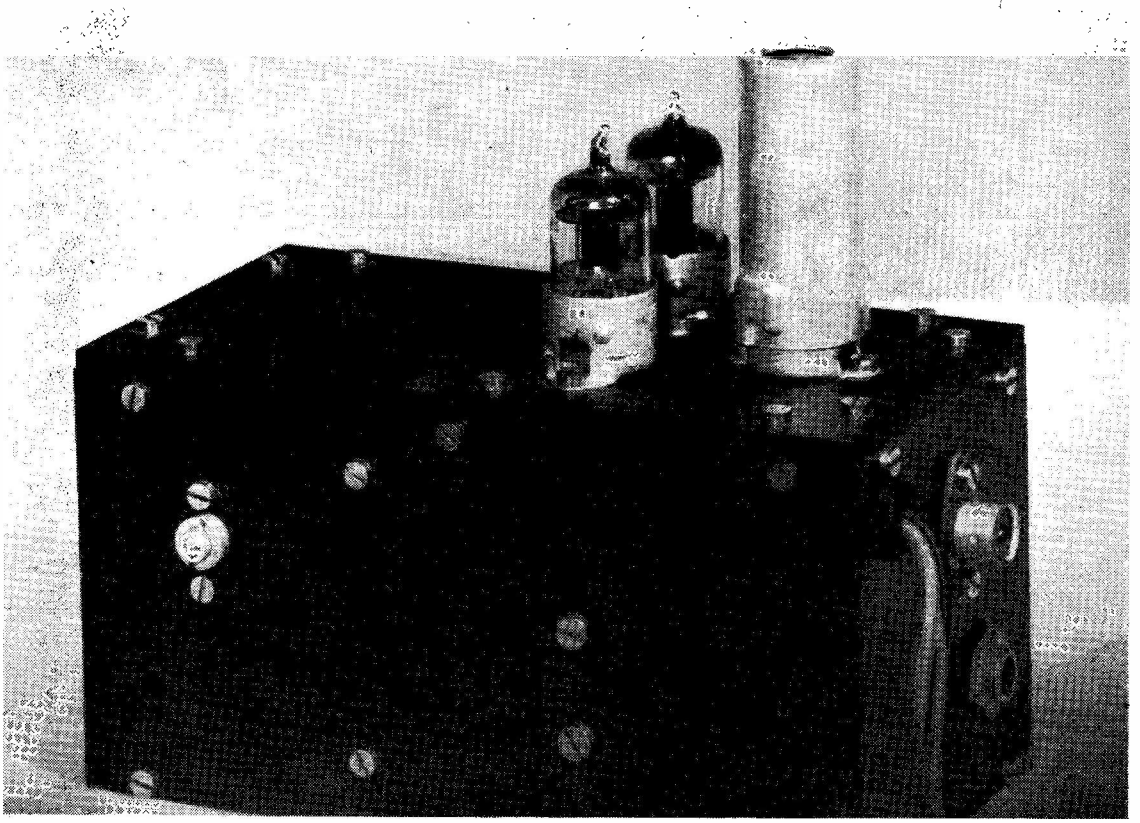


Fig. 1. Circuit of the Franklin VFO-buffer, as described by G3IRM. Miniature valves can be used and a feature of this oscillator is its high stability under wide variations in HT feed, and even valve changes. This is because the tuned circuit, L1, C2 is very lightly coupled through C4, C5. The performance of the Franklin oscillator depends almost entirely upon the mechanical stability of the tuned circuit. In the particular arrangement described here, V3 is a keyed buffer.



General appearance of the Franklin VFO-Buffer unit designed and constructed by G3IRM. The oscillator valves are 9002's, but could be 6C4's, and the canned stage (for which an EF91 is used) is the keyed buffer. The pre-set trimmer C3 is at left-hand front and the output socket and key jack at the right end. The main tuning control (not visible) is on the left front. For the model a very solid form of construction has been adopted; it could be varied to suit individual requirements.

value of not less than 1 megohm is suggested. This is a good rule to follow where any tuned circuit is shunted by a grid leak if it is desired to maintain a high Q-factor.

(4) The two coupling condensers C4, C5 to the tuned circuit must be as low in value as possible and should not be above 2 $\mu\mu$F each. The lower these capacities can be made, the better will be the stability obtained.

(5) Peaking RF chokes should *not* be introduced into the anode circuits as these may introduce undesirable phase differences.

(6) Due to the low degree of coupling to the tuned circuit, the Q-factor remains fairly high; although it is desirable to use a good high-Q circuit, circuits of lower Q can be employed. As a matter of interest, a crystal (and a "difficult" one at that) can be substituted for the tuned circuit and oscillation will be maintained.

(7) Although the circuit will operate up to at least the 40-metre band it is better to use a fundamental frequency of below 4 mc to get the best results. The actual oscillator to be described covers 1.75 to 1.9 mc which can be multiplied into the other amateur bands. The usual formulæ can be used to obtain different coverages.

(8) If the oscillator valves are selected with care for good heater/cathode insulation and the tuned circuit coupling reduced to the

Table of Values

Circuit of the Franklin-Buffer VFO Unit.

C1	= 200 $\mu\mu$F ± 1%	R5	= 470,000 ohms
C2	= 50 $\mu\mu$F double-ended variable	R6	= 470,000 ohms
		R7	= 50,000 ohms, 3 w.
C3	= 25 $\mu\mu$F preset air-spaced	R8	= 140 ohms
		V1	= 9002 or 6C4
C4	= Less than 2 $\mu\mu$F preset (*see text*)	V2	= 9002 or 6C4
		V3	= 6F12, EF91, 6AM6, etc.
C5	= Less than 2 $\mu\mu$F preset (*see text*)		
		L1	= Approximately 46 turns 28 DSC, ¾in. diameter, well doped with polystyrene varnish and close wound. Adjust number of turns for correct coverage.
C6	= .001 μF		
C7	= 100 $\mu\mu$F		
C8	= 100 $\mu\mu$F		
C9	= .0015 μF		
C10	= 100 $\mu\mu$F		
C11, C12	= .001 μF		
R1	= 1.5 megohm		
R2	= 10,000 ohms 2 w.		
R3	= 5,000 ohms, 5 w.		
R4	= 10,000 ohms, 2 w.		

minimum which will give level output over the desired band, a pure T9x note is guaranteed on all bands using the normal smoothing arrangements. An anode voltage of 170v. is ample, and in the writer's VFO smoothing consists of 32 plus 100 μF and a 20H choke, but this is not actually needed. The additional cost of larger condensers is so small that 132 μF of smoothing is not amiss.

(9) If the tuned circuit is well screened, break-in (BK) operation can be obtained by keying the buffer stage and allowing the oscillator valves to draw current all the time.

(10) The buffer stage should operate with no grid current; a small RF pentode is ideal for this position.

Stability

In order to obtain some idea of the stability of the oscillator as built and illustrated here, the station receiver was switched on and allowed to warm up to normal operating condition for half-an-hour. (This receiver includes a crystal calibrator producing pips every 500 kc. At the end of the warm-up period the oscillator was switched on and very quickly tuned so that its second harmonic produced zero-beat with the 3·5 mc harmonic of the crystal. From then on no variation could be heard over a period of *two hours*—not even did an occasional rumbling (showing signs of drift) make itself heard. This without voltage stabilization or temperature compensating condensers should say enough for the stability of the Franklin. Even on the 10-metre harmonic only the slightest variation could be detected—not more than 25 to 30 c.p.s.

Construction

Absolute mechanical rigidity is a feature of this design. It is possible to thump the table on which the oscillator stands hard enough to make the whole unit jump into the air without producing any change in beat note. For this test the oscillator tuning condenser was locked in position—when a slow-motion dial is fitted the condenser is unlikely to move under any normal vibration effect.

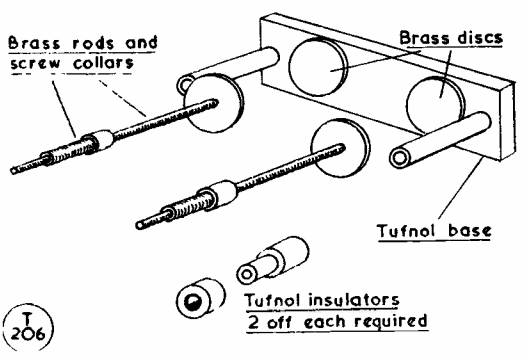


Fig. 2. Detail for the construction of the feed-back condensers C4, C5, as adopted by G3IRM. Other ways of doing it would be just as good, provided a really small adjustable capacity can be achieved, with absolute rigidity.

The cabinet-*cum*-chassis is made entirely from 3-in. x $\frac{1}{8}$-in. mild steel flats, with $\frac{1}{4}$-in. square brass along the edges—it is thus possible to remove one side, one end or the top simply by unscrewing the bolts holding that piece in position. Bolts are 6BA and the brass bars are tapped to take them. The top plate measures 6-in. x 3-in., each side is also 6-in. x 3-in. and the ends are 3-in. x $2\frac{3}{4}$-in, so that it is only necessary to cut off lengths of metal and true two sides of each. The two ends fit into the side plates, making a total width of 3-in. of metal to match the top, which is bolted on to all other pieces. A screen made of the same material is bolted across the chassis, being held in position by two $\frac{1}{4}$-in. square brass bars fastened to the sides. The correct position for this screen depends on the length of the coil former. That used by the writer is a piece of ebonite rod 2-in. long. The ends of this should be trued, drilled and tapped 6BA at each end and placed between the front panel (one end) and the screen. Holes drilled in the front and screen to mate with those tapped in the former hold the latter in position. If possible, the former should be as near the centre of the front as possible, but in some cases it may be found impossible to do this due to the size of the tuning condenser.

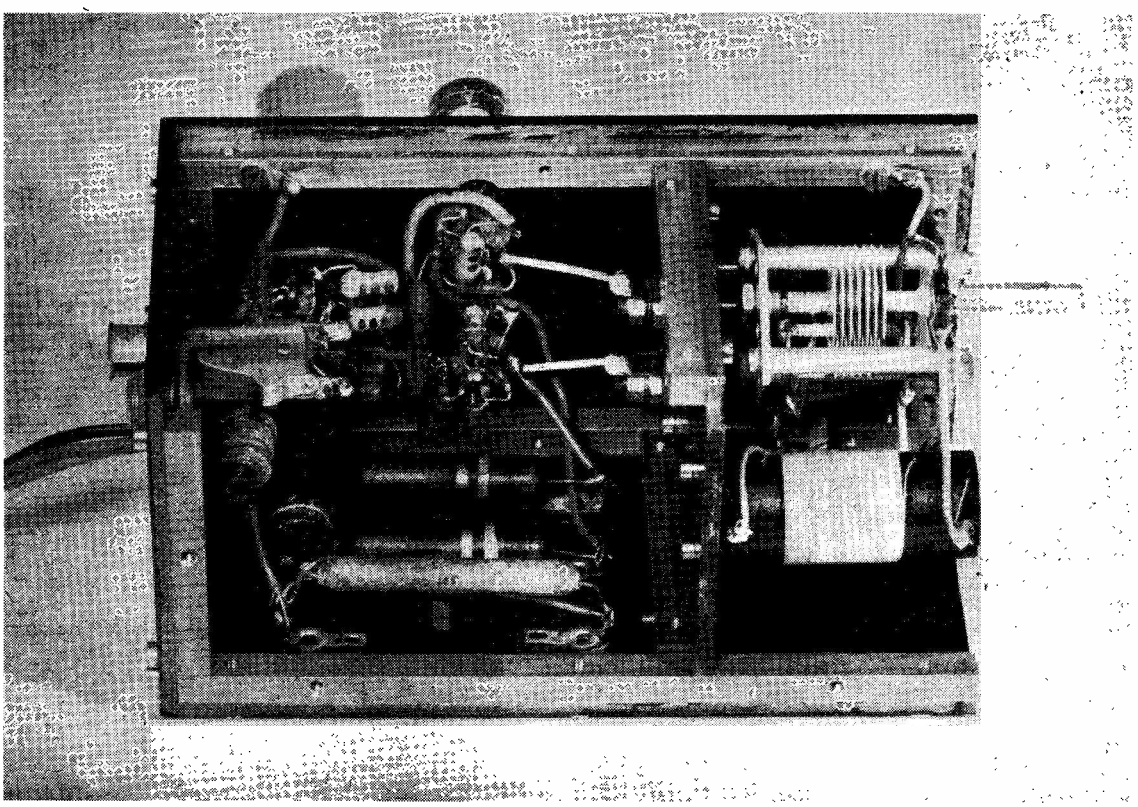
If the coil is too near the sides or the metal cover plate on the bottom the degree of coupling to the tuned circuit will have to be increased, which is a most undesirable state of affairs. The tuning capacity, C2, is mounted as far into the top left-hand corner as possible and should be a miniature 50 $\mu\mu$F *double-bearing* type. The design with clover-leaved end plates secured by three bolts at the front is best. Mounted on the right-hand side is the band-setter 25 $\mu\mu$F capacity, C3 — again a miniature type, but this time with screwdriver adjustment and locking device. Also in the front compartment is the additional padding condenser, C1. It will thus be seen that with the bottom plate in position (not shown in the photographs), the tuned circuit components are completely isolated from all changes in temperature due to valves and resistors. The writer was quite prepared to provide heat insulation if this proved to be necessary, but

even with the unit mounted in a table-top type of transmitter cabinet no change in frequency with changes in temperature can be noticed.

Coupling Capacities

The coupling between the tuned circuit and the remainder of the oscillator is by means of the two coupling capacities, C4 and C5. Various methods can be used, such as concentrics, lemon type ceramics or the miniature neutralising types. From the point of view of rigidity (and this is essential) and convenience, the latter is the best, although the actual construction may present a few problems. The attached drawing is almost self-explanatory, but a few notes on how to tackle the job may prove helpful. Tufnol rod is turned and drilled to form the bushes which are a close fit in two holes drilled in the screen near the top. Tufnol washers complete the insulation on the other side. Through the washers pass two sockets of the type used for banana plugs with soldering tags fitted on the valve side of the screen. Each socket is tapped 6BA. The fixed plates of the condensers are held in position by two brass rods threaded 6BA internally and held to the screen by bolts. Across the rods is fitted a piece of paxolin on which the plates are mounted. Two discs of brass $\frac{3}{8}$-in. diameter are turned, drilled and countersunk; 6BA countersunk bolts pass through the discs and paxolin, and are held on the back by nuts. Solder should be run on both ends and then the two discs faced smooth with a file, or on a lathe faceplate. (Owners of lathes will soon appreciate how construction of this type is facilitated by the use of the lathe!) The two fixed plates are joined by a piece of 16 SWG tinned copper wire. The variable plates can be made a similar way, but must be provided with 6BA bolts for adjustment. Here again the best way is to turn the ends of pieces of screwed rod to a nice diameter to fit holes in the centre of the discs, soldered, and then faced flat and true with the threaded rod. Screwdriver slots should be cut in the ends of the rods and locking nuts provided.

The foregoing is the way the writer made



Neat and rigid construction inside G3IRM's version of the Franklin VFO. The tuned circuit L1, C2 is in the screened-off compartment on the right, the small feed-back capacities C4, C5 being fitted on the bulk-head. For the utmost rigidity, light steel sheet is used, held by square-section brass bars. This calls for accuracy in drilling and squaring off; the use of a die-cast aluminium box would make construction a good deal easier.

these condensers—other methods will suggest themselves to readers, the object being to get a small, adjustable but rigid fitting.

No components are mounted on the left-hand side of the cabinet so that all wiring can be completed and remain accessible when the oscillator is finished. The two 9002 valves are placed side by side and so arranged that the grid of V1 and the anode of V2 face the soldering tags on the two coupling condensers. This wiring is again carried out with 16 SWG tinned copper wire. Skirted holders are advisable for the oscillator valves and a full screen for the buffer. Miniature components must be used and mounted as close to the valve holders as possible ; a miniature soldering iron is essential for neatness. The three large resistors are mounted on a tag board on the side of the chassis and all other components are held by their own wires. The power leads leave through a hole in the rear and no decoupling was found to be necessary.

The anode load for the pentode buffer stage is an RF choke, and the output from the unit is taken to a co-axial socket on the back panel. Keying can be carried out in any of the usual ways, but the best method has been found to be by earthing the buffer screen, using the back contacts on the key. No click filters or other additions are necessary and no variation with keying can be found even on the 10-metre band. The keying jack is also mounted on the rear panel.

The writer is satisfied that the Franklin oscillator, constructed as described here, can hold its own with all " these new-fangled contraptions," and is certainly simpler to build and adjust than most others. The only adjustment needed on completion is to reduce the two coupling capacities, C4, C5, to the *lowest* values which will maintain oscillation and level output over the band. Components fit together conveniently and the use of a lot of tag strips (as are necessary with such oscillators as the Clapp) is completely avoided ; this all helps to maintain the stability which is absolutely necessary with all variable frequency oscillators.

BEAR IT IN MIND

That we welcome new writers on Amateur Radio subjects—but do read p.432 of the October 1955 issue of SHORT WAVE MAGAZINE before committing anything to paper ; it will help you as much as it helps us if you follow those notes. All material we publish is paid for at good rates.

That we are always glad to see photographs and short items of Amateur Radio interest for possible publication in SHORT WAVE MAGAZINE. Anything we are able to use is paid for immediately on appearance.

That we can accept subscriptions, and subscription renewals, in sterling not only for American periodicals like *CQ*, *QST*, *Radio Electronics* and *Audio*, but also for any other American scientific or technical journal, on any subject. ARRL membership renewals, which are really continuations of *QST* subscriptions, should also be made through us.

That you get all the information you need about the DX Zone system from our *DX Zone Map*, which shows not only the boundaries of the 40 Zones, but also the main prefixes in each Zone area. The *DX Zone Map* is a very handsome pin-up and costs only 3s. 9d. post free (immediate delivery from stock).

OLD TIMER ACTIVITY

We were very interested to have a note from G3IDG—who devotes much attention to research into Amateur Radio history and statistics—showing that there are still no less than 33 holders of present G calls who were first licensed before the *Kaiser's* war! It is not known whether they are all actually on the air, but certainly they hold current licences, and from the callsigns we know that some at least remain fully operational. The youngest of this fine company of OT's goes back 42 years, and the oldest 52 years. Of the 33 we have, from G3IDG's painstaking researches, the pre-1914 callsigns of 23 of them. If any of those concerned who may chance to see this note would care to step forward, we shall be delighted to hear from them, with some details of their activities and interests over the years.

A.W.R.S. ON ACTIVE SERVICE

During the recent emergency, several members of the Army Wireless Reserve Squadron (which consists mainly of licensed amateurs) were called up for service. A special-duty Squadron, commanded by Major D. W. Haylock (G3ADZ) was formed, other members of which were Capt. A. D. Taylor (G8PG), Capt. D. H. MacLean (G3DNQ), SQMS Bailey (G3BNW), NCO's G3KLX, G3FQN, G3HWB and Foreman of Signals Houghton (G3AMO). One member of the Squadron—which has been attached to Southern Command—reported for duty with his arm in plaster. He managed to elude the medicos long enough to stay with the boys for over a week before being found out and sent home. The Army Wireless Reserve Squadron has now formed the A.W.R. Amateur Radio Society, of which G8PG is chairman.

THE NEW G.E.C. KT88

In the illustration on p.489 of our November issue, the new G.E.C. type KT88 should have been identified as the valve on the *right*. It is of considerable interest in view of its high power-handling capacity.

Simple Linear Amplifier

RF UNIT USING 807's

S. J. LLOYD (VK3AST)

Till the advent of SSB, the linear RF amplifier had been much neglected in amateur circles. Its main disadvantages are that it is power-wasteful and a relatively high plate dissipation is involved. On the other hand, as our contributor shows, the Linear PA is a very convenient, cheap and easy way of getting modulated RF output at high carrier input from a low-power modulating source. A small telephony transmitter can be used as exciter, the drive applied to the linear amplifier being modulated RF. In the design discussed here, an output power gain of 10 : 1 can be expected. The unit as described would also be suitable as the final stage in an SSB transmitter.
—Editor.

THE Linear Power Amplifier has recently become familiar in amateur circles in connection with SSB transmission; its use to follow a low-level amplitude modulated stage has, however, been rather neglected, although it offers some advantages. The system can be made very simple, and is as effective as any other form of efficiency modulation, the advantages of which it shares. Harmonic generation is greatly reduced, which alone would be enough to justify a slight drop in final PA efficiency. A self-contained linear RF amplifier becomes an easy way to boost the output of any small AM transmitter without internal modification. The unit described here will amplify—in the RF output sense—a low power signal by ten times, to a maximum of 60 watts for AM or 120 watts for CW and NBFM.

Circuit

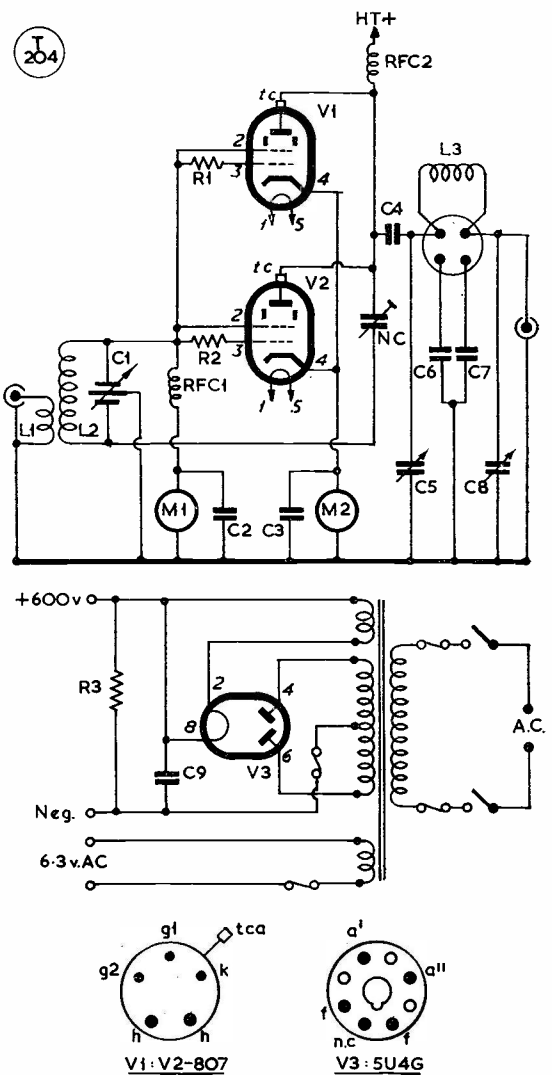
Two 807's are connected in parallel as triodes in zero-bias Class-B, thus avoiding the need for screen and bias supplies. A pi-section tank circuit is used for output coupling, in accordance with the present practice for harmonic suppression. Neutralisation is effected through a balanced grid circuit, and the RF drive input is link coupled *via* 72-ohm coaxial cable. The output connection to the aerial coupler is also taken through 72-ohm coaxial cable; the constants of the pi-circuit are calculated to match into impedances of this order only.

Power supply is derived from a 600-0-600 volt transformer and 5U4G rectifier. A 12 μF condenser is all the smoothing needed;

Table of Values

Circuit of the Linear RF Amplifier

C1	= 100 $\mu\mu$F per section, split stator	R3	= 50,000 ohms, 10w.
C2, C3	= .001 μF	NC	= *See text*
C4	= 400 $\mu\mu$F	RFC1	= Rx type
C5	= 180 $\mu\mu$F max.	RFC2	= Tx type
C6	= 100 $\mu\mu$F	M1	= 0-10 mA
C7	= 150 $\mu\mu$F	M2	= 0-300 mA
C8	= 700 $\mu\mu$F max. (Rx two-gang type)	V1, V2	= 807
C9	= 12 μF, 1000v. wkg.	V3	= 5U4G
1, RR2	= 22,000 ohms, ½w.	T1	= 600-0-600v. 200 mA. 5v. 2 A., 6.3v. 3A.



A pair of triode-connected 807's in parallel form this neutralised linear PA stage, which will give a ten-times boost to a modulated low-power stage, used as exciter, running 6-12 watts input on phone. The HT need only be condenser smoothed for hum-free operation.

omission of a choke improves regulation on speech transients, and introduces no noticeable hum because the amplifier is not itself modulated.

Construction

As a trial circuit, the original version was built on a temporary plywood and hardboard chassis, and gave no trouble. However, it is advisable to construct it as a screened unit, because although the amplifier itself generates no harmonics, it will amplify any that are present in the output of the exciter. Internal screening should not be necessary so long as the layout is arranged to prevent stray capacities from affecting with neutralisation.

The neutralising condenser NC consists of two discs $\frac{3}{8}$-inch diameter, mounted with a screw adjustment to allow a maximum spacing of $\frac{1}{8}$-inch. The grid and anode coils are wound on $1\frac{1}{2}$-inch diameter four-pin plug-in formers: winding data for 3·5 and 7 mc coils are given

COIL WINDING DATA

	L1	L2	L3
3.5 mc.	3 turns	40 μH 36 t. @ 32 t.p.i.	10 μH 20 t. @ 15 t.p.i.
7 mc.	1 turn	18 μH 28 t. @ 16 t.p.i.	4.5 μH 14 t. @ 8 t.p.i.

in the accompanying table. Heavy gauge wire should be used for L3. On 3·5 mc, supplementary capacities C6 and C7 are connected in parallel with C5 and C8 respectively, by shorting links in the coil former. The parallel-feed RF choke is a standard Eddystone transmitting type, and has not given any trouble. Voltage rating of components in the anode circuit should be sufficient for $1\frac{1}{2}$ times the DC anode voltage.

Adjustment

Preliminary neutralisation is carried out with HT off and drive on, by observing grid-current flicker as C5 is tuned through resonance. Final setting of the neutralising condenser can be carried out with HT and drive on, but no load ; the anode current should rise symmetrically on each side of the dip at resonance. When making this adjustment the drive must only be applied for a *short* time, as the permissible dissipation of the valves may be exceeded in the absence of a load. The standing anode current, with HT on but no drive, should now be less than 40 mA, and should not vary as C1 or C5 is rotated.

To tune the amplifier, insert the appropriate coils, connect the aerial coupler and drive, and resonate C1 for maximum grid current. Adjust the drive to about 4-5 mA, tune C5 to resonance, as shown by the anode current dip, then tighten the aerial coupling by means of C8 to the point of maximum output, maintaining resonance by C5. For CW or NBFM, increase the drive until 200 mA anode current is drawn, which will require 10-12 mA grid current. For AM, the steady anode current must be restricted to 100 mA, unless the drive is less than 100% modulated, when a proportionate increase is permissible. If the exciter is not capable of providing the full driving power needed, it is adjusted simply for the maximum obtainable PA grid current; the amplifier power output is always about ten times that of the exciter. Reducing power for local contacts is done by cutting down the drive until the anode current drops to the desired figure.

Performance

This amplifier has been used for some time to follow a modified Type A Mark III transmitter, and has proved a simple way to get increased output from a small rig. As amateurs in VK are restricted to 100 watts input, the linear PA is normally operated with 165 mA to the anodes and 10 mA to the grids ; the modulated exciter runs at about ten watts input. On 'phone, 50-60 watts input is easily obtained without distortion.

INSTRUMENT MERGER

We are informed that the firm of Victoria Instruments, Ltd., has joined the Pullin Group, well-known manufacturers of meters and test gear, of which another member is Donvin Instruments, Ltd.

SAGA OF THE "Magga Dan"

On the morning of November 15 the 2100-ton Danish motor-ship *Magga Dan* left London River to take the British South Polar Expedition to Shackleton Base in the Antarctic. When they get there, early in the New Year, they will find VP8BO, radio man with the advance party already at Shackleton, who has maintained contact with the outside world under very difficult conditions through the long Antarctic winter. Now, he has his R.A.F. T.1509 working with a rhombic, and is putting a good phone signal right into this country. In the consignment of stores being taken out for him by the *Magga Dan* is a parcel of books and periodicals supplied by SHORT WAVE MAGAZINE. It is of interest just to add that as we were similarly represented with the North Greenland Expedition, it can be said that SHORT WAVE MAGAZINE will have been seen in both Polar Regions.

More on the "ZL Special"

FURTHER DESIGN DATA & EASIER CONSTRUCTION

THIS is quite a widely-used, simplified beam system for the HF bands — and not so simple, either, when it is capable of a forward gain of 7 dB. At any rate, ideas and suggestions about the "ZL Special" keep coming in, and now we are indebted to ZL3CP for some further notes.

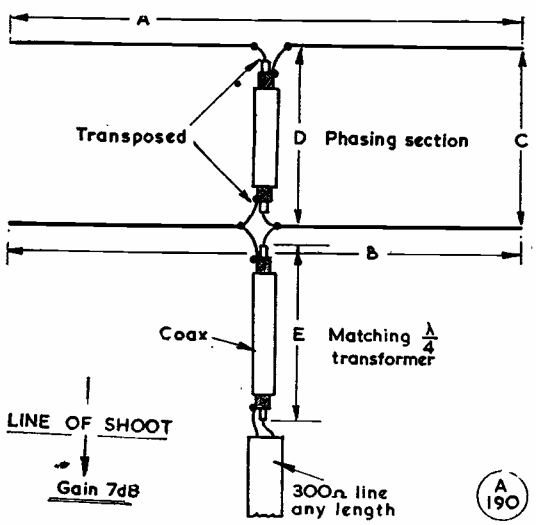
The origin of the "ZL Special" has always been in some doubt. It is evidently an amateur adaptation of a commercial design for a fully driven system—it is this that gives it its high gain factor. According to ZL3CP, it was ZL3MH who, in 1949, applied it to the 14 and 28 mc amateur bands, with outstanding results. Articles on the "ZL Special" appeared in the July, 1950, and August, 1956, issues of SHORT WAVE MAGAZINE.

We are now able to give the dimensions of an improved version of the "ZL Special" which has the great advantage of using single elements made of tubing, instead of folded dipoles contrived from wire or ribbon, thus considerably simplifying construction. For single elements using $\frac{3}{8}$-in. dural tube, the dimensions should be as given in the Table herewith; the layout of the beam is shown in the sketch.

It will be noted that the design is still further simplified by the use of coax for the "D" feed-line, with a coax $\frac{1}{4}$-wave transformer to match in 300-ohm line for the main feeder. The phasing line "D" must be made of a piece

TABLE OF DIMENSIONS

Formulae (*Worked in Feet*)	Band	
	14.1 mc	28.2 mc
A—492/Fmc x 0.95	33ft. 2ins.	16ft. 7 ins.
B—492/Fmc x 0.90	31ft. 5ins.	15ft. 8½ins.
C—984/Fmc x 0.1	7ft. 0ins.	3ft. 6 ins.
D—123/Fmc x 0.85 (*beaded coax*)	7ft. 5ins.	3ft. 8½ins.
E—246/Fmc x 0.85 (*beaded coax*)	14ft. 10ins.	7ft. 5 ins.
E—246/Fmc x 0.66 (*solid coax*)	11ft. 6ins.	5ft. 9 ins.



Layout of the "ZL Special" using single elements, which could be of 3/8-in. dural tube, as explained in the article. The feed impedance becomes 72 ohms, and the separation at the transposition points, between the ends of the elements, can be 3/4-in. It is necessary to use beaded coax for the transposition line (see text).

of *beaded* coax in order to get the right velocity factor, so that an eighth-wave section in physical length will span the tenth-wave spacing between the elements. The matching transformer "E" can be of beaded or solid coax, the dimension in the Table being quoted for either.

With tubing elements, the matching and therefore the attainable gain should hold over at least 100 kc either side of the frequency for which the beam is designed. On 10 metres, the dimensions are such as to permit a compact rotatable array to be constructed, as 8 foot (each side of centre) dural tubing only requires support along about half its length, *i.e.*, the whole thing could be put together on a wooden framework 8 ft. long by 3 ft. 6 ins. wide, using 2 in. by ½-in. timber, with three cross-pieces, and the four 8 ft. dural tubes mounted each on two or three stand-off insulators screwed to the wooden framework. Secured at the point of balance (which should be the centre of the middle cross-piece) mounted on the top of a 30 ft. pole, and with 100 watts input at the transmitter end, this beam would bring the DX back all right!

As ZL3CP says, why bother with a heavy, three or four element parasitic array—which would be at least twice the weight and might or might not be working properly—when the two-element "ZL Special" cut to the dimensions shown here will be found to give equal if not greater gain.

Treatments for Receiver Break-Through

SOLUTION FOR AERIAL PICKED-UP IF INTERFERENCE

A. D. TAYLOR (G8PG)

This article will be of practical interest to those encountering, perhaps for the first time, the annoying phenomenon of untunable signals breaking straight into the receiver. Our contributor shows that much can be done by the use of a well-constructed wavetrap, and also suggests other possible lines of investigation.—Editor.

BREAKTHROUGH on the IF side can be one of the most annoying troubles encountered in a communications receiver. It is the one form of signal interference which can appear over the whole of one or more tuning ranges, blanketing out weak signals, producing whistles and, in the case of broadcast breakthrough, causing speech or music background on the stronger signals. It is particularly annoying on CW signals, as even the weakest breakthrough will produce a continuous background heterodyne at all points on the dial. This article discusses briefly the causes of such interference and explains how a cheap and simple cure was found in a difficult case.

Causes and Sources of IF Breakthrough

Breakthrough on IF can be traced to two causes. It is produced either by direct pick-up in the receiver wiring associated with the IF stages, or by a strong signal at the intermediate frequency being picked up by the receiving aerial and then making its way through the RF and frequency changer stages. In the latter case the interfering signal will be greatly attenuated by the RF and frequency changer tuned circuits—but with a sensitive receiver only a very small signal at the grid of the first IF amplifier valve will produce an unbearable level of interference due to the high gain inherent in the IF stages themselves.

Actual sources of interference depend upon the intermediate frequency employed in the receiver and generally fall into two categories—breakthrough from ship-to-shore W/T stations, and from broadcasting stations. As examples, receivers employing an IF in the 450-470 kc range are liable to suffer from coast station or ship W/T breakthrough when used in coastal districts. British ex-Service receivers, such as the R1155, which have a 560 kc IF, are very prone to interference from the Athlone broadcasting station. Receivers with an IF in the range 1400-1650 kc are susceptible to interference from a number of British or Continental broadcasting stations.

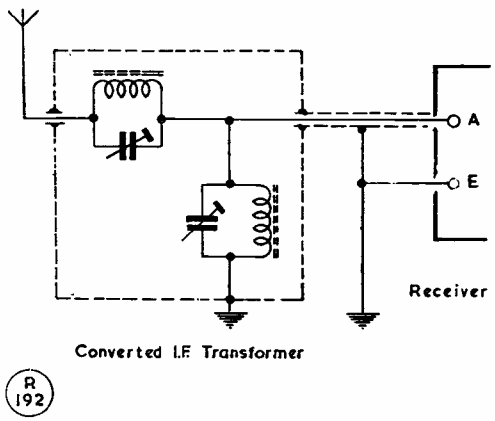
Where IF breakthrough is due to a signal picked up *via* the aerial, it will normally be found that the nearer the signal frequency circuits are tuned to the intermediate frequency, the worse will be the interference, *e.g.*, in a receiver using a 1600 kc IF, interference due to breakthrough from a 1600 kc broadcast signal may be negligible when the receiver is tuned to 7 mc, but over-powering when trying to listen on 1.8 mc. This is, of course, inevitable from the response curve of the receiver's signal-frequency tuned circuits.

Tracing and Curing the Interference

It is first essential to establish whether any of the interference is caused by direct pick-up in the receiver wiring. See that all normal screening is in place, switch the receiver to the wave-range on which the worst level of interference is experienced, remove the aerial and cover the aerial terminal with an earthed screening can. Then turn the RF gain control up to maximum and switch on the BFO.

In nine cases out of ten, it will be found that the interference disappears, indicating that the interfering signal is being received *via* the aerial. Where the signal is still audible, either at the same or reduced volume, the cause is direct IF pick-up, due either to poor screening and/or layout, or by an exceptionally powerful interfering signal.

While interference of this type is common in cheap broadcast or television receivers, it should rarely be met with in a communications receiver. The cure lies in reducing the FC and IF valve grid and anode leads to a minimum length and screening them, seeing that the screening of the IF transformers is adequate and, if necessary, placing a screening plate over the bottom of the receiver. At the same time ensure that the spindles of any front panel controls—associated with IF circuit-crystal phasing condensers, mechanical selectivity controls, and so forth—are thoroughly bonded to earth, as any pick-up on such metal objects may add to the interference level. Should all these precautions fail due to the high field



G8PG has found that this arrangement helps to prevent, if not to eliminate entirely, signals breaking through on the receiver. The screened lead should be kept as short as possible, and all screening must be carefully tied to earth, as indicated.

strength of the interfering signal, the only answer is to move the IF tuning 10 kc or so and then re-align the receiver. Before any attempt is made to do this, however, it is essential that the vicinity of the intermediate frequency be monitored, both during the day and at night, to ensure that there is a quiet spot to which the circuits can be retuned.

The foregoing describes the worst possible case of IF breakthrough. In most instances it will be found that, when the aerial is removed, the interference disappears, indicating direct breakthrough from the aerial circuit. The writer recently met such a case when converting a BC-454 Command receiver for multi-band, plug-in coil operation. During the evening hours breakthrough interference on the original 3-6 mc range was considerable, while reception on 1.8 mc using a modified coil pack was virtually impossible. A few moments' work with a broadcast receiver located the source of the trouble—a German broadcasting station operating in 1415 kc, which is the intermediate frequency of this particular model of Command receiver. Removing the aerial cut out the interference, so the answer was obvious—either move the IF or introduce some 60 dB of 1415 kc attenuation into the aerial circuit. The first course was impossible, due to equally loud broadcasting stations above and below 1415 kc, so the second course had to be tried.

There are two methods of introducing spot-frequency rejection into an aerial circuit connected to a receiver. A parallel tuned circuit can be connected in series with the aerial close to the aerial terminal, or a series tuned circuit placed between the aerial and earth terminals. In the former case the circuit presents maximum impedance at resonance, thus greatly attenuating the unwanted signal, while in the latter the circuit shows minimum impedance at resonance, thus letting most of the unwanted signal current flow to earth without entering the receiver. The two methods can be used either individually or in conjunction with each other. Due to the shape of the response curves involved, signals more than 100 kc or so away from the resonant frequency of the tuned circuits suffer little or no attenuation.

The answer to the problem was thus to introduce both types of rejection between the aerial and the receiver, using high "Q" circuits and screening the whole arrangement as shown in the diagram. On opening the junk box in search of coils, the first component found was a spare 465 kc IF transformer and it was immediately realised that this provided an ideal basis for the wavetrap unit. Some 90 turns were removed from each of the iron-cored coils and the internal wiring was modified to correspond with the circuit shown here. The modified unit was then connected in series with the aerial and adjusted, first by tuning the parallel circuit for minimum interfering signal, then doing the same to the series circuit, after which a slight final adjustment was made to both trimmers.

Results

With either tuned circuit used alone, the interference level could be reduced from S9 + to S5/6. With both circuits used together and properly tuned, the interference was eliminated completely. Inserting the unit causes a barely perceptible drop in signal strength on the 160-metre band and has no effect at all on the higher frequency bands. The attenuation at the unwanted frequency is estimated to be about 60 dB.

Conclusion

The idea suggested is felt to be an elegant solution to the problem, providing as it does a cheap, efficient and easily installed unit of good performance. This is particularly so in the case of receivers using an IF in the order of 460 or 1600 kc, as it should be possible to use an existing IF transformer merely by altering two of the internal connections.

THE LEAK FM TUNER

NOTES ON A COMMERCIAL DESIGN

THE Leak trough-line FM Tuner is now in production. It is claimed to be radically different from any other FM receiver in its engineering design and circuitry, overcoming many of the faults in simpler FM receivers.

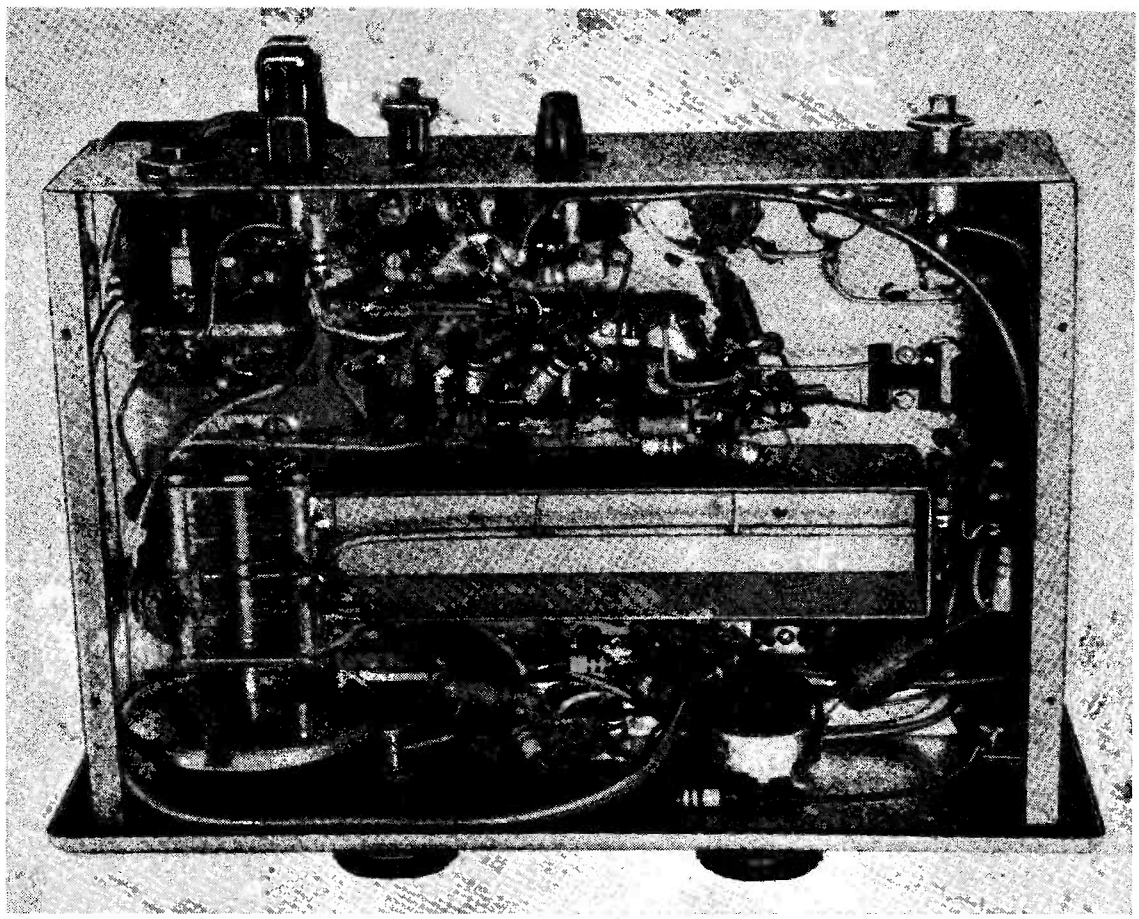
Since the quality of the BBC's FM transmissions is now better than that of the best recordings—provided the programme is "live" and good land-line circuits are in use—it follows that to get the utmost from these transmissions, a first-class FM tuner is essential. It must be sensitive, selective and entirely free from drift—which many simpler types are not. The requirements are:

(1) For quality to remain unimpaired, drift should not exceed 10 kc on Band II.
(2) Re-radiation from the tuner should be so low as not to interfere with TV reception.
(3) Some form of tuning indicator is necessary, because it is impossible to be sensitive by ear alone to variations of 2-5 kc when tuning, or to find the optimum tune adjustment.
(4) The power supply should be integral with the unit, and not obtained by bleeding off from the main amplifier.

General Design

In the Leak FM Tuner, the oscillator circuit is a trough-line. This, in conjunction with an automatic frequency control system, results in tuning stability within 5 kc in Band II from the instant of switching on. As shown in the photograph, the trough occupies much of the sub-chassis space and itself provides some RF screening.

The oscillator operates on the HF side of the signal frequency (Band II, 88-95 mc) and output is injected into the RF-mixer coupling with second-



Layout under-chassis of the new Leak FM Tuner, in which a trough-line oscillator circuit (lower centre) is used, with the open end of the trough directly connected to the tuning condenser. The general design of this Tuner is more elaborate than most commercial types and exceptional performance is claimed for it. The calibrated tuning range is 88-100 mc and the power supply is built in.

channel attenuation at this point. The IF selected is 12.5 mc. This ensures that harmonics do not fall within Band II. In some other designs, with an IF of 10.7 mc, beats do appear in the band, and can be mistaken for dead carriers.

Sensitivity overall of the Leak FM Tuner is such that excellent reproduction is given whenever the signal appreciably exceeds noise level; full limiting action is obtained when the signal level is 4 mV/metre. The magic-eye in the discriminator output is a very sensitive indicator of mis-tuning. When the set is accurately tuned, the discriminator output is *nil* and the magic-eye gives a very sharply defined, crisp display. With the slightest mis-tuning, the discriminator output causes the display to become blurred.

The output level is approximately one volt, at low impedance, enabling long inter-connecting (screened) leads to be used, if required, between tuner and amplifier without loss of fidelity. Any good high-fidelity audio amplifier can be used with the tuner.

Circuit Layout

The stage sequence is: Pentode RF amplifier, triode local oscillator, triode reactance valve, pentode mixer, pentode 1st and 2nd IF amplifiers, pentode limiter, double-diode Deeley-Foster discriminator, triode cathode follower output stage, magic-eye tuning indicator, full-wave HT rectifier. (Since the loading is 60 mA HT with several amps. of LT, the power supply is built in).

With the type of discriminator used, amplitude modulated signals are eliminated, and the receiver is not affected by ignition and other forms of impulse interference.

Manufacturers of this FM Tuner are: H. J. Leak & Co., Ltd., Brunel Road, Acton, London, W.3.

STUDY IN THE INFRA-RED

MECHANISM, APPLICATIONS AND POSSIBILITIES

From a Paper Read to The Radar Association

by

Dr. F. E. JONES, M.B.E., B.Sc., Ph.D., A.M.I.E.E.
(*Mullard Limited*)

Strictly, this article has little to do with radio as we know it. Nevertheless, it is of considerable interest because it discusses the usable frequency range that lies well beyond that at which the highest-frequency radar detection systems operate. From the amateur point of view, there is scope for fascinating experimental work with local transmission systems using infra-red frequencies, for which much of the apparatus can be found on the "surplus" market.—Editor.

THERE is a well known saying which goes, "I shall not believe it until I see it with my own eyes. The eye is, of course, a very well designed receiver of electro-magnetic radiation working on a narrow band of wavelengths around 1/2000th of a millimetre, *i.e.*, 0.5 microns (1 micron is one millionth of a metre). It sees each particular wavelength as a colour; for example, at 0.4 microns it sees violet and at 0.75 microns it sees red. Beyond 0.75 microns, where the eye ceases to respond, and up to 1000 microns, lies the infra-red area. The region immediately beyond 1000 microns, or 1 millimetre, is in the radar spectrum and although the first wavelength up to be used for working equipment is 8 millimetres (high resolution airfield radars) this is only because techniques are not as yet sufficiently developed for wavelengths less than 8 millimetres.

The main advantage of short radar wavelength is that it gives high resolution with a small aerial size. Thus on X-band (wavelength 3 cm) a radar with a 1ft. diameter scanner can separate two aircraft at 5 miles range if they are one mile apart. On a wavelength of 8 millimetres it could distinguish between them if they were $\frac{1}{4}$-mile apart. In the infra-red, on a wavelength of 1/500 millimetre (2 microns), an infra-red receiver with only a 3-inch diameter scanner could resolve the separate engines on a single aircraft at a range of five miles.

Transmission

All warm bodies transmit infra-red radiation, the amount and wavelength depending on the temperature of the body and on its surface. The level transmitted depends on the fourth power of the temperature. Thus, a body at 1000°K (°K = °C + 273)—say, a jet engine—transmits more than 250 times as much power as a kettle of boiling water at a temperature of 373°K. In addition, the band of wavelengths transmitted is also a function of the temperature, the wavelength on which maximum power is transmitted being given by the simple formula:

$$\lambda_{max} = \frac{300}{T°K} \text{ microns}$$

The Table herewith shows the maximum wavelength in microns radiated by various bodies.

Theoretically we have only to make a receiver to work on the various wavelengths and we can detect the body concerned—the hotter the body the easier it is because the more power it transmits.

Reception

Broad-band receivers which respond to all infra-red wavelengths equally well have been known for many years. These are the thermal detectors called radiation thermo-couples and bolometers. They rely for their action on the warming-up effect of the incoming radiation and in general they are too sluggish in their

response-time to detect rapidly moving objects, although they are still widely used for laboratory measurements.

The modern infra-red detector is one based on a German war-time development—photo-conductivity in the infra-red. In this type of detector a semi-conductor is used—the same class of material as is used in transistors. A semi-conductor, as its name implies, is a material that lies between a conductor and an insulator as far as its electrical properties are concerned. In a photo-conductor infra-red detector the semi-conductor is in the form of a thin layer between the electrodes, across which a potential is applied. The resistance of the layer is usually made fairly high (in excess of 100,000 ohms) and when infra-red radiation is allowed to fall on it the resistance drops, and this is in turn indicated by a fall in the applied potential. This type of detector does not require that the temperature of the layer shall change—the effect is caused by the *absorption* of radiation in the layer. Thus, each unit of infra-red radiation absorbed releases an electron in the layer which would not normally have been free, and these freed electrons flow across the layer and add to the steady leak current caused by the applied voltage. The result is measurable changes in voltage for very small amounts of infra-red radiation and, what is most important, the change takes place in a few micro-seconds. So much so that even the Fairey Delta II will only have gone about *two inches* in the time that it takes a photo-conductor to respond!

These photo-conductor detectors only work over certain wavelength ranges, *i.e.*, they are selective, and the particular semi-conductor material must be chosen to suit the required wavelength. The commoner materials for the layers are lead sulphide, which responds to about 3 microns; lead telluride, which responds to 4.5 microns; lead selinide to 6 microns; indium antimonide to 7 microns; and germanium, which responds to very long wavelengths—possibly 100 microns. All these materials must be specially treated to give them infra-red sensitivity, and all of them (with the exception of lead sulphide, and possibly lead solinide) need to be kept cool, *i.e.*, refrigerated, to make them sensitive.

Atmospheric Effects

These photo-conductive detectors with their extremely high sensitivity and high-speed response have made possible many modern developments, in the infra-red. Before we come to consider these developments, however, we must look briefly at the transmission of infra-red radiation through the atmosphere. In foggy or misty weather the safest assumption is that the transmission of infra-red radiation is exactly the same as that of visible light. This is because the diameter of fog particles—of the order of up to 80 microns—is still large compared with infra-red wavelengths. Thus infra-red is of no use in fog or cloud. Even in clear weather the atmosphere absorbs completely much of the radiation. For example, the only wavelengths reaching us from the sun lie in the bands visible to 2.2 microns (with two gaps) 3.4 to 4.0 microns and 8.5 to 13.5 microns. The remaining bands are all completely absorbed by the water vapour and carbon dioxide in the atmosphere. At high altitudes the "transmission windows" increase in width because there is little water vapour above, say, 30,000 feet, and a reduced amount of carbon dioxide. In general, however, if one wishes to detect a hot body the most appropriate of the three atmospheric windows must be chosen.

Applications

If we now consider some of the military applications of infra-red, the most common are the well-known night driving, sniping and signalling systems in the near infra-red—that is, in the region beyond 0.75 microns, where the eye just fails to detect. As normal bodies transmit very little radiation in this region it is necessary to illuminate the object with a searchlight in the normal way, except that the visible light emitted is cut off by a filter. The searchlight normally has a tungsten-filament lamp operating at about 3000°K and hence considerable power in the 0.75 micron region is transmitted, reflected by the object, and detected. These are active systems, already in use. Their main disadvantage lies in the fact that the illuminating searchlight can be "seen" at very great ranges with a suitable infra-red detector because the temperature of the lamp is so very high.

As far as passive detection is concerned, the Germans first used, in about 1942, a lead sulphide detector mounted in a 150 cm diameter searchlight mirror for tracking Allied night bombers. This equipment was known as the *Elac NMG42*. Later they tried, experimentally, an air-to-air detector system, rather similar to a passive AI, which gave bearings but not the range of a target ahead of a fighter. This equipment, known as *Kid*, had a scanning mirror about 4 or 5 inches in diameter and could indicate accurately the bearing of a target at several *miles* range. Additionally, the Germans had an equipment called *Madrid* which was in the form of a homing eye or infra-red seeker suitable for a guided missile.

TABLE 1

Radiating Body	Temperature °K	Max. Wavelength in Microns
The Sun	6000	0.5 (*visible light*)
Jet aircraft Engine	1000	3.0
Piston-engined Aircraft	750	4.0
Kettle with Boiling Water	373	8.0
Human Body	300	10.0

All these equipments used lead sulphide cells working in the 2 to 2.2 micron atmospheric window, as this was the only detector material the Germans could make sufficiently sensitive for infra-red detection. Little has been published about modern military applications using the types of detectors now available, but the lead sulphide cell of today, for

example, is at least 10 if not 100 times more sensitive than the German war-time cell. The sensitivity of a modern lead sulphide cell is such that mounted in a telescope it can detect the heat from stars. The published figures of sensitivity would indicate that even with a mirror as small as 3 inches it would detect the heat from a domestic two-kilowatt electric fire at about 10 miles range! Possibly as important is the fact that with the very fast response time and high sensitivity of photo-conductor detectors it becomes possible to trace very small *changes* in temperature with a scanning system, and hence to build up a thermal picture.

In addition to possible military applications, modern infra-red techniques, particularly photo-conductive detectors, have made their mark in a number of scientific and industrial fields. For example, the vibration and rotation of molecules gives rise to absorption bands in the infra-red. By the measurement of the wavelength and intensity of these absorption bands a great deal of information on the structure and size of molecules can be obtained. Dr. H. W. Thompson, of Oxford University, has led the world in these techniques for some time, and many molecules of interest to human life and to industry have been investigated. In astronomy it is possible to measure and study the infra-red radiation from stars. In industry, the temperatures of rapidly moving parts can be measured using lead sulphide pyrometers, and there is a wide application of photo-conductors in gas analysis equipment. Nearer home, the lead sulphide cell is often employed in an arrangement which ensures that the oil is turned off should the flame in a domestic heating equipment go out. Photo-conductivity is the mechanism of the latest television camera—known as the Vidicon. It may well be that we shall see some thermal pictures on our home screens in the years that lie ahead. Finally, an infra-red beam can also be modulated for the transmission of audio frequencies.

TUNING TO RESONANCE

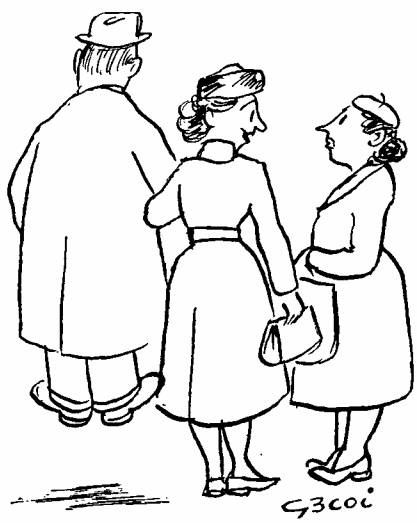
In the adjustment of any transmitter, circuits have to be brought to resonance. This can be done by GDO, or by meter indication, or on reduced HT, or simply by sleight of hand. For most PA's, and in particular those using large valves with HT of 800-1200 volts, this business of "tuning to resonance" can, for a few moments, produce conditions of high stress—in the PA stage, its meters, the power pack and the anxious operator himself. All this can be avoided, and the operation carried out calmly and at leisure, by listening on the receiver at the output frequency with PA drive on, the receiver turned well up, and no HT on the final stage. Then, as the PA tank condenser is swung through resonance, a distinct and unmistakable "wheep-wheep" will be heard on the note; the point at which it changes is, near enough, resonance tune. Full HT can then be smacked on the PA with reasonable certainty that it will only need a touch on the tank condenser to bring the stage accurately to resonance. (It can all be done far quicker than it has taken to read about it). In theory, there should be no "wheep-wheep" if the PA is fully screened and perfectly neutralised, but the fact is that in practice one can always "hear resonance" (which is all this dodge amounts to) no matter how accurate the neutralisation. Try it in your 813, or pair-807, PA stage, and see.

TRIODE VALVES FOR MICROWAVE LINKS

An advance in the design of valves for microwave relays and multi-channel telephone links has been made in the form of two new Mullard triodes capable of amplifying and delivering power at the extremely high frequency of 4000 mc (corresponding to a wavelength of about 7 centimetres). Whilst triodes have already been used at these frequencies, they have not, hitherto, been characterised by reliability or good life factor. Nor has it been possible to achieve really useful power or low noise from them.

The new Mullard types are of disc-seal construction and are distinguished by embodying dispenser cathodes. Apart from giving large emission current densities, this permits precision grinding of cathode surfaces and the employment of very small inter-electrode clearances. A useful result of this type of construction is that the valves generate very little electrical noise, and can therefore be used to advantage in sensitive receivers.

Of the two new triodes, type EC56 gives a power gain of 13 dB at 4000 mc with a bandwidth of 100 mc Type EC57 is a power amplifier with an output of 3 watts, and typical gain and bandwidth figures of 8 dB and 50 mc at 4000 mc. Operating HT voltage is 180v., heaters the usual 6.3v. and, for the EC57, rated anode current is 60 mA.



". . . . He always walks on air after working a new one . . . ."

DX COMMENTARY

L. H. THOMAS, M.B.E. (G6QB)

W1AHX

AFTER phenomenal happenings on all bands, we seemed to relapse into typical winter conditions early in November. The change came quite abruptly, with a spell of really poor conditions. Then things settled down somewhat, and at the time of writing one finds the HF bands wide open one day (but perhaps not for long) and pretty poor on the next.

This is probably how we shall continue until the Spring, and then anything might happen. Last month's resumé of the state of the sunspot cycle has been superseded once more, and present predictions are that the maximum will be something quite fantastic.

The new 70 mc band does not come within the scope of this Commentary—A.J.D. will be dealing with it under "VHF Bands"—but it seems pretty obvious that there is a chance of world-wide DX on four metres.

Meanwhile, our advice to you is not to neglect 28 mc. Just because it sounds dead one day, that doesn't mean that you are not missing several new countries by making a QSY. Ten does funny things, as it always used to; one day recently we listened at 1600 GMT, and the only signal on the entire band was a KP4 on phone. The following day it was jam-packed with W's, including all the West Coast States, together with VE 6 and 7, CE, LU, VP8 and all-sorts. WWV's prediction was the same—"N 7"—on both days.

And so to our review of the bands . . .

Ten Metres

GW3AHN (Cardiff) returns to the fold and describes conditions as "brilliant up to the end of October but patchy since." He has now worked 102 countries on Ten (80 on phone), and recent ones include CR7, HZ, KG4, KH6, KL7, OY, PJ, VP7 and ZP (all CW) and CR9, FB8, HI, HK, HR, KR6, MP4K, TG, TI, VP2, 3, 7 and 9, XE, YV, ZP and many others on phone. This, by the way, is with an input of 25 to 60 watts and a 68-ft. "Windom" aerial; he hopes to move to a better QTH in a few months, and also to instal a beam.

G5BZ (Croydon) describes the conditions in almost the same terms. On Ten he worked CR 6, 7 and 9, HZ, LU, OQ5, ST, SV, VP6, VU, VS 1 and 6, ZD6 and plenty of VE, VK, ZS and all W districts.

G3GZJ (London, S.E.23) raised CN8, IT, KP4, VS6, VU and ZD6; he is limited to week-ends, as the band is dead by the time he gets home in the evenings, and he regrets that on Ten W and K stations seem to outnumber all others by about 100:1.

G2DC (Bulford) worked 24 countries in 17 Zones during the DX Contest. Among them were VE 7 and 8, all W districts, AP, HZ, ST, VK's, VS6, VU, CE and UL7. He, too, says that the W QRM in the evenings makes work on this band a doubtful pleasure.

G2CDI (Stokenchurch) has worked 108 countries on 10 metres this year (all on phone) and is well in the lead for the 21-28 mc Marathon. New ones during October and November were numerous and included XZ2AD, KA2LZ, KR6GL, FQ8, ZD2, DU1AP, VP2KB, OA4EE, KL7BVE, FB8BP, TG9AD, ST2DB and all the "routine stuff."

G3DNR (Broadstairs) started up on Ten for the first time, and raised W, UA and FA on phone. G3GGS (Preston) collected TG9AD and VP7NF for new ones (both phone) as well as CR9AK, HK, FA and CN8; he missed HI6EC and VP7RV (G5RV); CW brought him a KH6. Incidentally, during the last favourable period for Ten (1946-48) KH6's and KL7's were

CALLS HEARD, WORKED and QSL'd

something of a rarity; nowadays they seem to crop up quite frequently. VE8's are more or less in the same category.

Two months' reports from G3HCU (Chiddingfold) show that he has increased his score on this band from 45 to 83 countries. Recent new ones, all on phone, were EA8CF, 3V8AX, ST2DB, CR5AC, FQ8AF, TG9MB, VP3HAG and FA3JR. Back in October he collected ZP, ZD3, HK, OA, CR9, VP2, DU, HZ and VU, among many others. In addition to all the new ones, 'HCU worked the usual all-round collection of DX in all continents!

G3BHW (Margate) found the band rather erratic, but his phone raised ZD4's, ZD6, CT2, EA8's, VS6 and TF, all new ones, as well as plenty of VE7, VK, VQ, ZE, ZS and the like. On CW he worked CR7's, HZ1HZ, OD5LX, ST2NG and KP4.

G3DO (Sutton Coldfield) ran phone in the DX Contest and collected CN, CR5SP, EA8, KL7, FQ8AF, ZD3BFC, VP7NS, TI2HP, VK9WK, 3V8AX and many other new ones for the band.

G6VC (Northfleet) added two to his score with FA8JO and UB5UB.

DL7AA (Berlin) worked ZD1FG, FK8AO and VQ5GC on CW; he started up on phone again after five years' hiatus, and this brought in ZP5GF, FU8AC, OA4EE, TG9AD and SVØWE.

Fifteen Metres

This has been the best DX channel of the lot, without a doubt. Quite a few correspondents have remarked that Twenty has been superseded by *Fifteen* at last, and one is bound to agree with them.

G2DC worked 36 countries in 18 Zones during the Contest—his highest score for any of the five bands he used. Helping towards his (no less than) 183,664 points were JA8AD, VO6U, VU's, VQ5, LU and PY. Despite the general falling-off in conditions, he finds the band still providing good all-round DX.

G3HQX (Mitcham) found the Contest "helpful," but didn't collect anything outstanding. However, he quotes CX, HZ, SV, VP6, VQ4 and ZL for new ones. G3GGS put up his score with the aid of G3IDC, first in Aden and then in Oman; he also worked him in 4S7. VK9AMZ (Papua) was a new one, and G3GGS also got his first ZL on phone. And G3DNR collected his first VK on the band.

New for G2CDI were FU8AC, JZØACK, GD3GMH, I1BCB/Trieste and HI8WL. Others included BV1US, JZØ's, KL7, KW6, VP8, OY, and the usual mass of "ordinary DX." This may be G2CDI's last report for the year, as he will be leaving in December for the States and the West Indies for some months; he will be looking for G's from W8, VP9, VP4 and finally VP6, where he may use his old call VP6CDI once again.

G3GZJ offers ZD6RM, JA, TF, KH6, CR7, VE 5 and 6, W7 and the like; he, too, laments the fact that the band goes dead so early in the evening. It's too bad that this happens in the winter, whereas in the summer it stays upon all the time and half the customers have other things to do in the evenings!

G5BZ's list includes BV1US (phone), CR 4 and 6, EA8, HZ, MP4, ST, VE 5, 6, 7, VP8BU (phone), VS6, ZD 1, 2 and 8, ZE, ZL and ZS. And, as he says, what we now call "the usual stuff" is world-wide DX that would have made the headlines a few years ago.

GW3AHN has raised his all-time score on Fifteen to 172 countries (140 on phone). This year's bag amounts to 141 (104 on phone). Best phones on 15 metres recently were HC1ES, HI8WL, HP's, TG9AZ, VP2GW, 4KL and 8BY, VR2BZ, VS4BO, XW8AB and YN1PM. On the CW side he quotes G3IDC in Aden and Oman, JA, KL7, LU/Antarctica, VK9's, VP2LU, VQ8AG, XW8AB and ZD1FG, among many others.

G3HCU added to his score with KX6ZB, FQ8AK, and some new Europeans, bringing his 1956 total up to 125 on phone, with an all-time figure of 146. He sends a complete copy of his log each month, and these bare figures hardly do justice to the mass of DX worked. For instance, the 21 mc log shows contacts with MP4, VS4, VK, VS6, ZL, OQ5, 4S7, ZD4, and, of course, plenty of W's. Quite a few locals also appear!

G3BHW has been having TVI trouble on Fifteen, but managed to get VP6FR, 6GT and 6WR, also 4S7GE and 7YL, all on phone. G3DO winkled out K4EMH/KG6. G6VC "dug out a modulator" and worked a K2 on phone; CO2WD was also raised for a new one.

New for DL7AA were PZ1AH, UJ8AF, G3IDC/Oman, all CW. On phone he raised BV1US.

DX on Twenty

The 14 mc band is so much troubled by short skip these days that it usually sounds like the pre-war "Forty on a Sunday morning." Under it all, though sometimes more than one layer deep, is the DX. We fervently hope that future DX-peditions will stop thinking of Twenty as the only band, and will get cracking on Fifteen and Ten.

G5BZ tailed YJ1AA for some time without success—so did G6QB. G5BZ was successful with CE, CR6, CX, KH6, KL7, PZ, W6 and YV, to mention a few.

G3DNR worked EA6, UQ, UR, UA9 and EA9, all on CW, for new ones; he also raised an

WAZ MARATHON, 1957

Our "Marathon Contest" for 1957 will be based on the number of Countries and Zones worked, irrespective of bands. All that will be necessary in putting in scores will therefore be the two figures—Zones worked, Countries worked.

These should be sent in every month or two to qualify. Three months' non-reporting will result in deletion from the Table. Similarly, the last month for entry will be April 1957. No new scores or back claims will be accepted after that month.

The results of the 21-28 mc Marathon, 1956, will be published, in the form of a final listing, in the February issue, together with the first of the new WAZ Marathon listings.

IT, and says he understands that Sicily does now count as a separate one (from September 1). We haven't yet got straight on this, and frankly, we don't know.

G3GGS raised UL7AB, but missed on HI8WL, W4EMF/KS4, VP8BK and VP9Y, all CW. G2DC, during the Contest, worked 28 countries in 14 Zones, which included CX2AM, HR1AT, PZ1AM, VK6RU, VS1GY and YV5AE. He also heard a UA calling HV2AD !

G3LEQ (Tunbridge Wells) is a brand new correspondent to this column, whom we welcome; already, with 25 watts and a 100-ft. long wire, he has worked ZL2GX and numerous W's on phone. He finds it a bit difficult owing to commercial QRM and numerous jammers — *see* later paragraph on this subject. Another one G3LEQ raised was RAEM, whose QSL has arrived. G3BHW accounted for ZD9AE and PJ2ME, both on CW, for all-time new ones.

Forty and Eighty

These two bands are quite overshadowed by the others, and very little *seems* to be happening on them, although this is not true because it is well known that Forty is full of DX if you catch it at the right time and are good at excavating.

G2DC used both during the Contest, raising 30 countries in 13 Zones on Forty—among them HZ1HZ, VQ5GC, KP4JE, YV5ES and six W districts. On Eighty, with 22 countries and 6 Zones, seven W districts, including W7, were worked.

G3LEQ takes a poor view of Radio-Paris, which still operates on 7050 kc during afternoons and evenings; short skip keeps the band very full during the week, and week-end QRM puts him with his QRP rather out of it.

The Overseas Mail

DL2ZO (G3KMQ) used *Forty* during the Contest and raised CT2, VQ5, VP6, KP4, PY, 4X and some U's. On *Twenty* he got HZ, ET, CR7, FB8, VQ5 and VS1. DL2ZS also worked *Forty* and raised VP6RG, YI2DX, CM2TW and YO2KAB. *Twenty* brought him SVØ, YV, 4S7, KZ5, KP4 and the like. He hopes to get his G call soon and to be on the air from home during his next leave. Towards his WBC, he has worked 42 British counties, but only has six cards to show for it, as yet.

K2GMO (East Orange, N.J.) is ex-VE7ACN and DL4OZ. During the Contest he worked 78 countries, 32 Zones in 32 hours, with his new 6-element 14 mc beam. His score is now 210 countries, 39 Zones, and recent catches have been VR3B, VR4AA, UAØKJA, KCA and VB, UI8's, VK1RW and YJ1RF; he runs a "partnership" station with W2OHF, with the full gallon of CW or SSB.

W6AM (Long Beach) adds to his phone score with VR4AA, HB1MX/HE, and FL8AB; he wants to know how to raise UM8KAA and AC3SQ.

JA1CR (Tokio) sends his latest score for the Five-Band Table, and says he is going to be specially active on 21 and 28 mc, trying to get his FBA award.

MP4BBW (Awali) is back on the job but had not got the rig properly installed at the time of writing; he was on through the Contest with a temporary aerial, and raised KG6AGO on 21 mc phone for a new one.

ZD2HHT (Ibadan) will shortly be on 14, 21 and 28 mc and hopes to keep ZD2 on the map and in these columns.

Top-Band DX

The Top-Band Trans-Atlantics are already on us, next dates being December 16 and 30. Do not forget the injunction to keep between 1825 and 1830 kc, which is very style-cramping but most important if you are to have any hope of success. The East Coast U.S.A. stations occupy 1800-1825 kc, and their Loran chain spreads around from the central noise on 1850 kc.

There is no reason why there should not be Top-Band operation from Labrador, but W1BB quotes W1PVF/VO6 as saying "Due to interest in phone-patch work, and love of 20-metre DX work, I am afraid you will not hear any 160-metre signals from here. Most of the transmitters are BC-610's

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	779	104	162	222	161	130	233
G5BZ	665	64	115	238	145	103	244
W8KIA	657	61	145	258	84	109	258
G3FXB	622	67	124	193	153	85	212
G3FPQ	564	60	76	183	151	94	201
G3DO	562	24	46	218	127	147	236
W6AM	497	30	58	267	85	57	267
W1VG	480	25	113	188	100	54	193
ZB1AJX	457	6	56	119	143	133	189
G2YS	436	62	79	146	94	55	163
K2BZT	422	65	66	187	79	25	193
GM2DBX (Phone)	398	34	31	158	84	87	171
W6AM (Phone)	334	13	32	229	39	21	229
JA1CR	304	15	49	167	63	10	168
G3INR	303	44	53	119	58	29	129
G6VC	301	30	40	134	61	36	139
G2HPF	293	28	48	140	45	32	155
G3IGW	231	42	60	74	46	9	98
G3IUW	216	31	38	66	59	22	101
G3JWZ	215	46	53	59	34	23	86
G3GZJ	215	18	43	65	62	27	100
GM3EFS	209	25	39	97	27	21	107
MP4BBW (Phone)	207	1	5	54	89	58	112
G3JLB	206	32	36	57	50	31	89
ZB1HKO	200	18	29	73	53	27	88
G3JVJ	182	23	60	51	33	15	81
G2DHV	182	19	26	115	10	12	117
DL2ZO	172	2	42	96	31	1	105
G3JJZ	128	21	32	65	8	2	80
DL2ZS	117	2	31	72	11	1	82
G3JZK	116	14	17	30	51	4	87
G3DNR	111	10	21	61	13	6	66
G3HQX	111	9	30	29	26	17	55
G3HEV	69	10	20	17	18	2	42
G3IDG	57	11	14	8	4	20	29

or 32V's; no trees of any size, so long 160-metre atennas are difficult to put up. We have never heard a Stateside broadcast station up here, and radio conditions are usually pretty poor."

Another "first" is belatedly reported. Once more W1BB is at one end, the other being VP6RG. This proves to be the first W/VP6 contact on Top Band—made on April 6 last year.

W8ANO has now worked 23 countries and five continents on One-Sixty. W4PJW is stationed in Ethiopia and is "looking into the 160-metre situation." And now, yet another "first" . . . W1BB and VP3AD made it on September 5, and it was regarded as an important event despite the fact that VP3AD's junior op. was arriving at the time! As that one was broken off in rather a hurry, the following week's contact (September 12) is regarded as the true "first."

KP4KD will not be able to work the band this season, nor will EI9J . . . KØHEM is planning to be on, with a rhombic *half-a-mile* to a leg! For those who can hear him and want New Mexico, W5SOT promises to be there, on 1998 kc . . . XE1A tried 1823 kc on October 28, and worked W4's and WØ's.

And a reminder that W1BB will, on request, send a handsome coloured "award" certificate to all DX stations working him this season. This will also be available to SWL's who send in seven or more verified reports on W1BB's signals.

DL2ZO is delighted to report that the British and German authorities have given him a permit to operate from October to March on 1825-1835 kc, at any time, but for the main purpose of taking part in the Trans-Atlantic Tests. A few German nationals will also be active, as previously mentioned in this column.

Top-Band GDX

The normal traffic seems to have thinned out somewhat, but a few determined WABC-chasers are still making the best of the band and having their fling. G3KXT (Croydon) confirms that GM3COV is indeed putting Caithness on the map again, and has received his card. G2CZU (Bath) has got his QSL's up to date at last and scores 69/69; on phone he is still aspiring to a WABC and has worked 48 (43 confirmed). If he is to make it, he says there will have to be more activity from GM, GI and some of the rarer Welsh counties. G2CZU managed to get a "4 and 7" report from GM6IZ in Aberdeen.

G3JHH (Hounslow) has found 160 metres interesting and enjoyable, as always, though he thinks conditions are not up to normal for this time of year. GM's worked were GM3KHH/P (Banff), 3AHQ (Glasgow), 3KHH/A (Nairn) and 6IZ (Aberdeen). OK1AEH and HB9T were also booked in for nice EDX.

GM3COV (Caithness) reports in person and claims his WABC for activities when G3COV in Cumberland. As a GM he has worked 34 counties already, but he wants someone to go to Caithness on a DX-pedition, so that he can work his own county!

G3KYU (Bournemouth) has been licensed for six months and is getting well up the Ladder (34/47); he was pleased to raise G3HGY/P in Hereford, and also GD3EGF. G3KYU uses a QVO4-7 PA, with a 70-ft. aerial only 16 feet high.

G3HEK (Oswestry) raised GM3KHHP (Banff) for a new one, and wants still more GM and GI activity; he has found skip short and static rather troublesome. G3GGS heard and called DL2UY, without success as yet.

G2NJ (on his boat in Hunts.) was received off Algiers by G3IAG, who, together with G3JU, was *en route* for Cyprus at the time. G2NJ also worked HB9T and OK1BN.

Crowding on Zanzibar

ZE3JO started something last month when he mentioned himself as only the third "inhabitant" of VQ1, preceded by VQ1RF and VQ1RO. VQ4EI (now home in Sussex) writes to say that he worked there as VQ1DT (he once held the call ZC4DT, too). Before him were VQ1NZK and VQ1VL. All these, one gathers, were since 1953. So we might cause a stir by remarking that G6QB worked VQ1HJP on December 4, 1947 . . .

Interesting layout at G3IKQ, Lipson, Plymouth, who is on all bands Eighty to Ten with phone and CW. The transmitter runs a pair of paralleled 807's, plate-and-screen modulated by 807's in Class-B, with a conventional speech amplifier and home-made microphone. Receiver is a modified CR-100 and the VFO is to the right of the receiver. His only possible aerial is a centre-fed 85 ft. wire, connected through tuned 600-ohm open line. The station is completely relay-controlled and TVI-proof.

The QSL card says "QSO Nr 91, but the one and only VQ1/G QSO." The op. was VQ4HJP, and he was just about to pack up and leave when this one was made. Any prior claimants for VQ1's?

DX Strays

W6ITH reports that all his PJ2MC and FS7RT cards have now been sent off. The last batch, total weight 54 lbs., was sent by air express to the island and air-mailed outwards from the Dutch and French Post Offices at Philipsburg and Marigot. Reg says this was done (despite the high cost) to express his thanks in a small way to the governments on the Island for their kindness. The postage involved (about £150 for FS7RT and £40 for PJ2MC) represents the mere task of replying to *cards received,* not sending out QSL's for every entry in the log. So if anyone still has not received a card, QSL to the home QTH of W6ITH. (And if you're thinking of fixing up a DX-pedition, study the figures above and consider them well...).

Further news from W6ITH: Quite a lot of activity on SSB is reported among Asian stations on 7 mc. In particular, JA1AEA is on 7100 and listens for calls from 7200 kc up . . . PY2JU has also been on SSB . . . A group of Japanese scientists left for Prince Harald Land, near the South Pole, to make observations in co-ordination with other countries, as part of the International Geophysical Year. About ten men will be left in Prince Harald Land, including a radio engineer with a complete amateur station. Look out for them early in 1957 . . . call and band(s) as yet unknown.

W6YY mentions that W6ITH might set up with the call **DUØRT** on Spratley Island (9° N., 111° E.), a French possession since 1932, unoccupied but not given up, and now claimed by Red China, Free China, Philippines and Viet-Nam! (Could be quite a lot of different prefixes let loose if they all claimed it together).

Other shorts from W6YY: VQ9JO was *not* ZE3JO/VQ1JO, as we know . . . **ZD1FG** is ex-ZL2FG, on a UNESCO mission . . . ZS9O, 9P and 9R were all "working W6's like mad" during the Contest . . . **YK1AK** is on 14043 kc, T7 . . . **FE8AE** has a very powerful signal in W6, but still eludes a lot of them . . . **UA1KAE** is understood to be at the South Pole (?), but **UPOL6** has also been heard, 14050 kc . . . **JZØACK,** Netherlands New Guinea, is ex-MP4QAH . . . KM6FAA closed down on October 13 . . . **XZ2OM** is on with a new 100-watt rig and a dipole . . . **VP8BP** is on the Caird Coast of Antarctica—one supply ship a year, so be patient about QSL's!

A few choice ones: FL8AB, 14040 (1430); FG7XC, 14035 (0915); ZC5SF, 14010 (1130); VR2BA, 14025 (1200); FR7ZC, 14060 (1215); and TI2WR, 14070 kc (1220). All CW, of course.

VQ8CB, at one time reported as possibly going to ZL, is now operating **VQ8AB.** W4BPD is trying to sort out the necessary paper-work to get him into the States, as they have been personal friends (thanks to Amateur Radio) since 1934.

The Ohio Valley Amateur Radio Association, in their news-sheet, *Ether Waves,* run a DX table on the lines of our Five-Band affair, but with 15 columns that have to be added up! They consist of all bands, CW and Phone separately, from 1.8 to 28 mc, including 27 mc, and an extra column for VHF. Highest scorer is W8JIN with a grand total of 1158

ZS9P has a crystal on 14061 kc and is very active thereon . . . **ZD9AE** has 700 cards ready to mail . . . **FE8AE** is laying the law

160-Metre DX Tests, 1956-57 Season

The U.S.A. stations have decided this year that they prefer special "Test" days to the principle of working every week-end, and have suggested the following dates for Organised Tests:

December 16 and 30;
January 13 and 27;
February 10 and 24.

Special attempts will be made to contact Europeans between 0500 and 0800 on these mornings. EU stations should call at 5, 15, 25 minutes past the hour, and so on, with the W's on the hour and every ten minutes thereafter.

All EU stations are asked to operate **between 1820 and 1835 kc;** the W's will be mostly in the 1800-1825 kc segment, and Loran causes trouble around 1850 kc. West Coast stations will be in the 1900-1925 kc area.

Synchronise your clocks with WWV just before each Test begins, and stick to the five-minute calling and listening periods (unless a QSO results, when the routine must be broken). Reports to "DX Commentary" by the usual dead-line dates.

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G5JM	97	97
G2NJ	97	97
GM3EFS	96	96
G3JEQ	95	95
G6VC	94	94
G3HEK	90	94
G3GGS	90	92
G2AYG	88	89
G3JHH	88	88
G3BRL	84	84
G3FNV	83	88
G3KEP	80	81
G3AKX	78	80
G3DO	74	74
G3KOG	72	77
G2CZU	69	69
G3KOC	65	67
G3COV	60	65
G3EJF	60	64
G2HDR	60	60
G2HPF	45	60
G3ICH	42	58
G3KNG	35	46
G3KYU	34	47
G3KXT	31	38
G3JZP	30	42
G3KNQ	24	34
GM3COV	9	34

down, and will black-list anyone other than F stations who butts in on his "CQ F" call at 2000 GMT; he will do the same for all wrongful answering of directional CQ's, and all calling during a QSO. Quite right, too—what's the use of being rare DX if you can't crack the whip now and then? (But it won't prevent the usual asinine behaviour).

Another odd batch of rare ones: KX6AF, 14255 (1053); FK8AO, 14115 (0615); DU7SV, 28330 (2355); FB8ZZ, 14164 (1325); VP8BY, 28280 kc (2355). All phone, this time.

VK1RW, on Cocos, now apparently signs **VK9AJ** . . . we hope to catch up on these VK prefixes before long! **ZK1BS** has been active on 21060 kc, CW . . . **VR3B** has been worked on 14055 kc . . . No further reports to hand about *Tahiti-Nui*, **FO8AP/MM.** It seems that his 2 watts may be a little difficult to catch sight of, through all the miscellaneous noises that we have to cope with.

The "Yasme" Story

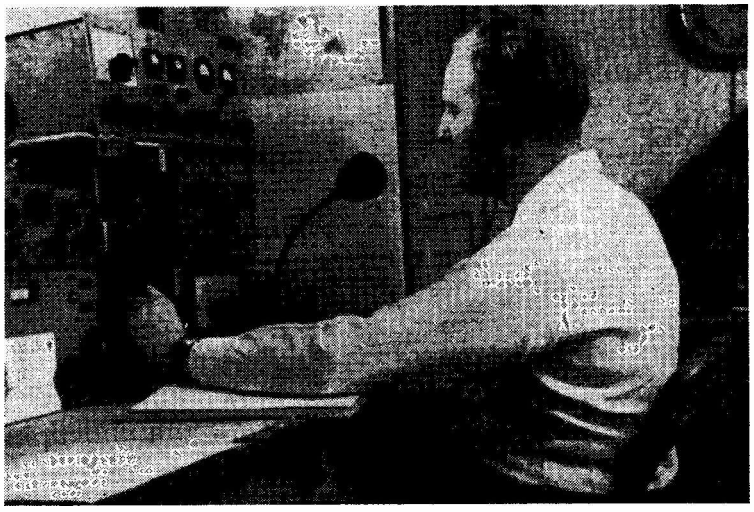
Last month's Editorial gave the essential details of the sad end of the *Yasme*, which became a total loss after hitting a submerged coral reef. Now from *Amateur Radio*, the VK journal, we learn that all of the following stations were instrumental in helping to save Danny Weil's life during the events leading up to the final crisis: VS6AE, VK9FN and 9SP, VK2AFA, VK4TT, 4VJ and 4NT, VK9DB, ZL2GX and a whole bunch of VK's who took on the job of keeping the frequency (14130 kc) clear while the rescue calls were being sorted out.

VK9FN's comment, after the whole business was over, was, "I consider the W.I.A. members have again proved they can handle an emergency operation with true professional dignity, and are ever willing to do so when the need arises."

We heartily agree, and consider that all concerned should be congratulated on their part in the rescue, the circumstances of which allowed no time for previous organisation or even for pre-arranged procedure during the actual operation. It appears to have been Old-Timer VS6AE who triggered the whole thing off, by breaking in on a VK9 sked with the news that VK9TW/MM had not been heard from, was not keeping skeds with KV4AA, and was probably in trouble. It is understood that Danny Weil is now in Sydney, looking for another 5-tonner. It remains to be seen to what extent the Americans will be prepared to continue their support.

21-28mc MARATHON, 1956

Station	Total	28 mc	21 mc
	Phone Only		
G2CDI	158	108	151
G3HCU	135	83	125
MP4BBW	97	58	81
G3KHE	87	20	82
GM2DBX	71	37	63
GM3BCL	69	56	15
	Phone and CW		
G2DC	116	53	107
VQ4RF	111	80	74
G5BZ	99	55	85
G3GGS	81	57	46
G3GZJ	63	27	62
ZB1HKO	42	19	39
G3JWZ	40	23	34
G3JVJ	36	15	33



OK1AEH, Prague, who has been on the air since 1948, has already gained his WBC and is now going for WABC, with 56 U.K. counties confirmed. All bands are worked, CW and phone, with 150 watts input.

Miscellany

G3KXT built himself the DX Pilot and DX Hunter (as recently described in SHORT WAVE MAGAZINE) and is very pleased with results. On the Pilot alone he raised W2 and W8 almost immediately after completion . . . G3JOM (Ripon) found a UB5 desperately keen to QSO—he wouldn't even wait until a previous contact was finished . . . G3HEV has had QSL's in from TG9AD, ZD3BFC, ZD4BQ, HK3AB, FF8AK and VS1GN. (G3HEV is the Ravensbourne Club station).

G3IUW (Hounslow), together with G3IUL, met the well-known EA6AF in Palma, Majorca, where they have no TVI troubles, but *tramways* QRN wreaks havoc with the HF bands. EA6AW told them that he is a QRP station and often has to call CQ for a long time on Twenty before getting replies. Anyone wanting EA6 will have to "dig deeper." EA6AR worked G3IUW on Eighty phone, and says he hears G's very often on that band.

SWL R. Bennett (Bristol) reports that VK2FA, on 21 mc phone, was coming over at S9 + 30 for nearly four hours on November 11 (0900-1245 GMT). And SWL V. Kelly (Bettws-y-Coed) says a station signing ZLØXX showed up on October 29 and caused a terrific pile-up,

but went QRT after working one G. And he adds that HRØXYL is as phoney as "she" sounds.

Mobile DX

GI3CWY/Mobile tells us that he has completed WAC from his car, and now awaits only one card to have all six confirmations.

G2NS (Southbourne) wonders whether anyone else has heard or worked French mobiles, who seem to arrange their call-signs in an unusual way. He worked F/M8QY, on the road outside Vichy, on 14 mc, 1500 GMT, 559 both ways.

Operating Methods

Referring back to some previous comments, G2CDI wonders why you can always hear twenty G's calling "CQ DX" while countries like XZ, VK9, VS6, VU and so forth are also calling CQ in the same part of the 28 mc band. (Some of the DX stations are even calling "CQ G"!) G2CDI asks "Why call CQ at all? I have yet to tune over an open DX band without hearing many DX stations calling CQ. Do we, I wonder, get a thrill from counting the W's who reply after a long CQ, with the mod. well up?"

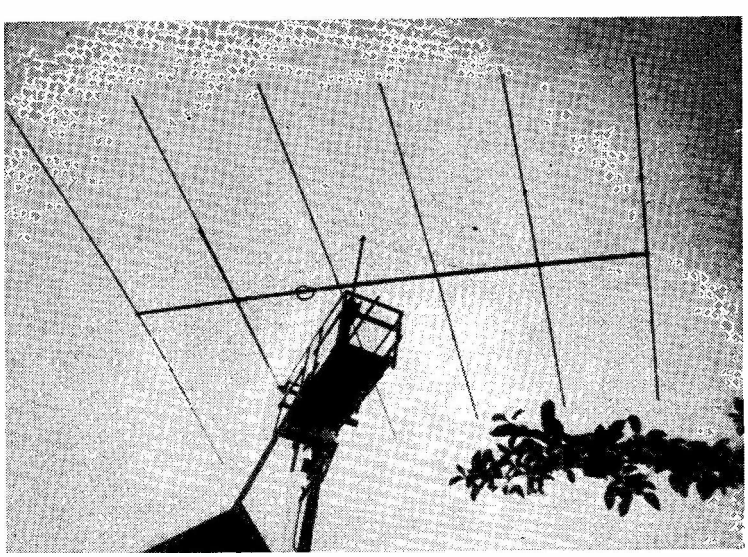
Unwanted Noises

We have left until last two subjects which took up a lot of space in the mail this month. The first is the terrific display of miscellaneous noises which spread themselves over all our bands these days, particularly Twenty and Fifteen. These are FSK stations, their parasitics and harmonics, and the Russian jammers with their parasitics, harmonics, harmonics of parasitics and all the incredibly obscene noises that fringe them in all directions.

The second subject, not entirely unconnected, is coming to the fore rapidly, and, in brief, is "Should we work the Russian and satellite stations any longer?" A considerable number of G's have stated categorically that they refuse to do so—new countries or not.

This is not a subject on which one can write much—it is entirely a matter of personal decision. One of the freedoms which we all have left to us is "Freedom to work whom one chooses." It seems rather doubtful whether a world-wide boycott, which some readers suggest, would do any good. Judging by the great number of the "rare" USSR prefixes which figure in DX bulletins from the States, they are popular enough over there. (Personally, we wouldn't touch any of them with a Fifteen-metre dipole, but that's purely a matter of opinion).

Far more serious, from our point of view, is the question of the jammers and their attendant garbage. Surely the whole lot of them represent the most barbaric use ever made of such a



A really big beam — six elements for 14 mc, on a 30 ft. boom at a height of 42 ft., and it has a kilowatt on the end of the feeder! This is the array at K2GMO, East Orange, N.J., who in a recent 32-hour test marathon worked 78 different countries on Twenty.

Short Wave Magazine
DX CERTIFICATES

The following have been awarded since the publication of our last list, in the September 1956 issue:

WFE

No.	25	OK1HI (Praha)

FBA

No.	66	SM5WI (Vasteras)
	67	DL6MK (Deisenhofen)
	68	EA1BC (Oviedo)
	69	SM5BRO (Stockholm)
	70	CR6AI (Caala)

WNACA

No.	105	DL6MK (Deisenhofen)
	106	CN8MM (Casablanca)
	107	ZL2FI (Nelson)
	108	CO2WD (Marianao)
	109	G3ABG (Cannock)
	110	EA8BF (Tenerife)
	111	CE3AG (Santiago)
	112	GI3AXI (Belfast)
	113	G3HFJ (Harrow Weald)
	114	OH7OU (Sirkkala)
	115	G6UT (Bishops Stortford)
	116	SM5AHK (Stockholm)
	117	G2HAP (Manchester)
	118	CR6AI (Caala)

WABC

No.	136	G3KLH (Eynsham)
	137	G3KLP (Hexham)
	138	G2HDT (Burton-on-Trent)
	139	G2HDR (Bristol)
	140	G3COV (Egremont)

WBC

No.	42	SM5YG (Bromma)
	43	OK1HI (Praha)
	44	VE1AE (Sussex, N.B.)
	45	W1HA (Quaker Hill, Conn.)
	46	TI2TG (San Jose)
	47	W8EKK (Massillon, Ohio)
	48	OK1GL (Praha)
	49	EA3GT (Sabadell)
	50	OK1MB (Praha)
	51	OK1AEH (Praha)
	52	OH3OD (Parola)
	53	W9IU (Kokomo, Ind.)
	54	ZD2DCP (Lagos)
	55	W2NIY (Teaneck, N.J.)
	56	CN8AF (Casablanca)
	57	VE3ADM (St. Catherine's, Ont.)
	58	SM7AAZ (Jonkoping)

Details of MAGAZINE DX AWARDS and CERTIFICATES, and the claims required for them, appeared in full on p. 246 of the July 1956 issue.

Overseas claimants are now asked *not* to send the QSL cards with the application, but to submit, instead, a full check list. From this we shall be liable to ask for any or all QSL's to be produced . . . but please **do not** send them with the original application.

A complete list of the U.K. Counties was given on p. 20 of the March 1956 issue.

potentially beneficial invention as radio. Even Popov would not have approved ! No one has yet got down to the question of a jammer to jam a jammer, but they will . . . Meanwhile, when there's nothing on the broadcast bands worth ruining, the noisome devices seem to be parked on the amateur bands to keep warm, instead of being switched off.

Despite all the foregoing, we must remember that the season of Peace and Goodwill is approaching once more, so, for the eleventh time, it is very pleasant to be able to wish all readers, and all DX'ers everywhere, a Merry Christmas, 1956, and the Happiest of New Years, 1957.

May your DX achievements never grow less ; may signals improve and unwanted noises die out ; and, to keep things in their right perspective, may you hear all that you work !

Deadline for the next issue is **first post on Friday, December 14.** Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Once again, MX, HNY, and 73 until next month.

THE AGONY OF THE HA's

Particularly affecting during the rape of Hungary has been the gallant behaviour of certain HA's who, in the face of the most frightful personal danger, have continued to radiate their pathetic (because they went unheeded) appeals for help from the outside world. In Budapest, at least one amateur operator was shot dead in the very act by the hated secret police, and was found lying in his own blood across his smashed-up gear. Yet there are HA9K's, in the eastern areas of Hungary under Russian control, who carried on as if nothing was happening. These are the notorious Communist-controlled " Klub " stations, operated on a communal basis, membership of which is open only to carefully-selected collaborators.

TA-12 CONVERSION — Grid Drive on Top Band

In the recent articles on this conversion, the figure for the grid drive on 160 metres kept on repeating itself as 0.1 mA—it should, of course, be *one* mA. Incidentally, the various marks of TA-12 vary only in detail so that, broadly speaking, the conversion data as given by GI3FWF can be applied equally successfully to TA-12's other than the " B." It would, obviously, be necessary to check carefully against the TA-12B details as published. Some marks have different band coverage from the " B."

"WORLD RADIO HANDBOOK"

For those interested in all the details of the broadcasting stations of the whole world, the 1957 edition of *World Radio Handbook* will be found to be full of information of the greatest value. Apart from listing *all* long, medium, short, television and FM stations, together with their addresses and the frequencies used, their operating schedules are given, with such data as interval signals, announcing procedures and other guides to identification.

This mass of information is set out clearly and the general arrangement is such that the references can be found quickly and accurately. For instance, on checking Peru, say, in the index, one finds that this one South American state operates no less than 30 short-wave outlets over a frequency range of 3350 to 21600 kc, with input powers varying from a few 100 watts up to 50 kW, and also runs 20 medium-wave stations between 730 and 1520 kc ; and that (as an example) Radio Cuzco, OAX7A, uses the bells of Cuzco Cathedral as its interval signal on 6125 and 1170 kc, verifying SWL reports by QSL card. Similar data are given for all other stations in Peru—and for all other stations in all other countries of the world as well ! Truly, a masterpiece of compilation, full of unexpected pieces of information—did *you* know that there are four versions of the BBC's Light Programme interval signal, one played on the novachord and three on the novachord celeste? Well, neither did we (and it doesn't help us much now that we do know !) but at least it gives some idea of the immense amount of detail contained in this new edition of *World Radio Handbook*, now in its 11th year of publication, and sold all over the world. Published in Denmark, and well printed in English throughout, we can supply copies from stock, as advertised by our Publications Dept., in this issue, at 11s., post free.

SERVICE RESERVE UNITS

Those who have in mind the possibility of joining one or other of the Service reserves which are of interest to, or offer special facilities for, licensed amateurs, can apply as follows :

Royal Navy: Royal Naval Volunteer Wireless Reserve: The Staff Communications Officer, Queen Anne's Mansions, London, S.W.1.

Army: Army Wireless Reserve Squadron: Capt. J. A. Bladon, G3FDU, 28 Jack Lane, Davenham, Northwich, Cheshire.

Royal Air Force: R.A.F. Voluntary Radio Service: Air Officer Commanding-in-Chief, Hq. Home Command, **P15(c),** R.A.F. White Waltham, Maidenhead, Berks.

All three Service reserve organisations have schemes whereby equipment is loaned for operation on Service channels, there are cruises and training camps, with pay and allowances of the rank at full rates and/or an annual grant.

Those licensed amateurs not able to undertake a Service commitment by reason either of age, fitness or occupation should consider whether they can assist in ***Civil Defence.*** For this, application should be made to the C.D. headquarters for the area. They will be welcomed with open arms—but unless the applicant makes it quite clear that he wishes to serve in some radio capacity, he is quite likely to be put into a fireman's helmet or pair of special constable's trousers. So it is advisable to write in first!

SSB Topics

TECHNICALIA, ACTIVITY & OPERATING RESULTS

Conducted by **R. L. GLAISHER, G6LX**

A PROBLEM that confronts many a prospective newcomer to Single-Sideband is the cost of building a completely new transmitter in order to be able to try out the system. For this reason alone there has long been a need for a simple transmitting adaptor which will permit multi-band SSB operation without the necessity to discard existing equipment altogether.

The Swedish Amateur Society (S.S.A.), in an attempt to encourage more Sideband activity and realising the need for simplified low-cost equipment, has sponsored the development of such an adaptor A suitable outline specification has been prepared by a committee of active Swedish SSB workers who are at present engaged on the design and construction of a prototype equipment. When complete the adaptor will be the subject of a special constructional article which will appear in the S.S.A. magazine.

The principle of operation is based on the "direct" phasing system. A low-level signal at the final operating frequency is fed from the exciter section of the existing transmitter through an RF phase-shift circuit into a double-balanced modulator. The audio is supplied from the normal station speech amplifier *via* a 90° phase-shift network and twin-channel amplifier to the balanced modulators. The resultant SSB signal can then be amplified by the PA section in the main transmitter. It is, of course, necessary to modify the operating conditions of the PA so as to keep the system linear, but this is no great problem.

This type of circuit is well known and the idea of direct phasing at the carrier frequency was first described in several of the early Sideband articles that appeared in *QST* and *CQ* during 1948 and 1949. The well tried W2UNJ exciter (*QST*, August 1949) and the G3GEN transmitter (*Short Wave Magazine*, October 1955), both used this method. In the States a commercially made exciter, the B & W 51-SB, is available and in many ways is very similar to the "S.S.A." project in specification and conception.

Query Department

Many thanks for the kind letters and on-the-air comments regarding the "Question and Answer" section introduced in the October *Topics*.

With the improvement in propagation conditions on 10 metres many more Sidebanders are constructing equipment to get on that band. Judging by recent enquiries, however, some people have met with difficulties and the queries this month deal specifically with 28 mc problems.

The first concerns shortage of final amplifier grid-drive, a very common trouble on the HF bands. Although this problem has been raised in varied forms, it can be summed up in the words of DL2TH writing from Hanover . . . "The rig works fine except for 10 metres where I need a lot more drive."

The crystal-filter exciter and high-level outboard mixer in use at G6LX until last December provided ample drive on all bands, but for various reasons this equipment was pensioned off and a new multi-band phasing exciter was brought into service; this worked well on all bands except 28 mc, where almost a complete lack of drive was a serious embarrassment! Several headaches later, after considerable work had been carried out on the PA grid circuit and coupling arrangements, enough drive was squeezed out of the exciter to kick the final to half the input obtained on the other bands.

This state of affairs existed until the appearance of an article by W6GEG in the September 1956 issue of *CQ*. He discussed the use of 6AG7 and 6CL6 type valves as grounded-grid drivers and after reading the article several times it became obvious that here might be a way of obtaining more drive with a minimum of effort. After a little cut-and-try the "Lazy Man's Driver" was evolved and was incorporated in the final amplifier grid compartment. The circuit is shown in Fig. 1 and can be applied to most single-ended link-coupled amplifiers. Installation is simple as no additional tuned circuits are required and the anode voltage can be obtained from the amplifier screen supply if a tetrode or pentode type valve is used. The booster is rock stable in operation and provides enough gain to drive any of the larger tetrodes direct from a low-level mixer stage. Incidentally, the 6AG7 *is* safe at the voltage shown in Fig. 1 !

Another boost amplifier which operates on similar lines has been suggested by G2IG and is in use by

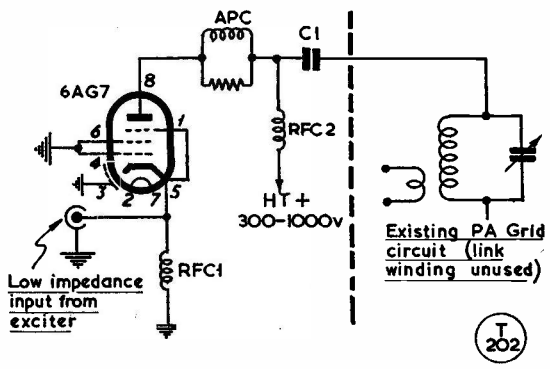


Fig. 1. The driver unit described by G6LX. APC is a 1-watt low value resistor wound full of 18 SWG enam., C1 is 100 $\mu\mu$F rated for the HT voltage, and RFC's are 2.5 mH 100 mA items.

AP2BP. The circuit is given in Fig. 2 and consists of a beam-tetrode connected as a zero-bias triode. Several types of valves have been tried in the circuit and AP2BP reports that the 1625 and 5763 types give excellent results.

Both these circuits have proved to be most effective in providing that little extra drive which is so necessary on the HF bands.

Query number two is from several readers who use the Central Electronics series of multiphase exciters (10A, 10B and 20A models). They wish to know why the manufacturer specifies that on 28 mc the internal crystal oscillator or external VFO must only operate on the high side of the signal frequency (37-39 mc). The indirect phasing system is employed with this series of exciters, the SSB signal being generated at a fixed frequency of 9 mc, which is mixed with the output of the CO or VFO into the required amateur band. As both "sum" and "difference" mixing can be used on the lower frequency bands, it seems illogical that "sum" mixing is not recommended for 10-metre operation, as this would allow the normal 5 mc VFO to be used with a $\times 4$ multiplier.

Generally speaking the reason is our old enemy TVI. With the type of second-mixer used in the Multiphase exciters a spurious signal at the 3rd harmonic of the injection frequency is radiated at low level and unless this is trapped in the exciter it can cause local TVI. With the oscillator operating on the low side of the signal frequency (19-21 mc), the spurious beat comes out in the TV band. On the high side, however, the harmonic is well removed from any TV channel and because it is at such a low level it is not likely to cause trouble to any other service using frequencies around 100 mc.

On the lower frequency bands, the internal trap circuits attenuate the spurious harmonic, but these traps become inoperative above 15 mc. Tests with a 10A exciter indicate that the level of harmonic radiated with a VFO on 5 mc and a $\times 4$ multiplier stage is of a very low order and not likely to cause serious TVI troubles.

Lastly this month, a question from SWL Jenkins of Walton-on-Thames, who asks where he can find SSB on Ten. He has been checking the 28650 kc

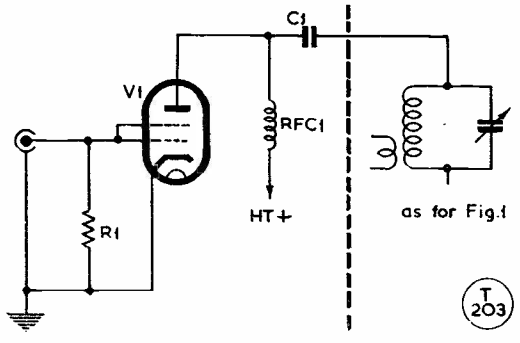


Fig. 2. The driver used by AP2BP, in which V1 is any suitable tetrode (see text), C1 and RFC1 as in Fig. 1., and R1 is a 2-watt carbon resistor of any value between 75 and 500 ohms.

JANUARY SSB CONTEST

See details p.539 this issue. All SSB operators invited to participate in world-wide DX event, offering two-way SSB contacts on all bands. Call "CQ SSB Contest".

frequency during times when the band is open but has only found AM signals.

The ARRL originally suggested an SSB calling frequency in the 10-metre band to provide a meeting place, in what was then a large expanse of unoccupied frequency. The arrangement worked well and enabled SSB stations to get together under what were often apparently dead band conditions. Now that the band is again well populated Sideband activity has spread out and many stations are operating at the HF end of 10 metres.

It has been suggested that a new calling frequency be adopted for non-American stations in the 28450-28500 kc area, and in recent weeks a few European sideband stations have given the idea a try. The results have been discouraging, however, because the DX sideband stations have not been looking for SSB outside the American phone-band.

It is worth while checking the 28650 kc frequency during times when the band is not open to the U.S.A. as SSB stations in other parts of the world still favour this channel as a calling frequency.

News and Views

VE3EGO (*ex*-G3IXL) who has recently settled in Kitchener, Ontario, sends 73 to all his old SSB friends in Europe; during a recent 14 mc QSO with the writer he reported that he is active most evenings on 14310 kc and would be looking for G contacts.

G2MA (Rotherham) has at last completed his mechanical-filter type exciter and 813 triode-connected linear. A multi-band Cubical-Quad aerial is under construction. He is very enthusiastic about his results and says that his first SSB contact gave him the biggest thrill in 30 years of Amateur Radio. Another welcome newcomer to the Sideband ranks is GC5ZC (Guernsey) who is on 80 with an LF type filter transmitter. Other new stations on SSB include G3KOK, G8OO, DL1JV, DL4JG, SM6AAB and SM6SA.

In Manchester, G3HJK finds his new Panda beam is out-performing his separate HF aerials. The beam is mounted on a short pole which is supported by the shack chimney-stack. The bottom of the pole rests in the fireplace, permitting direct rotation of the beam. G3HJK says the fireplace is disused; let's hope it does not get too cold this winter! G3IRP (Morden) has also recently erected a new aerial for 14 mc and is highly pleased with his SSB DX results. G2WD (Stone) hopes to be on SSB soon. G3CWB (Hampstead) has modified his phasing exciter for multi-band operation. Old-Timer G6KI is now on 80-metre sideband.

GW3ECH, better known to the DX types as AP2BP, hopes to be active again soon from his home location in Pembrokeshire. He is due for 6 months

leave in the U.K. and is scheduled to arrive about the middle of the month. He has plans for a spring holiday in the Channel Isles and hopes to be able to take a portable SSB rig along. GW3EHN (Swansea) is still burning the midnight oil on 14 mc; he now has local competition in the shape of GW3CEN and GW2DUR. Both are located nearby and are new to Sideband.

Stations who were on SSB during 1949 and 1950 will certainly remember DL4WC. He has recently returned to Europe and is now active from Paris as F7BN; operation is confined to 14 and 21 mc because of aerial difficulties but he hopes that he will be able to get on 80 in a few months time. Another early sideband, SM5QV, reports that he is rebuilding and will be back on the air early in 1957.

Friends of G3EPL (St. Bees) will be sorry to hear that he has been in hospital with eye trouble. After an operation he is back home and on 80 metres . . . best of luck, Jim. G3JOL (Daventry) is new to sideband and can be found most evenings on 80 after closing time; he is the landlord of the "Saracen's Head" and would welcome a chat with any sideband who is passing through Daventry. G3ILD (Darlington) is on 21 mc and has been heard on 7 mc. DL4YU (Kaiserslauten) has completed his work in Germany and is now back in Texas.

G3MY (Sheffield) has little to report this month but has sent in his five-band score, as has G5BJ (Birmingham). G3KTU (Esher) has migrated to 14 mc and has a new linear amplifier; large doses of DDT are being used on a major debugging project to clear instability and spurious troubles. G3KTU is also active from his /A location in Mill Hill. The Cray Valley Radio Club recently held a constructional contest for home built equipment; the senior prize was awarded to G3HRO (Bromley) for his SSB transmitter.

DL2TH (Buckeburg), reporting for the first time, says he has been active on SSB for just over a year and likes it very much. He is using a crystal filter exciter with two half-lattice sections on 380 kc. The output is heterodyned into the 80-metre band and then amplified by a 12AT7 cascode and an 815 buffer stage. A second mixer stage can be switched in to convert the 3.8 mc signal to other bands. The linear amplifier is paralleled 807's and is a modified unit originally constructed for CW and AM service.

Regulars on Eighty will be sorry to hear that DL6WL has closed down preparatory to emigrating to the States. One of the early sidebanders in Europe and the first German national on SSB he has maintained a nightly contact with G2NH for longer than most of us care to remember. Now that the excuse for nightly oil burning is no longer valid, perhaps Ernie of G2NH will have time to complete that phasing exciter which he started so long ago. Joking apart, the writer is sure that all of the 80-metre fraternity will wish DL6WL the best of luck in his new venture.

SSB COUNTRIES WORKED-LADDER

(Starting Date January 1st, 1954 — Two-Way SSB Only)

STATION	3.5	7	14	21	28	Total
DL4SV	17	0	46	6	0	56
K2DW	0	0	56	0	0	56
ZS6KD	0	0	55	10	5	55
G6LX	15	2	49	42	6	52
VK3AEE	0	0	51	0	0	51
W2JXH	—	—	—	—	—	50
G3BXI	0	0	45	42	2	49
VE7EL	—	—	—	—	—	49
ZL3IA	—	—	—	—	—	48
W6IAL	—	—	—	—	—	48
W2CFT	—	—	—	—	—	48
ZL3PJ	0	0	46	0	0	46
G3GKF	0	0	1	45	1	45
G3MY	—	—	—	—	—	45
AP2BP	0	0	44	3	0	44
OZ3EA	0	0	43	0	0	43
OH2OJ	—	—	—	—	—	43
HR2WC	0	0	36	37	0	39
DL2TH	8	0	31	9	0	38
G5BJ	6	0	34	0	0	35
G3AUB	14	0	28	0	0	33
G3BFP	11	0	21	15	0	32

Table corrected to November 9, 1956

DX Notes

For the past few months a group of sideband workers have been trying to arrange a WAC round-table. Numerous schedules have been made on both the 14 and 21 mc bands and in recent weeks 28 mc has also been tried. Due to propagation conditions these attempts have always just failed, with only one continent being absent. On the morning of October 28 a further schedule was arranged on 14 mc; this time conditions were excellent and the six-continent QSO was duly achieved. A number of other stations climbed on the band-waggon when they realised what was happening but the original participants were CN8GD, DL4SV, G3HRO, KA2FC, PY2JU, VK3AEE, W5SVP and ZL3PJ. Further attempts will be made other Sunday mornings at 0800 GMT.

Unfortunate that conditions were so poor during the recent *CQ* Contest, as the operators at KC4USV had planned to be active on 10, 15 and 20 metres for the whole period of the Test so as to give many more sideband operators the chance of a new country. Never mind, chaps, they will be down in Little America for quite a while yet and sooner or later conditions will give us a break.

As previously mentioned AP2BP hopes to be in Europe until next May but the other sideband stalwart AP2CR will continue to represent Pakistan. Sideband contacts with Asia have been made easier with the increase in KA, KR6, KG6 and JA stations now active on both 14 and 21 mc. Also from Asia VS6BE has at last appeared and is putting out *quite* a signal on Twenty.

KL7AOP, Anchorage, is a well-known SSB operator who has given many Europeans their first contact with Alaska.

VQ4EU has been working into the States on Ten with good results, but so far has heard no Europeans ; he is also very active on 15 and 20 metres and uses a 14 mc Skeleton Slot which he finds works very well on all three bands. VQ4EU says the conversion to SSB cost under £2, which was mostly spent on parts for the G3GEN exciter. He must have a well stocked junk-box !

EAØAC has been on Twenty with a very strong but rather odd-sounding signal. During a recent QSO he mentioned that he was using a W2UNJ type exciter which had been constructed with components " borrowed " from BC sets. At present he is the only amateur on SSB from Spanish territory but EA4BF is ready to go as soon as he receives permission from the authorities. ZS3BC has completed his rebuild and is back with a very fine 14 mc signal. VE3EGO mentions hearing ZS7AG on 14 mc. JA1AEA is on 7100 kc.

On Fifteen, G3GKF reports that his schedule with W9RUK and KH6AR continues to be successful. G3GKF invites any other G-sidebander to join in these contacts, which take place each weekday evening at 1830 GMT on 21425 kc. Another KH6 station reported to be regularly active on 15 metres is KH6EM, who is looking for G stations every week-end on 21430 kc.

SSB has really caught on in Iceland, with four stations now active. Newcomers are TF3KA and TF3SF, who join TF2WBI and TF3CJ. All are on 14 mc, but 21 mc operation is planned by at least two of the stations. A UB5 has been reported on 14 mc sideband and several Polish stations have been heard, including SP5FD and SP8QS.

HH2AR has been worked by G3MY on Twenty. PY2JU has finished his final and is on 15 and 20 metres with a terrific signal—but has since blown his plate transformer ! KV4AA is on 14290 kc most Sunday evenings—but somehow he never seems to hear the G stations calling him on the frequency !

Information for these notes was provided by K2DW (*CQ Magazine* SSB section), AP2BP, DL4EW, DL4SV, F7AF, F7AR, G3AUB, G3BFP, G3GKF, G3HJK, G3HRO, G3MY, G5BJ, VK3AEE, W2KR, W6ITH and SWL's Amie, Richardson, Wilkie and Williamson. Thanks to them all for their help.

Worked All States Certificate

For those interested in operating awards the A.R.R.L. will issue the WAS Certificate suitably endorsed for two-way SSB working *provided* all the QSL's state clearly that the contacts were made on A3a.

A list of SSB stations active in the " difficult " States will be given in the next *Topics*.

Countries Worked Ladder

The Ladder this month has been broken down into individual band scores, although in several cases it has only been possible to show totals as the separate scores by bands have not been quoted. The top notcher is still DL4SV (Munich) with a total of 56 different countries worked.

Sideband DX Contest

We have just been notified that a Sideband-only Contest is being organised by *CQ* for the week-ends January 12-13 and January 19-20, 1957, 1800-1800 GMT during both periods. All bands may be used, but there are no multipliers. Contacts are by exchange of serial numbers, starting 001 for each entrant, given with the RS report, *e.g.* RS57004 for the 4th SSB QSO made, with R5 and S7 as the signal report given. Contacts to score must be between SSB-only stations both ways, and for a completed two-way QSO (serials exchanged) the scoring system is: 3 points between stations in different Continents ; 2 points between different countries in the same Continent ; and one point between stations in the same country. A station can only be worked *once* to score during the Contest.

Logs showing Band(s) worked, Date/GMT, C/s station worked, Serial given, Serial received, and Points claimed must be sent either direct to *CQ* or to The Editor, *Short Wave Magazine* (for onward transmission) postmarked not later than February 3, 1957. Certificate awards will be made to the ten highest scorers in the world, with a cup for the outright winner.

Dead Line

The next appearance of this feature will be in the February 1957 issue of *Short Wave Magazine*, for which reports are requested from all SSB operators not later than December 31. It now only remains for your commentator to wish all Sidebanders the best of Christmases and the happiest and most prosperous of New Years, and may the DX bands keep wide open for us all. BCNU on February 8, 1957—till then, Cheers and 73.

AMERICAN WIRE GAUGES

When following articles in American periodicals, remember that in size for size quoted, American wire gauges are somewhat lighter than ours. That is to say, our No. 14 SWG is just about exactly (to the third decimal place) the diameter of their No. 12 B & S. Similarly, what they would call No. 21 B & S is the same as our 22 SWG.

VHF BANDS

A. J. DEVON

ALTHOUGH VHF conditions and activity have relapsed into a more normal state since the October openings, there is nevertheless quite a lot to discuss this month.

First of all, the new 70 mc band: Several correspondents say, in effect, that its advent is in some ways a pity, because it will tend to split the available VHF effort, *i.e.* divert activity from two-metres. This is probably true, but we rather question whether it matters a great deal, because for one thing the 4-metre allocation is not permanent (*see* p.483 November "VHF Bands") and for another most people getting under way on 70 mc will be VHF types who will maintain their two-metre installations. Indeed, there is hardly any point in doing otherwise.

Taking the broader view, in these hard times it is undoubtedly a very good thing to have another band open to us — and it certainly makes the amateur VHF spectrum much more interesting now that we have active bands from 4 metres to 25 centimetres. At the LF end, it brings inter-Continental DX at least within the ken of the VHF-only operator.

So far as we know, nobody is yet fully operational on all the four VHF bands, 70 mc to 1250 mc — though G6NB soon will be, if he is not already, and G3JHM will not be far behind. The stations at present known to be active on four metres are: G2HCG, G3DKF, G3FAN, G3GNR, G3HAZ, G3HBZ, G3HRH, G3HTC, G3JHM, G3JTQ, G5KW, G6NB and G8KW. There are, no doubt, others of whom we have not yet heard.

Of course, a great many people who might otherwise have given 4 metres a run are precluded because of what Jack Train would call their geographical location. The Jodrell Bank limitation covers a far greater area than might be supposed, because Holmes Chapel (which is near-enough the pin-point for Manchester University's Radio Observatory) is 22 miles east of Chester, on the A.54 between Congleton and Middlewich. A 50-mile radius with Holmes Chapel as centre takes in places like Preston, Burnley, Bradford, Barnsley, Sheffield, Rotherham, Chesterfield, Derby, Walsall, Dudley, Wolverhampton, Shrewsbury, Denbigh and Rhyl.

This brief summary is strictly for guidance only; for instance, our rough plotting of the 50-mile radius does not quite enclose the whole of Bradford nor the suburbs of Wakefield. Obviously, those who feel they may be border-line cases should make a more accurate plot, reckoning the distance from Holmes Chapel railway station. If this brings them very close to the 50-mile limit, and it becomes a matter of yards, then it will mean taking the NGR of Jodrell Bank (off the 2½-in. O.S. sheet for the Holmes Chapel neighbourhood) and working it out from that. Your A.J.D. will endeavour to get the precise location details screwed down in time for the next issue.

Irrespective of the detail, the fact remains that a large part of north-east England, where VHF population is quite high, is cut off from 4-metre activity. This is a limitation that has to be accepted in view of the very important long-term investigations going on at Jodrell Bank — though, with only 50 watts input, we would have thought that the radius could have been reduced to something a good deal less than 50 miles. (Somebody, somewhere, was over-insuring, as usual).

Results on Four Metres

G3HTC (Twickenham) has been doing tests on 70 mc with G3JTQ/M; in general, they find that 4 metres gives better results than 2 metres over obstructed paths or in badly screened locations. (They made their first 4-metre QSO's within a week of the band being opened). Other findings are that TVI can certainly be expected on 70 mc unless there is a high degree of rejection, by means of filters, on the receiver.

For getting on to 70 mc, G3HTC suggests a 7 mc crystal multiplied to 35 mc in a Colpitts-type oscillator circuit, with its anode tuned to the 5th harmonic; this is followed by a buffer, the valves to use being EF91-EF80; the result will give ample drive for a 5763 doubler to 70 mc.

G3HTC also suggests the R.1143

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1956

Starting Figure, 14

From Home QTH only

Worked	Station
47	G3GPT
41	G3KEQ
35	G3GHO, G5ML
33	G3DKF, G3JWQ, G3LHA
32	G2DVD
31	G2CIW
30	GC3EBK
29	G3IOO
26	G3KHA
25	G3CKQ
24	G3KUH
23	G3KEF
19	G3FIH
18	G5MR
15	G3IER

This Annual Counties Worked Table opened on September 1st, 1956, and will run till August 31st, 1957. All operators who work 14 or more Counties on Two Metres in the year are eligible for entry in the Table. The first claim should show a list of counties with stations, which can be added to thereafter as more counties are worked.

"surplus" receiver as a useful possibility for listening around 70 mc. It can be modified to operate as a CC converter by re-wiring the grid side of the EL32 oscillator to the Colpitts; a 7575 kc crystal is doubled to 15.15 mc in the plate of the EL32, and the EF50 multiplier is tuned to 60.60 mc by changing the coil to 6 turns, ½-in. diam.; the other three coils should be altered to 5 turns, ½-in. diam. By connecting the anode of the R.1143 FC stage straight to the main receiver through a 100 $\mu\mu$F capacity and tuning 9.6 to 9.8 as the IF channel, 70.2 to 70.4 mc can be covered.

25-Centimetre Frequency Area?

The suggestion made in this space last month by G6NB has been taken up by various correspondents — and it is quite clear that we are as far off as ever from getting an agreed "two-megacycle activity area" on the 1250 mc band!

It seems that many people are already committed to 1296-1300 mc (the third harmonic from 430 mc) in the sense that they have gear under construction for this part of the band, and cannot readily change for the LF end. Others are already tied down in some other area, and see no reason why they should have to change — and at these frequencies, any change *is* a major undertaking.

In view of these conflicting views, it would appear that the best thing at this stage is for us to be given detailed information as to the call-sign, location, Tx frequency, Rx coverage and any operating schedule of all 25 cm stations for publication here — much as we did for 70 centimetres when that band was being opened up. This will at least enable all interested to see where everyone else is, and in due course might induce a degree of rationalisation, with everybody urging into the same frequency area. As things are at the moment, it seems certain that stations in the 1215-1217 mc area will never QSO those using 1296-1300 mc — it is just not a practicable proposition on the receiving side, unless everybody has a two-channel converter!

If there is any other suggestion, or approach to the problem, that can be put forward by anybody, your A.J.D. would be very glad to have it for ventilation in these columns.

In the meantime, to implement the general idea of getting the 1250 mc band pegged out, please let us have details of your 25 cm gear and where you are in the band, so that we can start an information column.

Some General Observations

F3SK (Asnieres) in a very interesting letter, is good enough to correct us on a small point as regards the pyramidical horn for 25 cm, mentioned last month as having been built by G3JHM to the design by F3SK; actually, it was designed by F8OL and has been used so successfully by both F8OL and F3SK that the latter passed the details on to G3JHM.

At F3SK, the transmitter runs, crystal controlled, a 2C39A in the PA, for plenty of RF on 1260 mc — nevertheless, F3SK is in entire agreement with G6NB on the advisability of the "LF two megacycles." F3SK/F8OL are in regular QSO on 25 cm over a non-optical distance of 9 miles, with contacts twice a day during the last six months. On F3SK's converter, F8OL is invariably S9+, and "with but a quarter-wave rod at the end of 18 feet of coax," he is always readable on CW. From 1250 mc, F8OL has worked F8GH cross-band at 50 miles. More work is in hand with improved converters using UHF coaxial pre-amplifiers and valve types like the new micro-lighthouse GL6299.

Needless to say, F3SK is strictly anti-SEO as regards development for the 25-centimetre band!

The comments attributed to EI2W last month have drawn some opinions — those in the southern

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in strict alphabetical and numerical order).

G3KUH, Rotherham, Yorks.

WORKED: G2BVW, 3DVK, 3ELG, 3FGT, 3GFD, 3GHO, 3HA, 3IIT, 3IWJ, 3JWQ, 3KEQ, 3WW, 4MK, 5KG, 5MA. 6NB, 6RH.

HEARD: G3ALC, 3FIH, 3FTN, 3GFW, 3GPT, 3HBW, 3JXN, 3JZG, 3JZN, 3KFD, 6AG. (*October* 25 *to November* 19).

G2BRR, Wootton Bassett, Wilts.

WORKED: F8NW, G2CIW, 3ANB, 3EPW, 3JWQ, 3KSR/P, 5SK, 8KW, GC3EBK.

HEARD: DL1LB, G2FJR, 3CCH, 3GHO, 3HXJ, 3HXZ, 3INU, 3KSR, 5KW, 5MA, 5ML, 5YV, 6NF, 8VZ, GW8UH, ON4HN, PAØBL, ØFB, ØGER. (*October openings*).

G3JWQ, Ripley, Derbys.

WORKED: DJ1DC, F3LQ, 8GH, G2ADZ, 2AIW, 2AHP, 2AHY, 2ANS, 2ATK, 2AVQ, 2BRR, 2CIW, 2CRL, 2CVD, 2CVD/P, 2CZS, 2DCI, 2DDD, 2DSP, 2DSW/M, 2DVD, 2FJR, 2FNW, 2FO, 2FMJ, 2FMO, 2HCG, 2HCJ/P, 2HQ/P, 2JF, 2NM, 2NY, 2YB, 3ABA, 3ALC, 3ARX, 3ATM, 3AUS, 3BA, 3BJF, 3BJQ, 3CGQ, 3CKQ, 3DBM, 3DF, 3DKF, 3DKF/P, 3DO, 3DOV, 3EEO, 3EJO, 3EPW, 3FCQ, 3FFV, 3FGT, 3FIH, 3FKO, 3FP, 3FW, 3GFD, 3GFW, 3GGR/P, 3GHO, 3GPT, 3GOX, 3GSO, 3GVK, 3GWB, 3HBE, 3HBW, 3HHD, 3HHY, 3HIQ, 3HVX, 3HWJ, 3IER, 3ION/P, 3IOO, 3IRA, 3IRS, 3IUD, 3IVF, 3IWJ, 3JFR, 3JQN, 3JR, 3KEF, 3KEQ, 3KHA, 3KPT, 3KQF, 3KSR/P, 3KUH, 3LAY, 3LAY/P, 3LCV, 3LHA, 3LIM, 3PY, 3WW, 4FB, 4IB/M, 4JJ/A, 4MK, 5AU, 5BD, 5BM, 5DW, 5KG, 5KW, 5LL, 5MA, 5ML, 5MR, 5NF, 5PP, 5SK, 5SV, 5UM, 5VN/A, 5YV, 6AG, 6CI, 6JK, 6LL, 6MI, 6OX, 6OZ, 6SN, 6UH, 6XX, 6YP, 6YU, 8AL, 8KW, 8VZ, GC2FZC, 3EBK, GI3GXP, GW5SA/P, 8UH, ON4DW, 4HN, 4UD, 4ZH, PAØBL, ØFB, ØGER, ØNO, ØWAR, PE1PL. (*September* 1*st to November* 14).

G3HVO, Gt. Shelford, Cambs.

WORKED: G2AIQ, 2CIW, 2XV, 3GGJ, 3IIT.

HEARD: G3FAN, 5BQ, 5HN, 5JO, 5KG, 5MA, 5UM.

SWL Stokes, Ruislip, Middlesex.

HEARD: G2AHL, 2AHP, 2AJS, 2HDZ, 2RD, 2TP, 2UJ, 2XV, 3ABA, 3BFP/A, 3BYY, 3CNF, 3ECA, 3FP, 3FVG, 3FZL, 3GDR, 3GHI, 3GNR/P, 3HBW, 3HWJ, 3IIT, 3IRW, 3JQN, 3JR, 3KEQ, 3KQR, 3LIM, 3WW, 5DS, 5KW, 5MA, 5YH, 6AG, 6NF, 8KW, 8RW. (*October* 10 *to November* 10).

G2AHY, Crowthorne, Berks.

WORKED: G2AHP, 2CIW, 2YB, 3ABA, 3FQS, 3FZL, 3IRW, 3JFR, 3JR, 3LIM, 5MA, 6AG, 6JK, 6OU. (*October* 6 *to November* 3).

SWL Smith, Hoxne, Norfolk.

HEARD: F8GH, 8XT, G2CZS, 2DRA, 2FJR, 2HCD, 2HCG, 2HOP, 3ABA, 3DKF, 3DOV, 3FGT, 3FZL, 3GDR, 3GFD, 3GVK, 3JWQ, 3WW, 4KO, 5BD, 5JV, 5KG, 5KW, 5LL, 5MA, 5PP, 5SK, 5YV, 6AG, 6LI, 6NB, 6SM, 6XX, 8KW, 8MW, GC3EBK, GW3GWA, PAØFB, ØNO. (*Phone and CW, October* 13 *to November* 18).

G3KHA, Knowle, Bristol.

WORKED: G2ADZ, 2CIW, 3AYL, 3BII, 3DKF, 3FIH, 3FKO, 3GNR/P, 3GYQ, 3HBW, 3HHY, 3HKT, 3IOO, 3IRA, 3IRS, 3JWQ, 3KPT, 3WW, 3YH, 4PS, 5BM, 5KG, 6AG, GW8UH.

HEARD: G2ATK, 2ANS, 2BVW, 2CPX, 2FM, 2FNW, 2HCG, 2IT, 2JF, 2NM, 2RD, 2YB, 3ABA, 3FCQ, 3FMI, 3GHO, 3GVK, 3GXN, 3HXS, 3IIT, 3IWJ, 3KEF, 3KEQ, 3XC, 5HN, 5KW, 5MA, 5ML, 5MR, 5RD, 5YV, 6OX, 8KW, 8VZ, GW5BI. (*October* 23 *to November* 18).

G3LHA, Coventry, Warks.

WORKED: G2ANS, 2ATK, 2ATK/M, 2CVD, 2FMO, 2FNW, 2HCG, 3ALC, 3AUS, 3BA, 3CGQ, 3CKQ, 3CRH, 3DF, 3DKF, 3DKF/P, 3EJO, 3FGT, 3FUW, 3FW, 3GGJ, 3GHO, 3GVK, 3GWB, 3HAN, 3HBE, 3HBW, 3HTY, 3HXS, 3IER, 3IIT, 3IRA, 3IRS, 3JQN, 3JWQ, 3JZG, 3KEF, 3KEQ, 3KFD, 3WW, 5KG, 5KW, 5ML, 6NB, 6SN, 6XA, 6YU, 8MZ.

HEARD: G2AVQ, 2BVW, 2DCI, 2DDD, 2FM, 3ABA, 3AYL, 3BJF, 3EPW, 3FAN, 3FIH, 3GPT, 3GKZ, 3HAZ, 3HHD, 3HZF, 3IWJ, 3JR, 3JXN, 3LDW, 3LIM, 5BD, 5BM, 5MA, 5PP, 5SK, 5YV, 6AG, 6CI, 6LL, 8KW, 8VZ, GW8UH. (*October* 22 *to November* 21).

part of the country tend to agree with him, but up north they do not entirely support Henry's views. We are told that activity in the north-west is *not* decreasing and that under contest conditions EI2W has many advantages. It is fair to say, however, that Henry was generalising on his theme, and not quoting himself as a particular example The suggestion of his critics is that regular EI activity would stimulate the appearance of more EI stations on VHF. EI2W has, we think, already done a good deal in this respect. The total of EI licences in issue is barely 170, so that on U.K. proportions the number of EI's equipped for VHF is unlikely to exceed 10-12 stations at the very most.

On yet another topic mentioned last month — the paucity of active GD stations — it seems that we may have done less than justice to GD3UB (Ramsey), who *does* appear on two metres and has given many G's their Isle of Man contact. The last time GD3UB was actually reported in "VHF Bands" was just a year ago. In this connection, G3GPT reports that on one occasion some time back, hearing ON4BZ calling "GD only," he tried hard to raise Guy to let him know when GD3UB might be available — but apparently ON4BZ missed the point and did not respond to G3GPT!

Guy himself writes to put us right on the ON/9S4 "First"— it was actually made by ON4UD last August; we will correct this at the next showing of the "Firsts" table.

F8MX is a very well-known VHF operator. When /A at St: Valery-en-Caux, he runs this 64-element array on 70 centimetres.

LF End Congestion

There is again a regrettable tendency for crowding to the LF end of the two-metre band; EI, GI and GM stations are all to be found in this area but will become increasingly hard to work if the VHF band plan, as agreed by all parties concerned, is ignored. There is no valid excuse for anyone to be outside his correct zone — the cost of crystals has long since ceased to be any factor in the situation, and by being out of his zone, an operator is merely creating avoidable and unnecessary QRM to others.

As has been repeatedly stressed in this column over the years — ever since we first offered the Zone Plan, in fact — operation of the plan does call for co-operation all round. The main thing is that the whole band should be searched, and not just the first 300 kc. This is *essential*, to give a fair look-in to those stations, respecting the plan, whose zone areas put them HF in the band.

Could we, therefore, have a little rationalisation in this matter? To this end, the agreed zone allocations are given again this month, so that there is no excuse for anyone not knowing. The present Zone D situation is, we know, not strictly "as per book," but as only a very few stations are involved, in practice it does not really matter; indeed, it

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
28	G2XV
26	GW2ADZ
23	G3BKQ, G6NB
20	G3HBW
19	G3KEQ
18	G3IOO
16	G6NF
15	G4RO, G5YV
14	G2HDZ
13	G2CIW
10	G2OI, G3IRW
9	G5DS
7	G2DDD, G2HDY
6	G3FAN, G3JHM, G3JMA, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G5ML
4	G3JGY

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

BRITISH ISLES TWO-METRE ZONE PLAN

(This is reproduced here for the attention of all concerned).

Zone A & B: 144.0 to 144.2 mc.	All Scotland.
Zone C: 144.2 to 144.4 mc.	All England from Lancs. Yorks., northward.
Zone D: 145.8 to 146 mc.	All Ireland.
Zone E: 144.4 to 144.65 mc.	Cheshire, Derby, Notts., Lincs., Rutland, Leics., Warwick and Staffs.
Zone F: 145.65 to 145.8 mc.	Flint, Denbigh, Shrops., Wores., Hereford, Monmouth and West.
Zone G: 144.65 to 144.85 mc.	Northants., Bucks., Herts., Beds., Hunts., Cambs., Norfolk, Suffolk.
Zone H: 145.25 to 145.5 mc.	Dorset, Wilts., Glos., Oxon., Berks. and Hants
Zone I: 145.5 to 145.65 mc.	Cornwall, Devon, Somerset.
Zone J: 144.85 to 145.25 mc.	London, Essex, Middlesex, Surrey, Kent, Sussex.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

16	ON4BZ (DL, EI, FG, GC, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM, 9S4)
15	G3GHO, G4MW, G5YV, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM)
14	G2FJR, G2HDZ, G3IOO, G5BD, G8OU
13	G2XV, G3BLP, G3CCH, G3DMU, G3GPT, G5DS, G6XM, G6XX
12	G2HIF, G3WW, G6LI, G6RH
11	EI2W, G2AJ, G3ABA, G3DVK, G3HAZ, G4RO, G4SA, G5UD
10	G2FQP, G2HOP, G3BK, G3BNC, G3EHY, G3FAN, G3GHI, G3GSE, G3WS, G5MA, G5MR, G8IC, GM3EGW, GW5MQ
9	G2AHP, G2CZS, G2DVD, G3FIJ, G3IUD, G5ML, GC3EBK, PAØFB
8	G2CIW, G2DDD, G2XC, G3AEP, G3DKF, G3GBO, G3HCU, G3HWJ, G3JWQ, G3VM, G5BM, G5BY, G8SB, GC2FZC

is probably more convenient to have the EI's, GI's and GM's all together at the LF end.

Some Station Reports

G2AHY (Crowthorne) puts in claims, and remarks that he is still running just the 25w. on 145.12 mc, with a 3-ele flat-top. G3HVO is now at Gt. Shelford, Cambs., having moved up from Dorset, and is glad to be back on two metres after a year of inactivity; he says he has had a lot of help from G3WW in getting going again.

G3JWQ (Ripley, Derbys.) will not be on 4 metres because, as he puts it, he is just about 45 miles from the centre of solar activity; so he is going to devote his energies to a better beam for two metres, and the gear for making a start on 70 cm. G3JWQ runs steady schedules with G5AU, G5MA and G8VZ; they have 100% contacts over good distances along difficult paths. G3LHA (Coventry) says he is still active, every evening, and has worked 15 more new stations during the period; his transmitter now runs a pair of 832's, one tripling 48-144 mc and the other as PA; this arrangement helps to eliminate Band III TVI while producing plenty of drive for the PA. Best QSO for G3LHA during the month was with G3AUS (Torquay), RS-56 both ways on phone — nice going with an indoor 3-ele Yagi! On 4 metres, G3LHA has heard seven of the active stations on that band, and on 70 cm he has logged 10 stations, including G3IOO and G3IRA.

G3DLU (Sheffield) has been very busy on the engineering side, and now displays a slot-fed 6/6, beam, motorised, at a height of 33ft. He has eliminated feed-back trouble in his phone and rebuilt the 829 PA as a fully screened unit; this is modulated by the 807 speech-clipper design described in the November 1953 issue of SHORT WAVE MAGAZINE which, says G3DLU, gives excellent results, audio power output and PA DC input being 1 : 1.

G3DKF (Coventry) is on 4 metres, CW only, and has made several contacts; he hopes to have phone going with about 20w. input by the time this appears. Some /P work has also been done on two metres — he had been hoping to try Hunts. and some of the Welsh counties, but G3DKF fears (as we all do) that the petrol business will curtail such activities. G3KUH (Rotherham) says that G5MA " at 170-odd miles " is a consistent signal with him, and mentions that QSL's are beginning to come in following last month's plaint. G3GPT (Nr. Preston) reports some very good QSO's during the period, in particular EI4E (Killarney) and EI6A (Wicklow); these, with others, gained him five more counties for the Annual.

G2CIW (Cambridge) has a sad thing to say — it is that on some evenings there is more activity from aircraft than amateur signals in the two-metre band! (SWL Smith (Nr. Diss) makes exactly the same comment). But in spite of that, G2CIW says he keeps active and " looks forward to working anybody " on either 144.65 or 433.95 mc. G3KHA (Bristol) moves in all tables, and reports hearing G5MR, called several times without result, around 1230 on November 18. G3KHA gives November 16-18 as a period of comparatively good conditions for GDX working. G2BRR (Wootton Bassett), having bought himself a TV receiver, now finds he is landed with a serious TVI problem!

G3JHM (Worthing) is very nearly fully operational on all four VHF bands and, having got going on 4 metres and acquired an ACT-22 for a QRO PA (100w. RF out), would welcome schedules with any 70 centimetre stations.

A very welcome report from EI4E (Killarney) makes it clear that he is indeed both keen and active; he is running schedules with EI2W, EI4R, G2ADZ, G3GPT, G3JGJ, G6NB and GI3GXP, at varying times between 1730 and 2300, almost daily. He beams through all sectors to the east of his location, and is on CW at 145.1 mc, with an ERP of about one kW. EI4E's nearest neighbour is EI4R on 145.82 mc, at a distance of 30 miles, and he also is on most late evenings. An illuminating comment on the remoteness of EI4E's location is that after three years on the band he has only been able to work three stations! He says that what really keeps him going is his *nightly* attempt to work EI2W and his regular QSO's with EI4R and G2ADZ. There's real enthusiasm for you! EI4E would like more schedules; write him at: Avenue House, Countess Road, Killarney, Co. Kerry.

The Tabular Matter

The tables shown this time are up-to-date with all claims — we would like to see more entries for Annual Counties, and more lists for the Activity Report. And don't forget about VHFCC; we know that there are several operators bobbing on the 100, if only they could get the cards in!

Season's Greetings

At the end of the tale, your A.J.D. must not forget to offer his good wishes for the season to all who follow this piece — their support and interest (and the kind remarks sometimes made about " VHF Bands ") are not only deeply appreciated but are also a constant stimulus. In the New Year, we meet again on January 4, so that reports are wanted by **December 17** if we are to be out on time; and even at that, it looks as if your A.J.D. will have to be checking page-proofs on Boxing Day — never mind, it's all part of the services! I shall have one (or two) for you all on Christmas Day!

Better Converter for Two Metres

"A GUN TO WORK DX"

M. VOZNJAK (YU1AD)

This article is actually a transcription from a manuscript prepared (in English) by YU1AD. A well-known electronics engineer in his own country, and an equally well-known character on the amateur bands, Mirko is also fluent in several languages. Here he describes a two-metre converter of modern design which will attract the attention of every experienced VHF operator.—Editor.

LOOKING over Europe as a whole, it is certain that activity on the VHF bands is increasing rapidly. Records are being broken, new countries are being worked, and all the time there are those who are striving for better equipment in order to improve their results.

The newcomer to VHF usually starts, quite rightly, with simple gear—but sooner or later he comes to the conclusion that the only way to do better *is* to improve his apparatus. Increased RF power output is, relatively speaking, an easy matter; if the original transmitter was QRP with, say, an 832 in the final, it can be used as an exciter for a Mullard QQV06-40A PA stage, running up to 70 watts input. If such a PA can be coupled into a beam consisting either of a pair of Skeleton Slots with reflectors, or a well-matched 5-over-5 Yagi, up high, the transmitting side will be well taken care of within the limits of average amateur capability.

The Receiving Side

This is where the biggest step forward can be taken. Plenty of RF into a good beam will not ensure success unless the receiver is a good deal better than those in common use. Most amateur two-metre converters — and in particular those using tunable oscillators—are no more than adequate for semi-local reception and can only find the DX when the band is wide open. Even if carefully constructed, they are far below the best standard that can be attained. It has truly been said that to use, on two metres, an SEO converter with an untuned RF stage is rather like listening for 160-metre phone on an 0-V-1. You *can* get results, but they are pretty poor!

In VHF reception, it has become evident that triodes are far preferable to pentodes in getting RF gain combined with a low noise factor. Pentodes are inherently much noisier than triodes, and there can be no question that a 6J6 neutralised push-pull RF stage is much superior to any 6AK5 arrangement.

For cascode circuits, the right valve to use is a 12AT7 (or ECC81), or two separate high-slope VHF triodes, which may be slightly better. Cascode RF amplifiers are extremely good when properly built and adjusted, and the noise figure can be as low as 4 dB. With a further, really good, RF stage ahead of the cascode, it may even be possible to achieve the "magic figure" of a 3 dB noise factor—but the RF stage must be good, otherwise it can nullify the performance of the cascode by itself. Since a triode RF stage is tricky to neutralise, the other approach is a grounded grid triode (GGT) RF amplifier.

A Converter Design

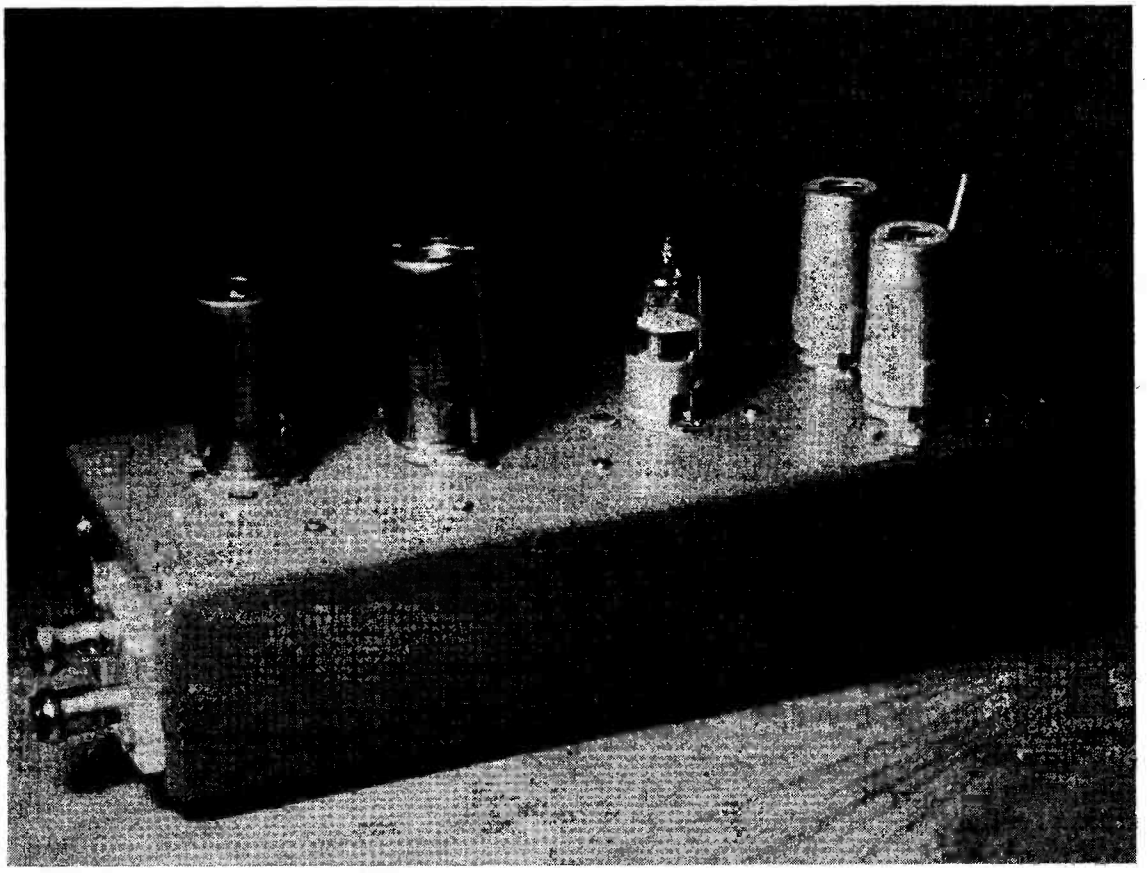
With all the foregoing in mind, consider the circuit for a two-metre converter shown in the diagram. This is not a beginner's receiver!

It is an eight-triode arrangement, each of which pulls its full weight. The first RF stage is a 6AF4 (the new Brimar type) connected GGT; this valve is rated at 80v. on the plate, which calls for a rather higher value of resistor at R2 than is usual. With a 6AM4 or a 6AJ4, both of which can be used in the same way as the 6AF4, R2 can be reduced to 2000 ohms with a 250v. HT supply.

The front-end input is arranged for 300-ohm balanced line, with L1 resonated at the centre of the band by trimmer C1; coupling to L2 is made very tight. The separation between the input and output circuits is obtained by putting a copper plate across the valve socket, as close as possible to it, with the grid pins soldered directly to this plate. The screening must be carefully done to achieve perfect stability and full amplification.

L3 is made self-resonant, and is coupled through C5 to the first half of the ECC85 cascode; L4 matches the plate of V2a into the cathode of V2b and also functions as a neutralising device (without L4, V2 will oscillate violently). Here again, perfect screening is essential, with a copper plate across V2 socket; L4 is passed through a hole in this plate, and secured to it by a liberal coating of polythene dope to ensure rigidity. In both the RF and cascode stages, heater chokes are fitted, double-wound and also doped.

The first half of V3 is the mixer, with V4,



General appearance of the two-metre converter designed by YU1AD, and described in the article. It is an eight-triode-stage arrangement, and from left to right the valves are : 6AF4 GGT RF, ECC85 Cascode, 6J6 mixer, with the 6J6 oscillator-multiplier and 6AB4 IF amplifier on the right. In the construction underside, three partitions divide the sub-space into four compartments, with copper-plate screens across the 6AF4 and ECC85 valve-holders (see text)

connected GGT, as an IF amplifier ; the purpose of this is to ensure that the good NF already achieved is not lost in the associated receiver. This IF stage looks somewhat like a cascode arrangement, but works differently ; L6 is for impedance matching and L8 resonates at IF, with a capacity divider, C12, C13, to get a proper match into the main receiver. (The second half of V3 is used as the oscillator-multiplier—*see* later).

YU1AD claims originality for this cascode mixer-IF amplifier arrangement, which gives a measured gain overall of 10 dB.

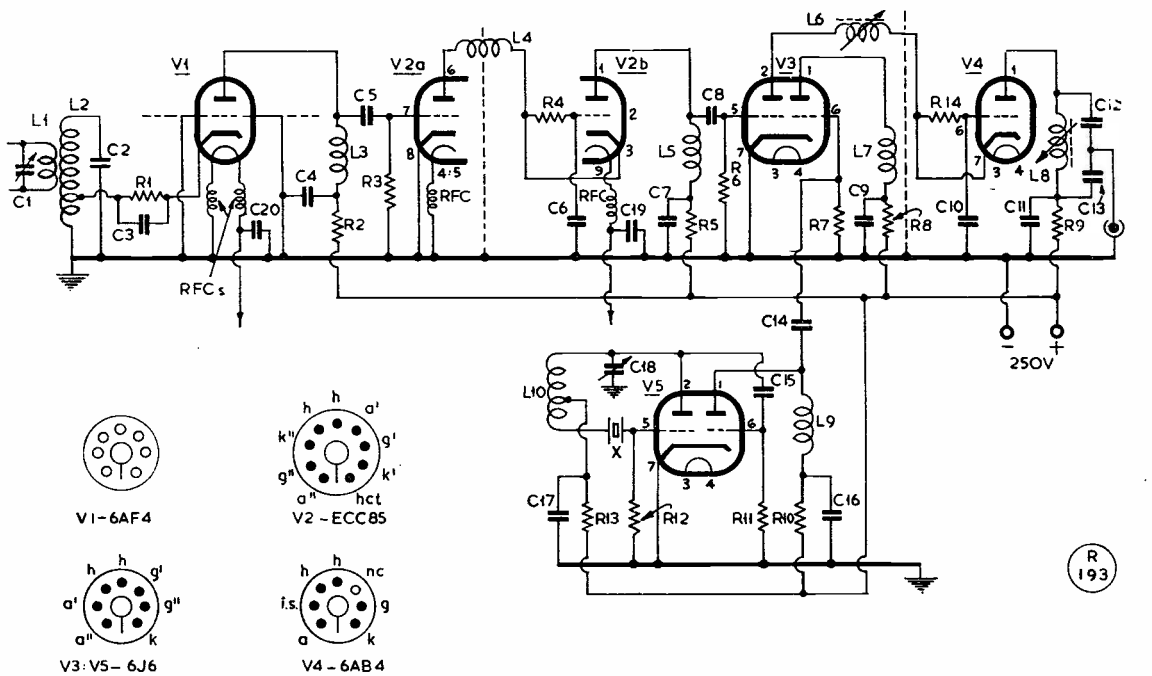
The IF range chosen for this particular converter is 9-7 mc, with the oscillator injection on the HF side of the signal, but this could of course be changed to cover some other IF with the more usual arrangement of oscillator injection LF of signal frequency. In YU1AD's case, the choice was dictated by the receiver with which the converter is used, it being tuned 9-7 mc to cover 144-146 mc ; this avoids the possibility of local 40-metre break through at the LF end of two metres which (in that part of Europe) is populated in the first megacycle or so only.

Oscillator-Multiplier

The oscillator V5 is a 6J6 which produces the third overtone of a 8500 kc crystal in the first half ; this is tripled in the second half and fed *via* C14 to the grid of the other side of V3, where it is doubled, to produce the final frequency, around 153 mc ; injection is by stray coupling between the two halves of V3. Coils L7 and L9 in the multiplier circuits are made self-resonant.

Construction

The entire converter is built on a chassis 10 in. long, 4 in. wide and 2½ in. deep. The



Circuit of the two-metre converter designed by YU1AD. Front-end gain is secured by a GGT RF stage ahead of the cascode, and the mixer is followed by a cathode-coupled IF amplifier with a capacity divider C12, C13 across the output coil L8, to ensure good matching into the main receiver. The second half of V3 is used as the final multiplier from the oscillator stage V5, and injection is by stray coupling between the two halves of V3. Pin connections for the 6AF4 are: 1, 7 anode; 2, 6 grid; 3, 4 heaters; and 5, cathode. It should be mounted with a close-fitting copper screen across the valve-holder (see text).

stages are mounted in their logical order, which is the best way to avoid any undesirable coupling effects, with the necessary screening between stages. In fact, the physical layout follows the circuit sequence. The IF connection to the main receiver *and* the power leads to the converter are in screened cable to minimise break-through.

Since this converter is intended for the experienced VHF operator who will have his own ideas, gained from the construction of many converters, it is not thought either necessary or desirable to give detailed constructional data.

Operation

After checking through, the first move is to get the oscillator working correctly. By listening on the main receiver, lock in the crystal on the third overtone by adjustment on C18, and then resonate L9 by GDO check; follow the same procedure for L7.

The next thing is to adjust all RF circuits into the two-metre band, using a GDO for the first check. Then connect up to the receiver and with a signal generator—or some locally-produced beat which is known to be in the band—peak up on C1, L2, L3, L4, L5, L6

Table of Values

Circuit of the Improved Two-Metre Converter

C1, C18 = 3-30 $\mu\mu$F, concentric trimmer
C2, C12 = 5 $\mu\mu$F, ceramic
C3, C4, C6, C7, C9 = 470 $\mu\mu$F, disc ceramic
C5, C8, C14, C15 = 27 $\mu\mu$F, ceramic
C10, C11, C16, C17 = .005 μF, disc ceramic
C13 = 33 $\mu\mu$F, ceramic
R1 = 150 ohms, ½-w.
R2 = 12,000 ohms, 2-w. (*see text*)
R3 = 1 megohm, ½-w.
R4, R14 = 470,000 ohms, ½-w
R5, R9 = 3,000 ohms, ½-w.
R6 = 2 megohms, ½-w.
R7, R11 = 100,000 ohms, ½-w.
R8, R10 = 15,000 ohms, 1-w.
R12 = 5,000 ohms, ½-w.
R13 = 10,000 ohms, 1-w.
V1 = Brimar 6AF4 (*and see text*)
V2 = ECC85, or similar
V3, V5 = 6J6
V4 = 6AB4, or ½-6J6

COIL DATA

(Assumes 8500 kc crystal and HF injection)

L1 = 2 turns, spaced double wire diam., close coupled to L2.
L2 = 5 turns, spaced over ½-in.
L3 = 3 turns, spaced over ½-in.
L5 = 5 turns, spaced over ¾-in.
L7 = 4 turns, spaced over ½-in.
L9 = 9 turns, spaced over 1-in.

All coils L1 L9 above wound with 18 SWG silver plated wire, inside diameter ⅜-in.

L4 = 9 turns 23g. spaced over ½-in., inside diameter 3/16in. Resonate by GDO into centre of two-metre band.
L6 = Dust cored, to tune mid-IF used } *L6, L8 staggered*
L8 = Dust cored, to tune mid-IF used } *staggered* 1 *mc*
L10 = 15 turns No. 21g., on ½-in. former, wound over ¾-in., with tap 4th turn from crystal end, or as necessary for correct operation.
RFC = 7 turns each of two wires, double wound No. 23, on 3/16-in. diameter former.

and L8 in that order until maximum deflection is obtained on the receiver S-meter or output meter. Should the receiver have no S-meter, an output meter can be contrived by using a suitable AC range on the station test-meter connected across the receiver output. If the input signal is modulated by an audio tone, a deflection will be obtained on the output meter. The circuits all through should be adjusted for maximum deflection on the test signal, as shown by the "output meter."

Even if the signal generator that may be available does not actually cover the two-metre band, harmonics from a lower-range instrument can be used just as effectively, *e.g.*, a standard AVO Wide-Range Signal Generator covers up to 80 mc on Range 6, the second harmonics of which at the 70-80 mc scale reading will give test signals up to 160 mc.

Having peaked up the converter thus far, the next thing is to adjust L7 for optimum injection as shown on the output meter and then, similarly, the cathode tap on L2.

By this time you will have quite a good two-metre converter—but it will not even yet be as good as it can be. Let us conclude in YU1AD's own words:

> "To get real honey from it, you will have to build or borrow a diode noise generator and play many hours with it. When you did, you will be able to say that you are owning a really hot-two-metre receiving equipment, a real gun to work DX" . . . . !

Multi-Range Test Meter

DESIGN THEORY, VALUES AND A PRACTICAL CIRCUIT

PART I

MOST enthusiasts are perfectly aware of the usefulness of a multi-meter and recognise that it is a necessity where a great deal of constructional work is done. Amongst those who do not possess such an instrument the omission is often put down to cost, because commercial test meters are often quite expensive. But why not build your own? The objection to this in many cases is the idea that such an instrument would be beyond the abilities of the comparatively inexperienced, calling for laboratory precision in construction.

It may surprise a good few meter-less enthusiasts to know that a simple test instrument can be constructed not only cheaply, but comparatively simply. Providing that the values of the components are correct, that all solder joints are sound and that certain points concerning the parts used (noted in this article) are watched, the instrument cannot fail to work. And there are not many items of equipment you can say that for!

Another misconception is that one has to be a mathematical genius to work out the values of the shunts, multipliers and so forth. But there are no complex computations, and providing you can add, subtract, multiply and divide there need be no qualms. *Don't* be scared of a few simple Ohm's Law calculations. In any case, the notes in this article should clarify the situation for any type of meter required.

The Movement

The basis of the whole unit is, of course, the moving coil meter which, by the switching in of series or parallel resistors, provides readings of voltage and current respectively. It is common practice to adopt a movement with a 1 mA Full Scale Deflection which will have a circuit resistance of 1,000 ohms per volt. Meters of lower sensitivity can be used, but the accuracy when used as a voltmeter falls off due to the relatively heavy current drawn through the meter. Reasonable accuracy can be obtained with a 5 mA FSD movement, but for more precise *voltage* readings one would have to measure the total circuit resistance and current and then work it out by Ohm's Law. For current and resistance measurements, however, there is no objection to the meter with a 5 mA deflection. A more sensitive movement (say of 500 or even 100 microamperes) is even better than a 1 mA pattern, but these are usually more expensive and for general radio test work the extra expense is hardly worth while.

There are some good 1 mA movements on the "surplus" market and also, if you are able to scour the shops, various movements of other values, which can be readily adapted.

Bearing these factors in mind, the instrument to be described is based on a 1 mA meter, the component values having been adjusted accordingly. When selecting a meter, note the calibration of the existing scale. Remember

that readings will have to be taken off it not only on the basic range but at multiples and divisions. Therefore, choose one with clear marking, preferably with five main divisions each sub-divided into ten smaller divisions. Naturally, the larger the dial the better; but also the higher the cost. The type of meter which has a scale length of about 2½ inches is satisfactory—anything much smaller tends to make reading-off rather trying. And make sure that the resistance of the meter is marked on the scale plate.

DC Voltage Ranges

To measure voltage, a resistance is placed in series with the meter so that with full voltage applied the current is restricted to the FSD of the movement. As an example, if the movement is 1 mA FSD and a series resistance of 1,000 ohms is inserted we can work out by Ohm's Law ($V = I \times R$) that 1 volt will deflect the meter exactly full scale—in other words, 1 mA will flow. Under these conditions we would have a 0-1 Volt DC range, the application of lower test voltage deflecting the meter correspondingly less due to the lower current flowing through the resistance.

For higher voltage ranges it is necessary only to switch in higher series resistances. In the example quoted, a 10,000 ohms resistance would provide a 0-10v. range; a 100,000 ohms resistance would give a 0-100v. range, and so on. The necessary value of the series resistor for any given voltage range can be calculated from:—

$$R + Rm = \frac{V \times 1000}{I}$$

where R = resistance of series resistor; Rm = resistance of meter; V = required full scale voltage; I = Full Scale Deflection of the movement.

Clearly, the resistance of the meter is part of the series circuit and this has to be taken into account when calculating the value of the series resistances. If Rm is 100 ohms, then the 0-1v. series resistor would be 900 and not 1,000 ohms (R – Rm, or 1,000 – 100). However, on all but the low voltage ranges the resistance of the meter can be ignored. On the 0-10v. range, for instance, ignoring the meter resistance will result in an error of only 1%. So on ranges above 50 volts or so, one may simply calculate the series resistances from:

$$R = \frac{V \times 1000}{I}$$

As to the practical side, here are some notes on components for the voltage ranges. Low-tolerance resistors for use as the series multipliers can be expensive and in any case it should always be borne in mind that there is little point in using resistances of greater accuracy than the movement itself! It is often considered, in instruments of the type being discussed, that 5% tolerance (gold band—or dot) resistors are satisfactory.

If the constructor does not feel that the expense of precision wire-wound resistors is justified, standard 5% tolerance carbon resistors will be suitable. But, even so, there may be difficulty in obtaining some of the odd values required. This can be overcome—even with ordinary 20% tolerance components—in one of two ways:

First, if the resistor is too high in value, the effective resistance can be lowered by paralleling another resistor with it. A useful pointer is that a shunt resistor ten times the value of the original component will drop the effective resistance by 10%; thus a 1,000 and 10,000 ohm resistor in parallel will give 900 ohms. For other combinations the standard formulæ can be used.

Where the resistor is too low in value, if it is a carbon type its resistance can be *increased* by carefully filing "flats" on its body. It is thus good policy to obtain, if possible, resistors slightly below the required value as they can then be accurately "pruned up" to value. (Remember that any resistor which has been filed should afterwards be given a dab of paint over the affected portion as a precaution against dampness.)

Another point is that odd values can often be found in the junk box. Suppose a resistance of 900 ohms is wanted. Quite likely a wide-tolerance 1,000 ohm resistor can be found which is low enough for the purpose. Where precision resistors are not used, the series multipliers should if possible be checked against an instrument of known accuracy. On the other hand, low value resistors can be carefully filed to the correct value if voltages of *known value* are available for application to the circuit.

You can, of course, take the series resistors at "face value," but it is more satisfactory, in the absence of precision components, to check them on a commercial meter.

To sum up: Precision wire-wound or 5% tolerance (the latter can be found as "surplus") resistors can be used without need for adjustment. Components with 10% or 20% tolerances can be used, but should be checked and

adjusted if maximum accuracy is expected.

Wattage Rating and Insulation

If 500 or 1,000 volt ranges are provided the series resistance should be made up of a series of several resistors in order to avoid the possibility of flash-over, which could break down insulation and damage the movement. Thus, where the series resistance is 1 megohm, four 250,000 ohm or one 500,000 ohm and two 250,000 resistors could be wired in series. Since the voltage drop across any given resistor is lower the risk of arcing is reduced.

Although half, or even quarter, watt types can be used, it is advisable to put in one watt resistors except on the very high ranges.

DC Milliamp Ranges

The movement itself can be used to measure DC without any external components, but it is restricted to the FSD of the instrument. To increase the range of the meter for measuring current it is convenient to place a parallel resistance or shunt across the movement, this shunt resistance by-passing the surplus current. By switching in suitable shunts, higher currents can be measured. On test, the current flowing through the circuit is divided between the meter and the shunt—the current not flowing through the meter passes through the shunt; thus with 5 mA applied to the test terminals, 1 mA flows through the meter and 4 mA through the shunt. It follows that each shunt must have a *lower* resistance than the meter in order to provide an "easier path" for the surplus current.

The heavier the current to be measured the lower must be the shunt resistance, which can be worked out from the formula:—

$$Rs = \frac{Rm}{N - 1}$$

where Rs = resistance of shunt; Rm = resistance of meter; N = the number of times the FSD is to be extended.

As an example (using the 1 mA meter of 100 ohms internal resistance) the shunt for the 0-10 mA range—needing a "ten times" scale—has a resistance of

$$\frac{100}{10 - 1} = \frac{100}{9} = 11.11 \text{ ohms}$$

Since the values of shunt resistances are very small (some will be less than an ohm) it is unlikely that components of the correct value will be available. But this need not deter the constructor as they can be easily made-up in various ways.

The Wire to Use

Ordinary enamelled or silk covered copper wire is often used for meter shunts. It has a low resistance, is easy to use and costs little. For heavy currents (up to 5 amps) 18 SWG is satisfactory, and for ranges up to 500 mA, 30 SWG is suitable. These two gauges of copper wire have resistances of 75 and 5·08 yards-per-ohm respectively. From this it will be realised that due to the lengths involved, copper wire is not so cenvenient for the higher resistance shunts.

Where copper wire shunts are used it is advisable to wind them on paxolin strips, reversing the direction of the winding at intervals to minimise magnetic effects. Probably a better scheme is to wind the resistances astatically on bobbins and so avoid the danger of magnetic fields affecting the movement and causing errors. The best way of doing this is to fold the required length of wire in two, starting the winding with the centre (fold) and working the two halves together so that both free ends will appear on the outside of the bobbin.

Unfortunately, copper wire has another disadvantage. It has an appreciable temperature co-efficient of resistance (approximately 0·004) so that changes in temperature affect its resistance considerably. An increase of temperature of two degrees Centigrade will affect the accuracy by nearly one per cent. And this does not take into account any heating which may be due to the current flow through the wire.

For more accurate and stable readings, a material less likely to be affected by temperature changes is wanted; "Eureka" resistance wire is the answer. This is the trade name for a wire alloy (60% copper, 40% nickel) which has a temperature co-efficient of only 0·00005 — a much better proposition. Apart from this, it is of higher resistance than ordinary copper wire so that shunts can be made more compact. On average, Eureka wire has 27 times the resistance of enamelled copper wire. To enable readers to calculate the lengths required for shunts, details of useful gauges in copper and Eureka wire are given in the Table to appear in Part II.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. callsigns, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the quarterly issue of the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.

G3KNG, A. F. Embrey. 54 Gatis Street, Wolverhampton, Staffs.

G3KOM, F. P. Singh, 19a Central Parade, Welling, Kent.

G3KRT, G. L. D. Hodges, 102 Torrington Road, Ruislip, Middlesex.

G3KVX, R. Pattinson *(ex-YI2RP)*, 20 Grenville Terrace, Ashton-under-Lyne, Lancs.

G3LAY, J. Hartwell, 60 South Road, Erdington, Birmingham. 24.

G3LDJ, K. Day, 27 Clough Road, Birkby, Huddersfield, Yorkshire.

G3LDN, C. Dodd, 24 Main Street, Embsay, nr. Skipton, Yorkshire. *(Tel.: Skipton 3564).*

G3LEJ, M. G. Hudson, 56 Clifton Grove, Rotherham, Yorkshire.

G3LGI, C. Seddon, 166 Newearth Road, Walkden, nr. Manchester, Lancs.

G3LGS, C. B. C. Hill, 48 Crowther Avenue, Calverley, nr. Leeds, Yorkshire.

G3LGW, D. Gordon Spencer, 34 Harrison Road, Erdington. Birmingham, 24.

G3LGX, C. A. Gledhill, 49 Larch Hill, Odsal, Bradford, 6, Yorkshire.

G3LGZ, A. Bate, 13 Bamford Street, Glascote, Tamworth, Staffs.

G3LHF, J. Shawcroft, 137 Glascote Road, Tamworth, Staffs.

G3LHT, R.A.F. Stafford Amateur Radio Club, c/o 6 Site Signals, No. 16 Maintenance Unit, R.A.F. Station, Stafford, Staffs.

G3LHY, L. Wilson, 44 Kaye Lane. Almondbury, Huddersfield, Yorkshire.

G3LIG, J. W. Sole, 8 Herons Close, Chilham, nr. Canterbury. Kent.

G3LIQ, D. L. Fell, 272 Coronation Road, Priory Road, Hull, Yorkshire.

G3LIS, D. W. Smith, 6 Ashbourne Crescent, Roby, nr. Liverpool, Lancs. *(Tel.: Huyton 4708).*

G3LIU, A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool, 14.

G3LIV, SAC J. Melvin, 4 Kelvin Gardens, Dunston - on - Tyne, Gateshead, 11, Durham.

G3LJK, C. Kenny, 32 Westbourne Villas, Hove, 3, Sussex.

G3LJQ, C. Leader, 60 Avenue Road, Southend-on-Sea, Essex.

CHANGE OF ADDRESS

EI4AB, C. Connolly, Rialto, Marian Park, Waterford, Waterford.

G2ANB, R. Brand, 188 Loughton Way, Buckhurst Hill, Essex.

G2CTC, S. R. Cooke, 21 Tredgold Avenue, Bramhope, Leeds, Yorkshire.

G2FCL, A. R. Thompson, 51 Princes Crescent, Bare, Morecambe, Lancs.

G3ADZ, D. W. J. Haylock, 3 Norris Gardens, Grange Estate, Havant, Hants.

G3AGF, R. L. Edginton *(ex-ZC4GF)*, 71 Rothley Road, Mountsorrel, Leics.

G3BA, T. P. Douglas, 141 Russell Bank Road, Four Oaks, Sutton Coldfield, Warks.

G3BBR, K. J. Wheatley, 2 Hazel Road, Woodhatch, Reigate, Surrey.

G3CCM, W. R. Harris, 25 Cotton Road, Potters Bar, Middlesex.

GM3COV, G. B. Woffinden *(ex-G3COV)*, 9 Hakon Road, Thurso, Caithness.

GI3CVH, W. G. Snodgrass, County Primary School, Newtownhamilton, Co. Armagh.

GM3CVJ, J. W. Sime, 173 Pilton Avenue, Edinburgh, 5.

G3EKE, L. A. F. Stockley, 4 Norbury Court Road, London, S.W.14.

G3FIJ, F. R. Howe, 29 Kingswood Road, Colchester, Essex.

G3FMT, D. W. Robinson, 25 Hamilton Avenue, Tolworth, Surbiton, Surrey.

GW3GNT, P. A. C. Wood, Glandwr, Voryd, Saron, nr. Caernarvon, Caerns.

G3GRL, J. A. Bonser, 38 Maple Drive, Nuthall, Notts.

G3HIS, G. Berrisford, 6 Westfield, Wadsworth, Hebden Bridge, Yorkshire.

G3HSC, N. S. Bennett, 45 Green Lane, Purley, Surrey.

G3HSV, D. E. Alesbury, No. 1 Cliff Terrace, Cullercoats, Northumberland.

G3IBH, D. G. K. Guy, 439 Broadwater Crescent, Longmeadow, Stevenage, Herts.

G3IGW, M. G. Whitaker, 39 The Green, Northowram, Halifax, Yorkshire.

G3IIO, D. R. Harriott, 5 St. Michael's Terrace, Lewes, Sussex.

G3IJU, Sgt. E. Briggs *(ex-ZB1EB)*, Sgts.' Mess, R.A.F. Station, Watton, Norfolk.

G3IVK, D. P. T. Evans, 26 Grange Road, Bearley, Stratford-on-Avon, Warks.

G3JQP, F. Brown, Myrtle Villa, Clifton Road, Pound Lane, Bowers Gifford, Essex.

G3JUC, R. G. Timms, 38 Lawrence Road, Ham, Richmond, Surrey.

GM3KHH, W. G. Cecil, 9 Waterside, Bishopmill, Elgin, Morayshire.

G3KMT, R. J. Thomas, 15 Addison Road, Bradmore, Wolverhampton, Staffs.

G3KPT, G. V. Farrance, 53 Yew Tree Drive, Kingswood, nr. Bristol, Glos.

GM3KSJ, S. Bungard, 7 Anderston Place, Bellshill, Lanarkshire.

G3KVE, T. K. Wright, 24 Stuart Road, Bootle, Liverpool, 20.

G4IK, R. A. F. Farquharson, Chylean, Penpethy, Tintagel, Cornwall.

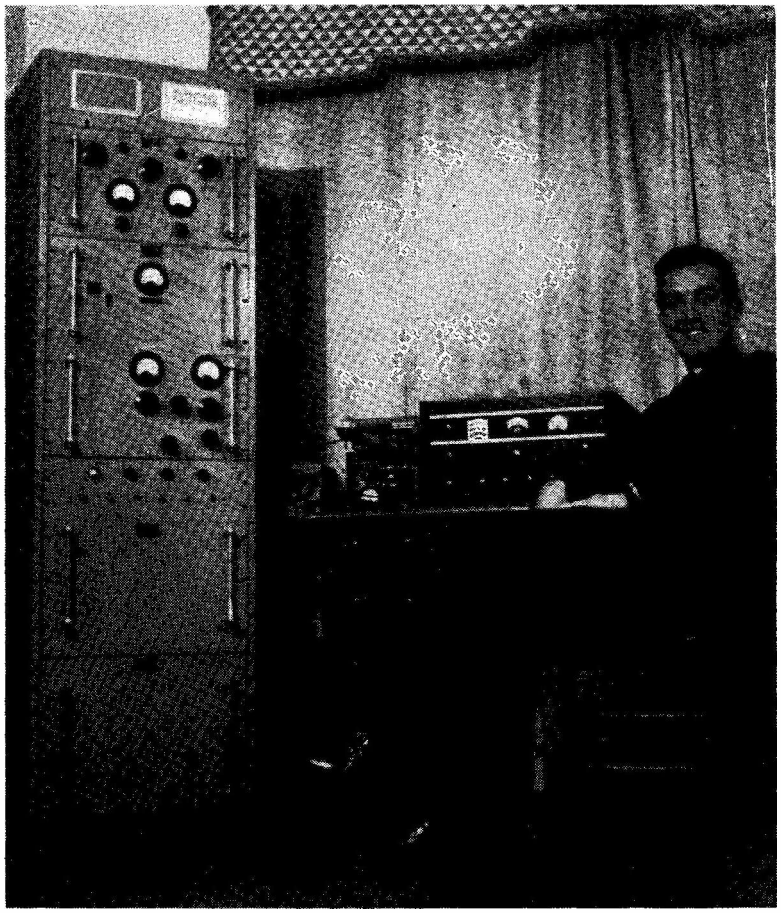
GM5RH, D. Q. Aldridge *(ex-G5RH)*, 6 Bank Street, Greenock, Renfrewshire.

CORRECTION

G3KKW, W. Willins, 15 Thorndon Avenue, West Horndon, Brentwood, Essex.

THE OTHER MAN'S STATION

G3GIQ



THE very neat layout illustrated this month is that of G3GIQ—owned and operated by H. J. Lewis, of 271 Popes Lane, Ealing, London, W.5—licensed in 1950 and interested in DX working ever since. Incidentally, in this connection, G3GIQ remarks that his "enforced year on CW" turned out to be a very useful experience, teaching him a great deal, as well as introducing him to the pleasure and interest of DX operation on the key.

Though the transmitter pictured here looks very much a commercial product, in fact it is almost entirely home-built, into a T.1131 rack, using the original chassis for the various sections of the assembly. Behind the top panel is the PA, consisting of a pair of TZ40's run at full power; below this is the modulator, also a pair of TZ40's, in Class-B; next comes the exciter unit, running 6V6-807, driven by a Wilcox-Gay VFO. The original T.1131 power packs are used, working into a control unit with the necessary DC power supply for the relay set. Station change-over is on a single switch at the operating position.

An AR88 takes care of the receiving side, and the aerials in use are a 3-element beam on a 50-ft. mast for 10 metres, with a 67-ft. end-on wire for the 7, 14 and 21 mc bands. (The 50-ft. mast precipitated a protest by the neighbours, which was successfully resisted.) Phone and CW are used in equal proportions on all DX bands, and at present the score stands at 135 countries worked, with 123C confirmed.

G3GIQ is to be congratulated on having a very nice station, with some interesting features — the T.1131 rack makes a handsome transmitter housing, and the operating record shows that it is being used to the best advantage.

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Deadline for next Club reports: JANUARY 18, 1957)

AS we write these notes, the Eleventh MCC is under way, and from the activity it appears that the number of entries will be somewhat higher than in previous years. On the first Saturday (November 17) conditions were not particularly good, with heavy QRN, and any GM entries that there may have been were not being heard in the South of England. On the Sunday, static was still troublesome, though not so bad, and activity was high. The silence on the band after 1900 was almost oppressive!

Secretaries of competing Clubs are asked to note that MCC Logs must be in our hands by **Monday, December 3, 1956.** The results. summary of contestants' logs, and the usual round-by-round description of the Contest, will appear in the January issue.

For this reason Club secretaries are once more asked to note that routine reports of Club activities will **not** be published in the January issue. Club reports, therefore, are not needed until the deadline for the February issue, which is *Friday, January 18.*

And so to this month's reports:

Bailleul have been running bi-weekly Morse classes, which have been popular and successful. One member has passed the test and four more are nearly ready. The Club station G3IHH has been making many excellent contacts on 28 and 21 mc. The operating on this callsign during the first MCC sessions was outstandingly good. During December, members will be visiting the Aldershot Club to hear a lecture by G6MB on The Antennamatch.

Nottingham (Amateur Radio Society) met in November to hear G3APY on Getting Going on Two Metres. At the next meeting, on December 21, at Cinderhill, members will hear a recorded lecture by G5RV on Transmitter TVI-Proofing.

Acton, Brentford and Chiswick report increased attendance at meetings, which are held on the third Tuesday at the A.E.U. Room, 66 High Road, Chiswick, W.4. All who are interested in Amateur Radio are invited to join. On December 18 there will be a Christmas Junk Sale, and the A.G.M. will be held on January 15, 1957.

Bradford have a talk on Mobile Working (G3BJP) on December 18, and open the New Year on January 1 with Mr. G. F. Craven on Automation. Other January meetings—Television (Dr. G. N. Patchett, at the Bradford Technical College) on the 15th, Annual Dinner on the 26th, and talk on Simple Receivers (G3INW) on the 29th.

Bournemouth meets on the first Friday, at the Cricketers' Arms Hotel, Windham Road (7.45 p.m.). The A.G.M. will be held on January 4, and a Hamfest on Saturday, February 9. Visitors to the town, as well as any interested residents, will be welcomed at all meetings.

Brighton will be holding their Morse class on December 11, and they have a talk on TV Servicing (Part II) on December 18. On Christmas Day there is no meeting, but they would like members to join a greetings "Net" in the morning.

The **British Amateur Television Club** (Chelmsford Group) will be meeting on December 13 at 10 Baddow Place Avenue, Great Baddow, at 7.30 p.m. to hear G3CVO/T on A High-Performance Oscilloscope for Amateur TV. Non-members will be welcomed.

Chester report that they have been very active during the summer, with several outings to the top of Moel Fammau, prospecting for sites for two-metre operation. A programme of lectures and discussions has now been drawn up for the winter, and we are told that there is a great increase in 'teen-age activity.

Clifton report two first-class meetings, at which they gathered to hear about Hamobile equipment (G8KW) and the manufacture of transformers (Mr. B. W. Kersting). On December 7 they are holding a Ragchew; on the 14th their Christmas Party; the 21st is a Constructional Evening, and on the 28th there will be a Quiz. All meetings at the Clubroom, 225 New Cross Road, London, S.E.14.

Kingston-upon-Thames hold their Auction Night on December 13—"Bring your surplus gear and sell it." Visitors will be welcome. On the 27th there will be no meeting. Club meetings are normally fortnightly, Thursdays at 7.45 p.m., at 7 Penrhyn Road, Kingston. Morse and Theory classes are being arranged.

Leicester gather on December 17 to hear about Frequency Measurement and Absorption Wavemeters (G3HDG), and on December 31 for a talk on Interference (G3AWM). (Both these lecturers are G.P.O. engineers). On January 14 they have A Symposium on Mobile Operation, and on the 28th a talk on The Clapp VFO on 28 mc (G3DVP). **Liverpool** announce A Practical Survey of Aerials (G3BHT/G3EWZ) on December 11, followed by an Open Night on December 18.

Newbury have organised a programme of films for December 7, after which their next meeting is on January 25, when G8PP will talk on Worldwide Commercial Communication. **Plymouth** have visited the local power station to see where the megawatts originate, and have also been to the local BBC station and had a coach trip to the BBC main transmitter at

Start Point. If they can find a 16-mm. projector they hope to show a few films in January and February. The Club station is coming along. Next meetings, January 8 and 22, February 5 and 19, at Virginia House Settlement, Barbican, 7.30 p.m.

The **Science Museum** Radio Society is arranging a series of appropriate lectures for its monthly meetings in the Science Museum, commencing at 6 p.m. Membership is open to all civil servants, and visitors are very welcome, but are asked to contact the secretary first at KENsington 6371, Ex. 237. On December 11 there will be a lecture demonstration entitled The Art and Science of Sound Reproduction.

Slade have a talk on the LG.300 Transmitter (G2PU) on December 7; their next meeting. on December 21, is described as "Fun and Games," presented by Messrs. L. H. Blackwell and G. L. Turner (members). The Club Station, G3JBN, is available to members every day of the week; instructional and constructional classes are held every Tuesday and Wednesday evening.

South Manchester will hear a recorded lecture on Inter-Planetary Travel (G2WS) on December 14. There is no meeting on December 28, and the subject for January 11 is still to be fixed. At the recent A.G.M. all the officers were re-elected. They are holding a course for R.A.E. again this year, and it is good to note that **all** last year's candidates were successful.

Crystal Palace will be running another Junk Sale on December 15. Previous meetings of this kind have been very successful, and it is hoped that large quantities of junk and large numbers of buyers will turn up this time. 7.30 p.m. at Windermere House, Westow Street, London, S.E.19.

Harrow took part in the Second Wembley exhibition in late October, operating GB3HAR and making many phone and CW contacts on 14 mc, which is quite an achievement for an exhibition with its usual attendant QRM and QRN. On December 7 the Club's annual Constructors' Contest will be held. Meetings are every Friday, 8 p.m., in the Science Laboratory, Roxeth Manor Secondary Modern School, Eastcote Lane, South Harrow.

Purley met on November 16 to hear Mr. F. J. Wells on the Construction, Adjustment and Use of Signal Generators, with a demonstration of his own instrument, and of alignment and signal tracing, using a standard broadcast receiver. A few members will shortly be active on the new 70 mc band.

Wellingborough get together every Thursday at the Silver Street Club Room. For December 13 the talk is "Amateur Radio, General," by G3KSC. On Friday, December 21, they are holding a Christmas Party; on the 27th there will be no meeting. January 3 is the date for a talk on The Principles of Radar, by Mr. F. Wright, and the A.G.M. will be held on January 10.

Hartlepools have started their winter programme well with lectures, and slow Morse classes. Subjects under discussion have been Aerials and the Z-match. Coming up are talks on SSB, NBFM and AM—their relative merits. Meetings are held every Monday at 7.30 p.m. and refreshments are provided.

Mitcham recently heard a lecture by G3BCM on his well-known miniature Rx/Tx, and also a talk by G3IIR on Dressing up the Rig. On December 7 there is a Junk Sale, and on the 21st the grand Christmas draw. Visitors will be welcome on both occasions—full details from the Hon. Sec. **Walsall** report that things are looking up; they have had a talk by a new member on Radio in the R.A.F. On December 10 they are visiting the local power station, and now hope to obtain a room for weekly practical meetings in addition to their routine fortnightly affairs.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
BAILLEUL: T. Holbert, G3DXJ, Bailleul R.S., Bailleul Camp, Arborfield, Berks.
BOURNEMOUTH: J. Ashford, G3KYU, 119 Petersfield Road, Boscombe East, Bournemouth.
BRADFORD: F. J. Davies, 39 Pullan Avenue, Bradford 2.
BRIGHTON: J. Trangmer, 33 Lennox Street, Brighton 7.
BRISTOL: J. H. Britton, G3IGR, 2 Chatterton Square, Bristol 1.
BRITISH AMATEUR TELEVISION CLUB: D. W. E. Wheele, G3AKJ, 56 Burlington Gardens, Chadwell Heath, Romford.
CHESTER: R. J. Rickers, GW3HEU, 97 Ruabon Road, Wrexham.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
HARROW: S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
HARTLEPOOLS: J. Thompson, G3KQU, 27 Chester Road, West Hartlepool.
KINGSTON: R. S. Babbs, B.Sc., G3GVU, 28 Grove Lane, Kingston-on-Thames.
LEICESTER: J. Tranmer, 4 Grocot Road, Evington, Leicester.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
MITCHAM: D. Tilcock, G3JYV, 67 Fleming Mead, Mitcham.
NEWBURY: N.A.D.A.R.S., 83 Newton Road, Newbury.
NOTTINGHAM: R. J. Sills, 38 Montford Crescent, Sherwood, Nottingham.
PLYMOUTH: C. Teale, G3JYB, 3 Berrow Park Road, Peverell, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
SCIENCE MUSEUM: G. C. Voller, G3JUL, Science Museum, South Kensington, London, S.W.7.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTH MANCHESTER: M. Barnsley, G3HZM, 11 Cemetery Road, Denton, Lancs.
WALSALL: F. J. Merriman, G2FPR, 123 Wolverhampton Road, Walsall.
WELLINGBOROUGH: P. E. B. Butler, 84 Wellingborough Road, Rushden.

No Reports next month . . . . Deadline for following month is **JANUARY 18, 1957.**

SIX-TEN METRE CROSSBAND DX

Just as this issue was going to press, we were asked to draw attention to the fact that there are a number of W-K stations, operating on their 50 mc (6-metre) band, who tune 10 metres for DX replies. As in the 1947-48 season, one of the most active of these is W1HDQ (of *QST*), who is coming over so well that he has been heard on TV receivers tuned to Channel II! If you have not got a receiver that covers 50 mc, it is a simple matter to contrive a converter—or use an RF-26 unit, which covers 50-65 mc. By the way, the RF-27 (60-80 mc) comes in nicely for the new 70 mc band.

SMALL ADVERTISEMENTS

9d. per word, minimum charge 12/-. No series discount; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

TRADE

TELEVISION INTERFERENCE: Receiver Filters —High-pass E.5037, 30/-; Low-pass E.5031. 30/-; Composite Band I/III, 49/6. Transmitter Filter E.5034, 80 dB, 1 kW., £6.—Labgear (Cambridge) Ltd., Willow Place, Cambridge.

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES.—ATKINSON BROS., PRINTERS, LOOE, CORNWALL.

WANTED: BC-610 Hallicrafter, Et-4336 Transmitters and spare parts for same. Best prices. —P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

QSL's and Logs by Minerva. The best there are.—Samples from Minerva Press, 46 Queen's Road, Brentwood, Essex.

G2ELOSO Tuner Chassis, 10-590 metres with dial, 12in. x 7in., IF strip, Det. 5 valves and AC Power Unit. £15 or offer.—Box No. 1814, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

G3CGD QSL's. Fixed and mobile samples on request. Printing enquiries welcomed.—30 St. Luke's Road, Cheltenham, Glos.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

WANTED: B2 Handbook, power unit, and/or cables and plugs. Also B2 minor Tx/Rx, any condition.—EI2BC. c/o 18 George's Quay. Limerick Eire.

BC-348Q with instruction manual. Completely overhauled, cabinet stoved grey. Internal mains power pack and speaker, O/P stage. £14.—P. N. Wood, 46 Orchard Lane, Amersham, Bucks.

WANTED: Class-D wavemeter in good condition, state price, including cost of carriage and packing.—J. McCann, 10 Southfield Crescent, Coatbridge, Scotland.

BC-348Q internal AC power pack, manual, £15 PCR1, 500 kc to 23 mc, (no Top Band) internal AC power pack and speaker, £15 o.n.o.—Sutcliffe, 104 West End Avenue, Harrogate, Yorkshire.

ET-4336 transmitter, complete with almost unused valves, spare HT transformer, Wilcox-Gay VFO. G3ESO temporarily QRT. Best offer secures. Details available, buyer collects.—4 Earls Road, Amesbury, Wilts.

SMALL ADVERTISEMENTS, READERS—*continued*

EDDYSTONE 640, manual, headphones, perfect condition, £13 plus carriage. *Short Wave Magazine,* Volume 10-13 inclusive (1952-56), mint condition, £1 2s. 6d. per volume.—Gardener, 51 Rowan Road, Sutton Coldfield, Warwickshire.

AMERICAN SSB miniature (20in. x 9in. x 7¼in.) table-topper, 50-watt Lakeshore Phasemaster Transmitter with automatic voice control and built-in power supply, cost $196. Offers, or accept SX28 or HQ129X.—27 York Road, Selsdon, Surrey.

WANTED: National HRO-6OT, prepared to give good price if in perfect condition.—Stephenson, 17 Park View, Morden, Surrey.

FOR SALE: Ex-R.A.F. R1448 (Eddystone) receiver, complete with 6 coil units and 3 spare units and external power pack, £15. ZCI Mk. I Transceiver less power unit, £5. R.C.A. filament transformer, £1. 300v. power pack, not wired, £1. Battery radio mains unit, £4. The lot one buyer £22, buyer please collect. —F. Dodds, 36 Whitfield Drive, West Hartlepool, Co. Durham.

WANTED, BC221. Have micro-wave Rx 8/APX1, complete with 28 B7G valves and dynamotor, offers W.H.U.?—G3KYT, 201 Upholland Road, Orrell, Wigan.

AR88LF, perfect, original, with manual, no modifications or changes. £45 or offer. 19 Set Tx/Rx, complete ATU etc., perfect, £10 0s. 0d. Car Radio " Motorola " 6v., £8 10s. 0d.—Cutler, Walberton, Arundel, Sussex.

FOR SALE: Eddystone 750 with mains filter and HF 1012 in bass-reflex cabinet, all as new. Maximum used 150 hours. £60.—Shattock, 35 Lonsdale Avenue, Cosham, Portsmouth.

WANTED urgently: valve type ATP-35, either new or secondhand, with good emmision. For sale: receiver R208, working, but requires hotting-up, 10-60 mc, 6v. DC or 200/250v. AC, internal speaker, and circuit, £10 10s. 0d.—4 Mellor Road, Western Park, Leicester.

WANTED: Class-D Wavemeter, AR88 chassis less or with components; also manual for National 1-10 Receiver.—Box No. 1813, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

FOR SALE: Army No. 12 Set in excellent condition, complete with manual, £14. Wanted: 750v. DC power unit, 250-300 mA, or similar. Good price paid for genuine article.—Box 1812, Short Wave Magazine. Ltd., 55 Victoria Street, S.W.1.

AR88 receiver, one of the latest made, in mint condition, with manual and S-meter, £50 (buyer collects). Panda low-pass filter and one Panda ATU Unit used two months, £14 the two. One Collins TSC-12 motor generator and a complete set of harnes, £5; one almost new Variack, £4 10s. 0d. (4) 35T valves (perfect), 15s. each. Two masts, one 40ft. the other 33ft., offers? Hundreds of small lots almost new gear, meters, valves, relays, generators, etc., all open to offers to callers.—Capt. C. J. Smith, 82 Framington Road, Brooklands, Chester. (*Tel. Sale 3803*).

SMALL ADVERTISEMENTS, READERS—*continued*

OFFERS for *QST*, February 1950-January 1956; *Bulletin*, March 1948-June 1956; *Short Wave Magazine*, January 1947-September 1956, all spotless; *ARRL Handbook*, 1951. Also MN26M Receiver—brand new condition, with built-in AC pack, £7 only. Large amount valves, transformers, RAF equipment, manuals CRT's, etc., must clear.—G2FZU, 18 West End Crescent, Ilkestone, Derbys. (*Tel. Ilkeston 3637*).

BC-224F receiver, with power pack speaker; also brand new communication receiver, 1 mc to 16 mc.—G3LIN, 42 Malvern Crescent, Spring View, Wigan.

HALLICRAFTERS receivers: S27C, 130 mc to 235 mc; S.27, 27 mc to 145 mc; also R.C.A. AR88; R103; T.C.S. 13 Radio.—17 Kent Road, Atherton, Manchester.

SELSYNS—will rotate ½-ton, 250 volt AC 50 c.p.s., same size as 1-HP motor, complete with two-speed gearbox 4 : 1 x 10 : 1, £7 10s. 0d. pair—buyer collects. 0-300 volt AC 50 CPS meters, 2½in. 19/6, p. and p. 2/6. Variacs, standard mains in-put, 200-250 v. out at 7.5 amps., £3, cariage 10s.—G3CRH, White Cottage, Hammerwich, Lichfield, Staffs.

AR88 unmodified, manual, matched loudspeaker, £50. Offers for *Wireless World* 1950-1956, *Short Wave Magazine* 1946-1956, *Radio Constructor* 1950-1956, *R.S.G.B. Bulletin* 1944-1956.—51 Rushall Avenue, Chiswick, W.4.

B2 wanted, complete with all coils, manual power pack, xtals, etc., details, price.—Button, 80 Lyttleton Road, Stechford, Birmingham.

G3XV moving QTH. Sale 140 watt Tx, £18. Modulator and Reslo MC mike, £18. S640 and speaker, £19. Valve-tester, Sig. Gen., etc., s.a.e. for list.—37 Queens Road, Donnington, Wellington, Shropshire.

FOR SALE: R.1302, 100-156 mc, £3 10s. 0d. P.U. Type 234, £3 10s. 0d. P.40 (S450B), 85-95 mc, £3 10s. 0d. P.U. Type S451B, £2 10s. 0d. Tx/Rx BC624, BC625, 100-156 mc (with two 832's), £8 0s. 0d. P.U. Type 236, 250v. 90v. 6.3v., £3 10s. 0d. All in excellent condition, with valves.—Thexton, 64 Fern Avenue, Jesmond, Newcastle-on-Tyne 2.

BC-348Q with built-in power pack and output stage, good working order, £13, or nearest offer.—W. R. Pollock, Holmlea, Omagh, Northern Ireland.

WANTED: Amateur-built 2m. Tx, 829 PA or similar; Labgear 21 mc wideband coupler, RF27 unit, TZ40's. Sale: Wilcox-Gay VFO, £4. B2 complete in case with power pack, as new, £14. Valves 805's 15s., bases 2s. 6d.; 866's 12s. 6d., 8012's 6s., STV280/80's 6s., RG1-240a's 6s. Transformers: Woden 2.5v. 10a. £1; Thorderson 1500v. ct., 5v. 6.3a. 165va., 30s.; Ex-WD 1150-0-1150v. 48kvA, 30s.; 670-0-670v. 200 mA 5v. 3a., 6.3v. 2a., 30s.; two fil. transformers 4v. 5a., 10s.; two chokes 8/40H 300 mA, 7s. 6d. Q5'er/BC453, unmodified, with genny, less 12SR7, £2 o.n.o. All *plus* carriage.—GW5BI, 171 City Road, Cardiff.

SMALL ADVERTISEMENTS, READERS—*continued*

JERSEY Holiday — Stay at "The Lincoln," 3 Saviour's Road, near sea/town centre, s.a.e. please for brochure.—Douglas Byrne, GC3KPO.

CR-100 and Manual, £18. Woden swinging choke 5/25H 350 mA, 25s. Woden 10v. 5a., 15s. List of other gear.—Hill, 2 Tower Road, Orpington, Kent.

DEFUNCT HRO required for rebuild, tuning mechanism intact, also commercial GDO, bug key.—Loader, G3HVO, 19 Waverley Park, Shelford, Cambridgeshire.

WANTED: AR88, good condition, reasonable price, greater London area to facilitate inspection.—George, 1 Shortwood Avenue, Staines, Middlesex. (*Staines 3532*).

HRO coils wanted. HF ranges, with 14 mc and 28 mc bandspread, state price. — Morgan, G2HNO, 52 Seafield Road, Bournemouth. (*Southborne 47182*).

PANDA PR-120v., latest model, in brand new condition, £100, exchanges considered. — 80 Ellesmere Street, Moss Side, Manchester 16.

CR-100. Recently checked by makers, perfect working order. Owner going abroad. First offer £30 accepted.—Boyd, 36 Egerton Gardens, Chelsea, London, S.W.3.

PHILIPS Vibratory Converter, DC to AC 200-245v.; 3.5 mc VFO (Franklin) used QRP; various xtals wanted, microphone or W.H.Y.?—J. Brown, Waterworks, Penryn, Cornwall.

TCS-13, unused receiver £5, transmitter £5, bound manual 15s., power supply (unwired) £3; PE94B £2, 'scope (G6FW) £4; R107 £7; BC454 30s.; BC453, BC454 (less valves) 15s.; Eddystone power pack 30s.; 20 valves £3; 80 resistors, etc., £1; 150 condensers, crystal £1; *Radio Handbook*, *Short Wave Magazines* 10s. No offers refused; details.—Peace, 17 Bedford Square, Leigh, Lancs.

1000 FT243 xtals, amateur bands and odd frequencies, fundamentals and overtones, 3.5 to 36 mc. Send s.a.e. for list of frequencies, etc. Taylor Model 45c Valve Tester £20 0s. 0d. Taylor Model 313D Ind/Cap Adaptor £3 10s. 0d. Eddystone 740 Rx, £22 0s. 0d.—G5YV, 8 Ashfield Avenue, Morley, Leeds.

EDDYSTONE 640 for sale, perfect condition, internal stabilizer fitted, but no other modification. Must sell for space, £16 or nearest offer.—Chapman, G3LFF, 131 Worcester Road, Droitwich Spa, Worcs. (*Tel. 3348*).

WANTED: AR88D or Eddystone 750 with S-meter; excellent condition; reasonably priced.—A. Dunscombe, 14 Upper Station Road, Radlett, Herts.

SALE: EF50, EF54, EC52, 6SH7, 2/- each; VR56, 7193, 6Q7, 1/6 each; VR65, VR54, 1/- each. Carriage extra.—Box No. 1815, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

SALE: G.E.C. BRT-400 receiver, one owner, guaranteed perfect and as new, £75.—K. Hall, 37 Carleston Avenue, Blackpool.

FOR SALE: Class-D Wavemeter, £5. 19-inch rack, enclosed, 3 feet high, offers?—G2DPD, 27 Gloucester Road, Whitton, Middlesex *(POP. 0557)*.

FOR SALE: Power Pack, input 240v. AC, output 640v. 400mA, 12v. 4A, in standard 19 x 10½ rack panel and box; metal rectifiers and fully metered (2). Weight, 50 lbs. approx. £11 (o.n.o.); buyer collects. Receiver, long-wave (Mackay, U.S.A.), 15-650 kc, in four bands; 240v. AC p/pack built in; £7 10s. (o.n.o.); buyer collects. Crystal Oven, Admiralty pattern, 3190, for 230v. AC; unused; £3. 829B (2) with ceramic bases, 25/- each. WANTED: Tuning Capacity and scale of BC-221, or would consider a modified or incomplete 221. — 6 Exeter Gardens, Ilford.

FOR SALE: Eddystone 358X Receiver, with 5 coils, 1.2 to 31 mc; xtal filter and built-in power pack for 240v. AC; £12 (o.n.o.); buyer collects.—41 Arnold Street, Bickley, Huddersfield.

WANTED urgently.: Front panel for AR88, please state price. — Christian, 25 Somers Street, Southsea.

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Please note that these Red Spot Transistors are ideal for most circuits including "WW." Pocket Transistor Receiver and Transistor Amplifier. All Transistors are British Manufactured and Guaranteed. Send for Circuits and Data.

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Just switch to your favourite Station. No Tuning, no Aerial or Earth. Pre-select 3 stations. Complete with all components and six Transistors. 7 x 4 Elliptical speaker. Teletron Superhet Coils and I.F.T.'S. Powered by 7½v. dry battery which lasts for months. 150 Milliwatts output. All the above with Circuits etc. £9/0/0, carr. paid.

Or with Matched Mullard OC72's (200 Milliwatts Output) and 7 x 4 Elliptical High Resistance Speaker **30/-** extra.

Suitable Plastic Cabinet easy to assemble **18/6**

Call and hear demonstration model working. Ideal as a car radio.

SPECIAL OFFER

Set of four Transistors including one R.F. Transistor **42/6**
Set of six Transistors including one R.F. Transistor **60/-**

TRANSISTOR SIGNAL TRACER

Complete Kit with 2 Transistors, Components and 'Phones with Circuit, 42/6.

TRANSISTOR SQUARE WAVE GENERATOR

Ideal for signal tracing.
Complete Kit with 2 Transistors, Components, and Circuit, 25/-.

U.S.A. INDICATOR UNIT BC929A

Complete with 3BP1 C/R Tube and screen. 7-valves : 2-6SN7GT, 2-6H6GT, 6G6, 2X2, 6X5G, volume controls, condensers, etc. Ideal for portable 'scope. In black crackle case, size 15½in. x 9in. x 9in. Brand New. **65/-** carr. free.

62A INDICATOR UNIT

Containing VCR97 with Mu-Metal Screen. 21 Valves : 12-EF50, 4-SP61, 3-EA50, 2-EB34. Plus Pots., Switches, H.V. Cond., Resistors, Muirhead S/M Dial. Double Deck Chassis and Crystal. Brand New. Original Cases, **67/6** carr. free.

INDICATOR UNIT TYPE 182A

Unit contains VCR517 Cathode Ray 6in. tube, complete with Mu-Metal screen, 3 EF50, 4SP61 and 1 5U4G valves, 9 wire-wound volume controls and quantity of resistors and condensers. Offered Brand New (less relay) at **67/6**. Plus 7/6 carr. "Radio-Constructor" scope circuit included.

CRYSTAL MICROPHONE INSERTS

Ideal for Tape Recording, Gramophone Amplifier, etc. Very sensitive. Guaranteed and Tested, **5/-** (ex-units), or **8/6** Brand new and boxed.

MINIATURE TRANSMITTING STRIP "TYPE 81"

Size 7½in. x 6in. x 3in. Complete with Valves Type CV415, CV309, 2-6AM6, 2-7D9 and Quartz Crystal, 4,860 Kc/s. Fully wired with circuit.
£4/10/- complete.

TRANSISTOR PUSH-PULL AUDIO AMPLIFIER

(150 Milliwatts Output)

Build this Push-Pull Amplifier, which is ideal for Crystal or Magnetic Pick-up Amplification, Baby Alarm, Microphone Amplifier, etc. Powered by 6-volt Dry Battery lasting for months.
Complete Kit of Parts including 4 Transistors and all Components, with Circuit (less speaker), **£4/10/-.**

F.M. CONVERTER UNIT

88/100 Mc/s.

Containing 6 valves—2-6BA6, EB91, VR137, 2-EF54. Two I.F. stages and separate local oscillator, graduated Vernier tuning. Just plug in to your radio and obtain good listening on F.M. Voltage required 250v. 50M/A. and 6.3v. 2 amps.

£7 . 19 . 6

1355 RECEIVER

Complete with 11 valves 8-SP61, 5U4G, VU120, VR92. As specified for inexpensive T.V.
In absolute new condition, **27/6,** carr. 5/-.
R.F.24 **10/-**. R.F.25 **12/6**. R.F.26 **25/-** Brand new with valves, carr. 2/6.

CATHODE RAY TUBES

VCR138A, with Screen ...	£1 15 0
VCR139A. 2½in. C/R Tube. Brand new, in original cartons (carr. free)	£1 15 0
VCR97. Guaranteed full T/V picture (carr. 2/-)	£2 0 0
VCR517C. Guaranteed full T/V picture	£1 15 0
MU-METAL SCREENS for VCR97 or 517. P.P. 1/6 ...	10 0
6in. ENLARGER for VCR97 or 517. P.P. 1/6	17 6
VCR97. Slight cut-off. Carr. 2/-	15 0
3BP1. Brand New	£1 10 0

MINIATURE I.F. STRIP TYPE "373" 9-72 MEG.

Brand new miniature I.F. Strip size 10¾in. x 2½in. x 3in. high. Valve line-up : 2-EF92 ; 3-EF91 and EB91. With circuit.
With valves, **45/-** (less valves **8/-** Post free.) This I.F. Strip is part of above equipment.

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