

*The*

# RADIO AMATEUR

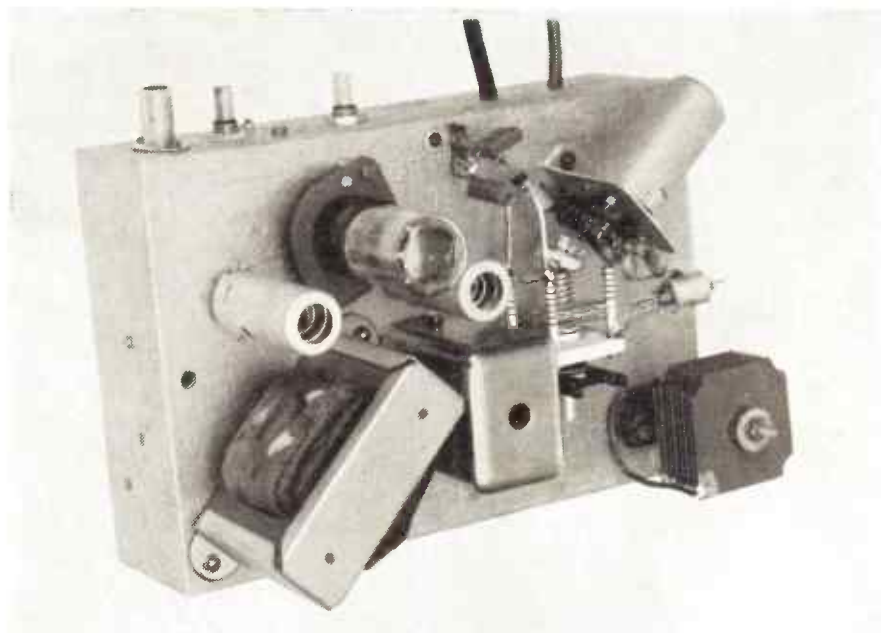
Incorporating "SHORT WAVE NEWS"

Vol. 7

Number 11

NOVEMBER

1952



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**2 Metre Converter.** Radiation Patterns of Model Aerials. Design of Mains Transformers. Simple Negative Feedback Device. Converter for Medium Waves. Strictly for the Beginner. Workshop Practice. Amateur Band, SW Broadcast Band and VHF Commentaries. Club Notes, etc.

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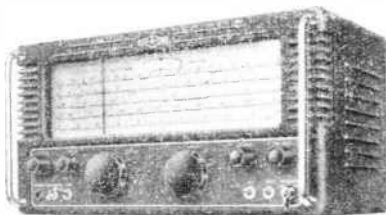
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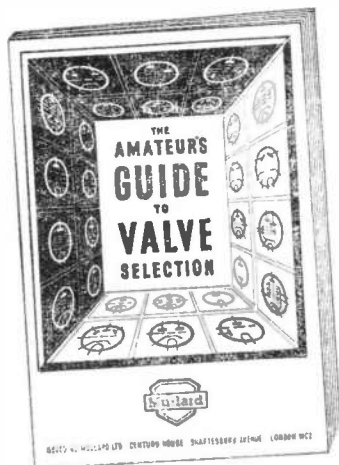
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**EXPEDITION NEWS**

The men of the Trees Sahara Expedition, equipped with two way radio, would be grateful for the co-operation of Amateur Radio enthusiasts in the United Kingdom. In emergency they may transmit on 3540, 7080, 7178 or 14356 Kc/s, any evening from the latter half of October at 2100-2115 G.M.T. The call sign is CN2MOT. Any information received should be passed to Potters Bar 2699.

**OUR COVER PHOTO**

*Our cover photo this month shows a view of the Two Metre Converter described in this issue (Part 1). Part 2 will continue the description next month.*

# The RADIO AMATEUR

Vol. 7 No. 11  
November



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## EDITORIAL

Of the variety of equipment comprising our amateur stations, the aerial is without doubt the most important. A good aerial can make just that difference between satisfactory or indifferent results. More often than not, one's aerial system is intimately related to one's location and this latter factor cannot be altered. The amateur lucky enough to have the space and wherewithal to erect an elaborate aerial farm is assured of consistent DX work. True, rotary beams and so on have helped those with restricted space, but Town and Country Planning regulations, etc., and again cost, often prohibit the use of such systems.

It is no doubt true to say that the "perfect aerial system" which will suit all requirements, just does not exist nor will it ever be described. Each case must receive individual treatment and it is quite impossible to advise on the best aerial system for the amateur to use without knowing in considerable detail all the various factors which may influence the design.

We have always been impressed by the popularity of articles on aerials—due no doubt, to the fact that every amateur is always on the look out for something which will suit his circumstances rather better than his existing system. In the past, much of the information dealing with aerial systems suitable for the radio amateur has come from America, where a different set of circumstances makes it generally unsuitable for this country. Recently, however, workers and writers in this country have been devoting their time to this question, bearing in mind the requirements of amateurs in this country, and some most interesting material is beginning to appear. We have been very fortunate in obtaining the services of Mr. F. C. Judd, G2BCX, whose work on aerials is well known to our readers. It was he, it will be recalled, who introduced the "ZL Special" into this country which was prominently featured some little while back by one of our contemporaries. In this month's issue, Mr. Judd begins a description of his model aerial polar diagram plotting table. A feature of this equipment, is that he can reproduce on it, the effects of nearby obstructing buildings, etc., and in this way he can show how an aerial system deviates from the theoretical in actual practice. In subsequent articles he will reproduce the radiation patterns plotted of aerial systems in use by actual amateur stations—patterns plotted entirely on the table with the surrounding terrain, etc., reproduced to scale and he will show how these compare with actual performance and with diagrams of radiation plotted by field strength measurements. He will show too, the sort of results which can be expected from the various newer types of aerials such as the "Corkscrew," the "Quad" and so on. We know that these articles will prove extremely interesting to our readers and we join with them in thanking Mr. Judd for making this material available to us.

—2UK.

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THE EDITOR invites original contributions on short wave radio subjects. All material used will be paid for. Articles should be clearly written, preferably typewritten, and photographs should be clear and sharp. Diagrams need not be large or perfectly drawn, as our draughtsmen will redraw in most cases, but relevant information should be included. All MSS must be accompanied by a stamped addressed envelope for reply or return. Each item must bear the sender's name and address.

Component Review. Manufacturers, publishers, etc., are invited to submit samples or information of new products for review in the section.

CHEQUES and Postal Orders to be made payable to "Amalgamated Short Wave Press Ltd."

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*A Companion Journal to THE RADIO CONSTRUCTOR*

# A TWO METRE CONVERTER

## A MODERN DESIGN

by

J. N. WALKER, G5JU

Part 1.

A number of two metre converters have, at one time or another, been constructed and used by the writer and the model described in the following paragraphs is the result of the experience thereby gained. It is capable of really excellent results and, in particular, the special design of the oscillator makes the instrument a joy to handle. Before dealing with the construction, the circuit will be discussed in some detail.

### RF Stage

The converter follows convention in that it consists of the usual RF amplifier/frequency-changer/oscillator line-up. It is practically impossible to improve on the well known neutralised double-triode for the RF stage, a useful degree of amplification being obtained but little increase in noise. The coupling between the RF stage and the mixer is important if optimum results are to be secured and this matter is dealt with further under "construction."

### Mixer Stage

In company with others with whom the subject has been discussed, the writer has not found wholly satisfactory the system of using a double-triode as combined mixer/oscillator. In theory it should be good, but in practice the performance leaves something to be desired. Noise level is certainly low but one has the impression gain is being lost. For one thing, the IF transformer does not peak sharply and it would appear that the triode mixer is introducing heavy damping. This may be alright when the oscillator frequency is fixed and a broad-band IF output is required but, when the oscillator is tuned, a wide bandwidth is a nuisance, at least for amateur communication work. Some improvement could probably be made by paying special attention to the design of the IF transformer but, irrespective of anything else, the double-triode mixer/oscillator combination suffers from "birdies" and it is difficult to remove them completely.

After a number of tests, the choice of mixer has fallen on a high slope miniature pentode, the Mullard EF91. This valve possesses an excellent conversion conductance, is not noisy, and the indication of IF resonance is very definite. The circuit adopted varies from that recommended (for use on 45 Mcs) by the manufacturers in two respects—the absence

of a grid leak and the rather high value of screen resistor. But again tests indicate a definite increase in conversion gain (at 145 Mcs), compared to the other circuit.

There are a number of ways by which injection of the oscillator voltage can be accomplished. The system adopted, and found quite satisfactory, is to inject into the control grid through a very small coupling capacitor, of which more later.

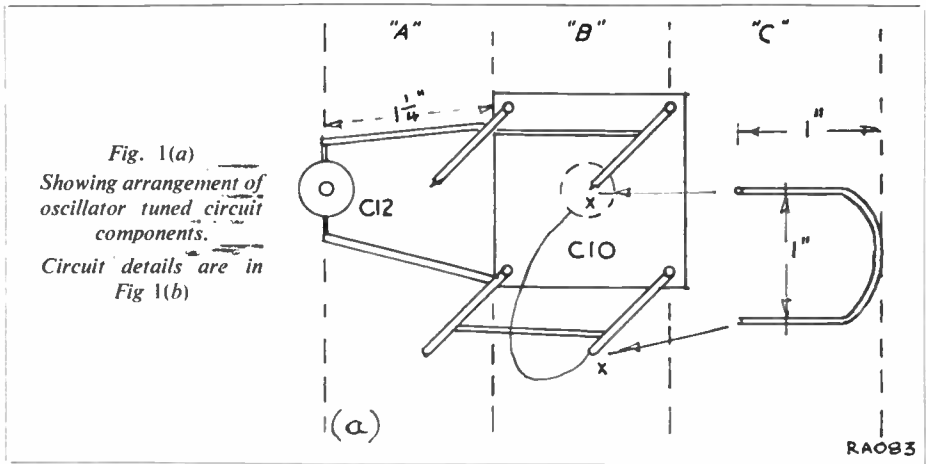
### The Oscillator Circuit

As far as the writer can remember, there seems to have been little discussion on oscillator circuits for very high frequencies and this seems strange considering the importance of the oscillator at these frequencies. In the present case, this stage has received much thought and attention, with the main object of reducing drift to truly negligible proportions.

The main cause of frequency drift is the capacitance change brought about by heating of the valve electrodes, yet one generally sees the valve connected directly across the extreme "hot" end of the circuit, where, of course, the slightest change of capacitance has a considerable effect. Further, the loading caused by the valve, due to transit time, is greater the higher the frequency and, around 130 Mcs, the loading of the valve drastically reduces the "Q" of the circuit. It may be mentioned here that when the valve is connected in this way, there is little point in using thick conductors (tube, rod or strip) in the tuned circuit, as little material benefit results.

A high value of "Q" is definitely desirable as it improves the inherent stability of the oscillator, whilst drift will be greatly reduced if the effect of the valve inter electrode capacitance can be modified. Both benefits are secured if the valve is shunted across part, as against the whole, of the tuned circuit, as indicated in the circuit diagram. For good operation, the valve chosen should possess a high mutual conductance and oscillate readily—the Mullard ECC81 fills the bill nicely. Since this valve is a double-triode, push-pull operation is employed, since still better stability is thereby obtained.

In practice, the oscillator tuned circuit divides up into three sections and the sketch in Fig. 1. is provided to explain these. Section "A" comprises the two rods (actually 14

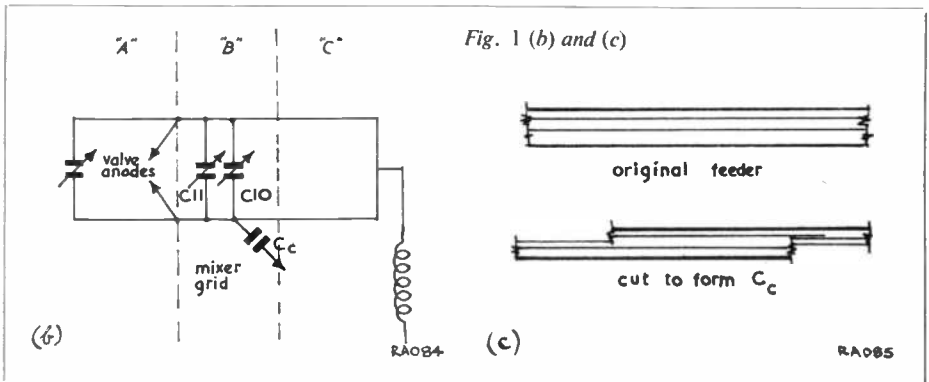


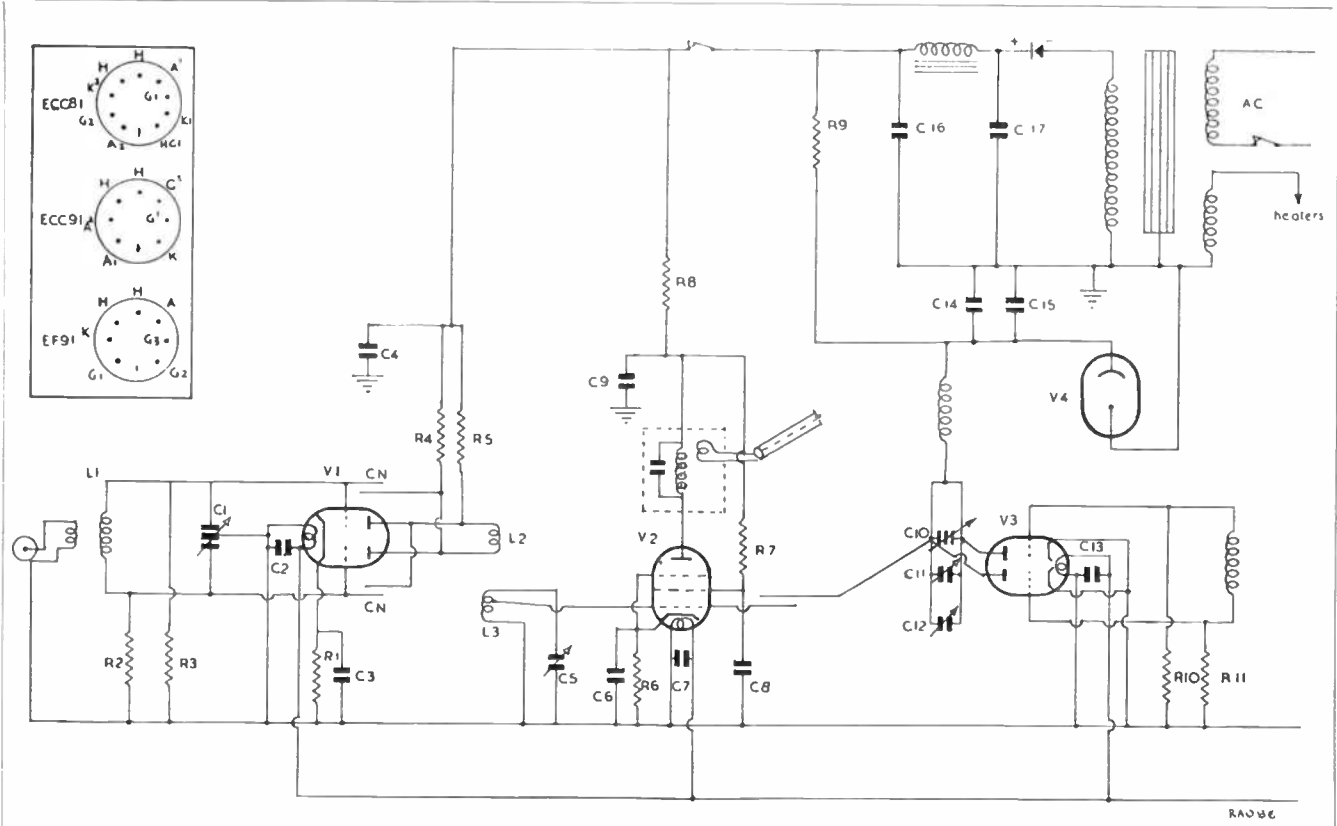
s.w.g. wire) which are terminated with C12 and form the extension beyond the valve anodes. The rods and vanes of the condenser C10 have lengths which cannot be ignored at 145 Mcs and these form section "B". Finally, there is the loop, again of 14 s.w.g. wire, which forms section "C." Section "B" dimensions are fixed, the only point to note being that the "A" rods are soldered on to the condenser arms near the ceramic plate and not at the soldering lug ends. The total length of the loop "C" controls the bandspread coverage of C10—shortening it increases the bandspread. The lengths of the "A" rods govern the frequency of the oscillator but C12 allows of any discrepancy being taken up. A small trimmer (C11), cut down by removing vanes so that the actual capacitance is only a few picofarads, is placed directly across C10. In fact, it acts as a vernier adjustment to C12, since movement of the latter has a considerable

effect on the frequency and adjustment is somewhat critical when it comes to locating the band within the sweep of the tuning dial.

With this arrangement, there is a highly stable capacitance of about 10 or 12 pF at the end of the line and further down is the 0.4 pF which is the quoted capacitance between the valve anodes. It will be appreciated that the valve capacitance is well swamped and variations due to heating can, therefore, have only a very small effect on the frequency.

Electrically the circuit is simple enough—tuned anode, untuned grid, the small coil L5 providing the reactance which induces oscillation. The feed to the mixer valve is taken from the lower end of the loop "C." It might be argued this causes some unbalance, but it is only to a very small degree as the point is away from the "hot" end of the circuit and, anyway, the coupling capacitance is only a picofarad or two. In this position a





Circuit diagram of two metre converter. Component values shown on opposite page.



## TWO METRE CONVERTER

### LIST OF PARTS

#### General

- 1 Chassis. *Eddystone Cat. No. 643 or similar.*
- 1 Cabinet. *Eddystone Cat. No. 644 or similar.*
- 1 Full Vision Slow Motion Dial. *Cat. No. 598. Eddystone.*
- 1 IF (output) Transformer. *Cat. No. 728. Eddystone.*
- 1 Flexible Coupler. *Cat. No. 50. Eddystone.*
- 1 Metal Bracket (for C10). *Cat. No. 708. Eddystone.*
- 1 Five-way tag strip. *Cat. No. 649. Eddystone.*
- 1 Mains Transformer. *230 volt input, 200 volt 30 mA and 6.3 volt 1.2 amps output.*
- 1 Metal Rectifier to suit transformer.

- 2 Toggle Switches, on/off.
- 2 Valveholders, type XM7/UB. *McMurdo.*
- 1 Valveholder, type XM9/UB. *McMurdo.*
- 1 Valveholder. *British, 4 pin.*

- 1 Valve, type ECC91 (V1). *Mullard.*
  - 1 Valve, type EF91 (V2). *Mullard.*
  - 1 Valve, type ECC81 (V3). *Mullard.*
  - 1 Stabiliser Valve, type 7475 (V4). *Mullard.*
- Coaxial socket, plug and cable, various tag strips, etc.

#### Variable Condensers

- C1 8×8 pF Butterfly. *Cat. No. 739. Eddystone.*
  - C5 12.5 pF. *Cat. No. 580. Eddystone.*
  - C10 15×15 pF Split-stator. *Cat. No. 476. Eddystone.*
  - C11 any miniature trimmer, reduced to about 3 pF.
  - C12 20 pF air trimmer—concentric or other type.
- Cn and Cc, see text.

#### Fixed Condensers

- C2, C3, C6, C7, C8, C13. *500 pF Micadiscs. T.C.C.*
- C4, C14. *.0005 μF moulded mica.*
- C9. *.001 μF moulded mica.*
- C15 4 or 8 μF Electrolytic, 300 volt or more.
- C16 8 or 16 μF Electrolytic, 300 volt or more.
- C17 32 or 50 μF Electrolytic, 300 volt or more.

#### Fixed Resistors

- R1 200 ohm.
  - R2, R3 33,000 ohm.
  - R4, R5 22,000 ohm.
  - R6, R8 470 ohm.
  - R7 20,000 ohm.
  - R9 10,000 ohm.
  - R10, R11 30,000 ohm.
- (All  $\frac{1}{2}$  watt except R9 which is 1 watt.)

#### Coils

- L1 6 full turns, plus two half turns, where threaded through ends of  $\frac{1}{4}$  in. former. 18 SWG enamelled wire. (Aerial coupling two turns at centre.)
- L2 11  $\frac{1}{2}$  in. 20 or 22 SWG wire (sleeved). Two self-supporting turns arranged to couple at lower end of L3.
- L3 three turns 18 SWG wire  $\frac{3}{4}$  in. diameter, self supporting and well spaced.
- L4 see text.
- L5 seven turns 18 SWG enamelled wire,  $\frac{1}{4}$  in. diameter, self-supporting, turns very slightly spaced.

ceramic condenser of 2 pF is suitable but it may be found difficult to obtain. An excellent substitute is a short length of twin feeder, with polythene insulation. Each end is cut away to leave  $\frac{1}{8}$  to  $\frac{1}{4}$  in. at the centre as sketched in Fig. 1(c).

This piece of feeder acts both as coupling capacitor and connecting lead from the stator of C10 and a  $\frac{1}{4}$  in. hole should be drilled in the chassis to give it ample clearance and a short path.

The position of the oscillator valve is perhaps unorthodox but the leads to the anodes (copper strips) must be kept short (not more than  $\frac{1}{2}$  in.). The location of the valve, as shown in the photograph, permits this and is convenient in other ways also.

Quite a lot of space has been devoted to the oscillator because it is the most important stage in the converter. The system described results in an oscillator which behaves like one on a much lower frequency and those possessing converters will find it well worth while to modify the oscillator stage to conform to the writer's recommendations.

#### Neon Stabiliser

It will be noticed that a small neon stabiliser is employed and this may be queried in view of the claims made for the oscillator stability. However, it should be remembered that capacitance variation is one thing, change of voltage another. The stand-by switch is arranged to leave HT on the oscillator but remove it from the RF and FC valves, which

# RADIATION PATTERNS AND OTHER MEASUREMENTS WITH HIGH FREQUENCY MODELS OF AERIALS

by F. C. JUDD, G2BCX

In this series of three articles, our contributor deals with the following topics which he has summarised as follows:—

(i) Methods of measuring the radiation patterns of various types of aerials and arrays have been investigated by using models (scaled from lower frequency designs) operating on very high frequencies.

(ii) The conditions which have to be satisfied in a model for accurate simulation are well known, but in a practical model it is generally impossible to maintain these conditions exactly, so it is necessary to consider the approximations which are permissible.

(iii) Methods for directly measuring the patterns of transmitting and receiving aerials and the equipment which has been used on a number of frequencies is described.

(iv) The accuracy of model-antenna-pattern measurements is discussed together with some notes on determining the polarisation of electric fields, as well as the effects of reflection and other disturbances which can and do distort the true or calculated radiation pattern(s).

## PART 1

### Introduction

The difficulties involved in taking even the simplest of measurements from aerials at low frequencies (having in mind at the moment the Amateur frequency allocations between 28 and 1.8 Mcs) make it almost impracticable to attack the problem. It becomes necessary therefore, to devise some other system for investigating radiation patterns and so on by using models. Various methods have been used and the idea is not entirely new, but measurements made on antenna models prior to the recent war (see references) were limited to an upper frequency (for the model) of about 500 Mcs due to lack of suitable oscillators for higher frequencies.

Model measurements in electromagnetic systems are based on the principle of ELECTRO-DYNAMIC SIMILITUDE, a direct consequence of the linearity of Maxwell's equations. (Ref. 1.) From a practical point of view an aerial out to resonance at say 10 centi-meters would have the same radiation

characteristics as an aerial of the same type operating at 10 meters, providing all other conditions are maintained, viz., height above ground, conductivity of ground, metallic structure involved in the aerial itself, the dielectric constants and conductivity of insulating materials used in the manufacture of the aerial, and the effects of surrounding objects, etc. Most of these can be simulated and small differences ignored, but at certain frequencies there are changes in conductivity and the construction of an accurate model becomes difficult. The effects of inaccurate simulation of metals is most prominent in thin wires. If the metal to be used to model a wire has too low conductivity, there is a change in the current distribution and the radiation pattern will be distorted.

Many other problems have had to be overcome in order to obtain fairly accurate results and the writer has constructed and developed several systems, studied the effects of different operating frequencies and taken hundreds of radiation patterns and gain measurements since the experiments were started some four years ago. Before continuing with descriptions of the apparatus used by the writer, and details of some of the results obtained, a brief survey will be made of other equipment and systems devised and used by independent investigators and other interested concerns.

### (i) A Model Antenna Range

To facilitate the measurement of antenna patterns in the vertical plane, a new model antenna range has been completed by the U.S.A. Bureau of Standards. The range consists of an inverted "V" structure which supports a test or target transmitter about 50 feet above ground. The model antenna to be tested is placed in the centre of a ground plane beneath the "V" frame which is movable through 90° either side of its vertical position. Techniques employed use the principle of electro-dynamic similitude. As applied to an antenna an equivalent performance is obtained from a model 1/nth as large as the prototype antenna if the operating frequency of the model is made n times the prototype

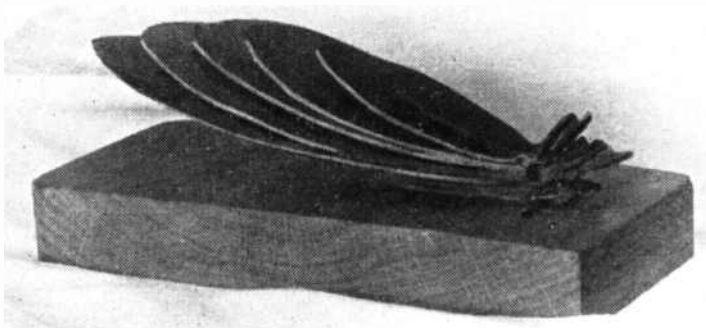


Fig. 1.

frequency. As the model frequency is increased the free space wavelength is decreased proportionately and the distance between the transmitting and receiving antenna can be reduced by the same scaling factor of  $n^{(1)}$

**(ii) Glide Path cavity antenna for Jet Fighter Aircraft**

A radiation pattern study was made using 1/10th scale precision models of the aircraft. A 1/10th scale model of the antenna was mounted in the lower lip of the air intake and accurate patterns might be taken.<sup>(2)</sup>

**(iii) Flush Mounted antenna for mobile application**

Small annular slot antennas with the same radiation patterns as a dipole and for construction integral with the metal of the car. Tests were made with models of the antennas operating at 10 cm (3000 Mcs) in models of the car 1/7th full size.<sup>(3)</sup>

**(iv) Effect of Feed on Patterns of Wire Antennas**

Measured radiation patterns for straight wire aerials of various lengths from half a wavelength to three wavelengths and fed at various points. Results show that the feed point effects the number, orientation and magnitude of the lobes. Tests were made with centimeter models.<sup>(4)</sup>

**(v) Micro-wave Pattern Plotter**

Furnishing a complete pattern in two minutes this automatic instrument using micro-wave models of aerials to be tested. A special feature of the equipment is an absorbing screen which eliminates interfering reflections when the apparatus is used in an enclosed space. The absorbing screen consists 1½ in. square pyramids cast from a mixture of lamp-black and plaster and assembled into frames

six feet square. These screens are able to absorb energy from 3000 Mcs to 30,000 Mcs (10 cm. to 1 cm.) and the VSWR of an antenna looking into the surface is better than 1.05 to 1 over the above frequency range.<sup>(5)</sup>

**(vi) Model Aerials**

A system using models of aerials operating at scale heights above a ground plane reflecting surface (table). The aerials are energised with modulated RF (3000 Mcs) and the changes in signal level conveyed (after demodulation) to an amplifier or other indicator depending whether the equipment is being used for demonstration or measurement.<sup>(6)</sup>

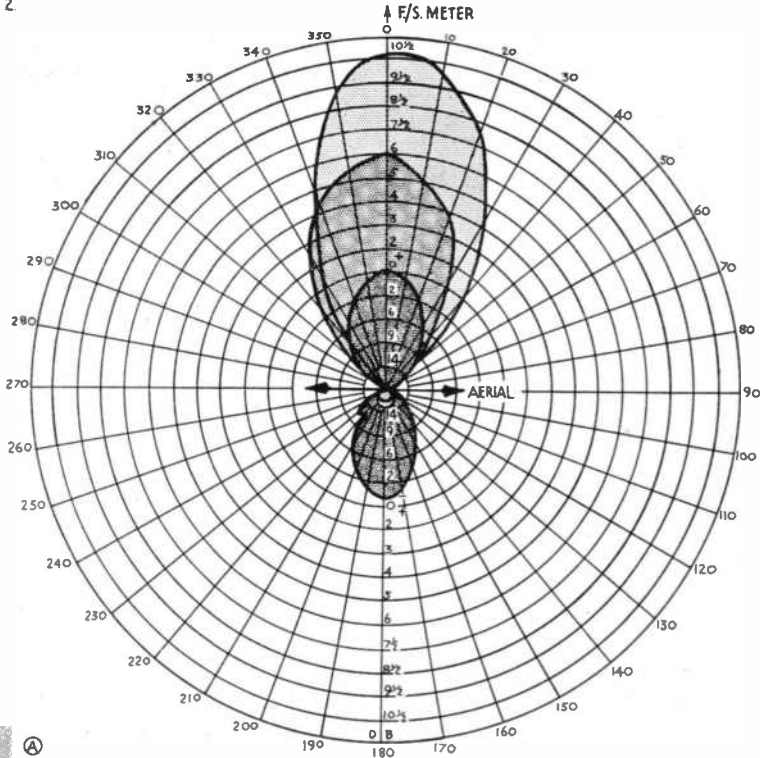
**(vii) Experiments with Scale Model Aerials**

The application of the theory of similar structures applied to transmitting aerials where the wavelength and size of the aerial to be tested is scaled down proportionately. The system enabled radiation patterns in both the vertical and horizontal planes to be plotted and frequencies between 144 Mcs and 300 Mcs were used.<sup>(7)</sup>

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FIG. 2



(A) DIPOLE AT 0dB  
(REFERENCE AERIAL)



(B) 3 ELEMENT PARASITIC ARRAY:  
GAIN 6Db

(C) 8 ELEMENT YAGI ARRAY:  
GAIN 10.75 Db

F/S METER ELEVATION:  
DIPOLE 25°. 3 AND 8 EL. ARRAYS 20°

HORIZONTAL ANGLE POLAR PATTERN

3000 Mc/s (10 C.M.)  
POLARIZATION IN E-PLANE

RA015

**(viii) Aircraft Antenna Measurements**

The Boeing Airplane Co. of America use models of antennas in scale models of aircraft in which the aerials are to be used. The airplane is mounted on a rotating stand and field strength plotted as the model is turned through 360°.

**Methods and the Frequencies used by the Writer**

From the foregoing it may be seen that considerable reliability is placed on the idea of carrying out tests and plotting radiation patterns from models of aerials and much time and expense can be saved by the method. As already mentioned, measurements such as those above would invariably prove difficult and in most cases impracticable where aerials for low frequencies, with their consequently large dimensions are concerned. With suitable equipment the following measurements can be made:—

(i) Radiation patterns in both the horizontal and vertical planes. Three dimensional models can be constructed from these as shown in Fig. 1.

(ii) Power gain with respect to a standard aerial. (Usually a dipole). Fig. 2.

(iii) Gain between two aerials may be ascertained. (Where design has been modified and/or different method of feed used, etc.)

(iv) Determination of the polarisation of the electric field.

(v) Phase of the wavefront of the radiated field relative to an arbitrary reference surface may be measured by mixing the received signal with a sample taken from the generator and adjusting the phase of one of the signals to produce a null at the receiver.

(vi) Numerous effects such as the introduction of other surfaces as might be in the vicinity of the antenna under normal working conditions, e.g. buildings, towers, and masts, other aerials, special surfaces on which the aerial may be mounted as aircraft bodies, etc., and the effects of different methods of feed and conditions of matching.

The writer's early experiments were made on an operating (model) frequency of 144 Mcs and aerials suitable for 160, 80, 40 and 20 meters were scaled down for measurement of gain and radiation. For example, the well known W3EDP all band aerial which is normally 84 feet long, and includes a counterpoise some 16 to 18 feet long, was scaled to lengths suitable for representation of the above wavelengths, e.g., 20 meters, 89 ins.: long—40 meters, 44½ ins. long—80 meters, 224 ins. long. Resonant aerials were cut to 144 Mcs fundamental (half wave or dipole approx. 39 ins.). Heights were scaled accordingly so that a quarter wave antenna for 160 meters which would normally be some 132 feet long, now became 19½ ins. with a scaled

height of 6 ins. to give simulation of an average working height of 30 to 40 feet.

More than 30 model aerials were constructed and were operated from self excited oscillators modulated with 1000 cps tone. Field strength meters consisted of a dipole, a resonant (tuned) circuit and crystal (germanium) detector, the output from this being coupled to a 0-500 micro-amp meter for indication of field strength. Three such meters were constructed together with adjustable stands for both the meters and the model aerials. Although the equipment was relatively crude, the results obtained were encouraging enough to warrant continuation of the experiments. Most of the radiation patterns were taken over normal soil (in the garden) although for indoor demonstrations an "earth mat" of paper backed with metal foil was used quite successfully. However, for accurate radiation and gain measurements it is *very* necessary that they are made in a clear space (large garden or field) in order to avoid reflection from various objects. Such reflection will add to or subtract from the measured radiation, depending on the phase and strength on arrival at the field strength meter aerial.

The equipment mentioned above was later modified for use on a frequency of 300 Mcs and the experiments were continued. It was found, however, that impedance matching with scale size feeder lines (600 ohm), was more difficult and required careful attention to the choice of materials from which these and the model aerials were constructed. This frequency, however, permitted the modelling of quite large aerial arrays, and to mention one example may be of interest. A model of an aerial, now known as the ZL Special, was constructed complete with a supporting tower, motor driven turning gear and scale size feeder line. The model gave simulation of the aerial as it would be used for 10 meters so that the tower at 30 inches high represented a full size structure of 30 feet, the aerial being 16 inches across (representing 16 feet) assembled on a carefully modelled wood frame complete with scale size insulators, etc. Also in connection with the 300 Mcs experiments some tests were made to determine the possibilities of the simulation of certain types of material, such as brick, earth, wood of various kinds etc., so that reflection and attenuation could be investigated with model buildings and so on. Again, good results were obtained but the necessity of having to work outdoors in order to avoid unwanted reflection, etc., proved unsatisfactory from the point of view of weather and constantly having to erect and dismantle the equipment. Attempts were made to construct a "table" which could be used indoors and although frequencies up to

## TRADE REVIEW

### LABGEAR 5-STAGE WIDE-BAND MULTIPLIER

The almost complete coverage of Great Britain by TV, and the expansion of programme time—particularly at week-ends and in the evenings, important times as far as the majority of amateur transmitters are concerned—means that TVI is a problem which *must* take priority in the shack. Otherwise, there will be a tendency for activity on the LF bands to become progressively lower and lower, and we shall be in some danger of losing them altogether.

With this in mind, the introduction by Labgear (Cambridge) Ltd., Willow Place, Cambridge, of a completely switched wide-band multiplier unit, built to give maximum attenuation of harmonic radiation such as will cause interference with TV reception, is a most welcome step.

The unit, which is completely wired up and tested at the factory, consists of a number of wide-band couplers, a band-switch of the wafer type, and the necessary by-pass and trimmer condensers. It is so arranged that, when mounted on the main chassis, each stage is completely screened from the others. Fixing is by four 6BA screws, and a drilling template is supplied.

It is quite small, so that a compact 5-band Tx may be readily built. The chassis space occupied is  $9\frac{1}{2}$  in. long by  $2\frac{1}{8}$  in. wide, and the maximum height above chassis is  $3\frac{1}{2}$  in. The switch spindle projects at the rear, and is suitable for coupling to a Labgear turret in the PA or buffer stage, thus simplifying band changing.

Output is obtainable at 3.5 to 3.8 Mcs, 7.0 to 7.3 Mcs, 14.0 to 14.35 Mcs, 21.0 to 21.45 Mcs and 28.0 to 29.0 Mcs (or to 29.7 Mcs with slightly reduced drive) simply by setting the switch to the appropriate range as indicated on the escutcheon. Input may be from either a 3.5 Mcs or 1.7 Mcs VFO.

The associated valve line-up can be really flexible, and in a simple rig may actually consist of double triodes. Three such valves would even allow for the VFO. EF50, EF54, EF91, Z77, 6AQ5, 6AC7, 6AG7, QVO4-7, 6V6, EF55, 6J6, 6C4, EC91, 12AU7, 12AT7, ECC81, etc., are all suitable. The makers suggest that multi-electrode valves should be triode connected, as this gives a flatter response and greater drive to the PA, as well as making for greater simplicity in the construction of the multiplier stages.

The unit is reasonably priced at £4 10s. 0d. Further particulars may be obtained on application to the address given above.

800. Mcs were used the limitations of the table top, constructed from sheet metal to provide an artificial earth, proved unsatisfactory owing to its small size compared with the free space wavelength of the above frequency, the highest available. Also it is necessary to mount the field strength meter and aerial at least five wavelengths from the aerial under test, in order to avoid interaction between the two aerials. This applies to all arrangements for model aerial work, irrespective of frequency, in fact a distance between the two aerials of 10 wavelengths is better and becomes more practicable as the frequency is increased. (Free space wavelength becomes shorter). RF power for 800 Mcs was obtained from a lighthouse valve and for the other frequencies in use namely, 55.6 Mcs, 111 Mcs, 222 Mcs and 444 Mcs VHF triode valves type 995 (acorn) and CV63 were used.

With the knowledge and experience gained in using the lower frequencies (144 Mcs to 880 Mcs) it was eventually decided to investigate the possibilities of using micro-waves (10 cm downwards) since the model aerials and an artificial earth plane having quite small physical dimensions, could be constructed thus allowing measurements to be made indoors. Further such equipment would be portable and suitable for demonstrations in conjunction with lectures. A considerable amount of time was spent in gathering all the available information on other micro-wave systems used by both private investigators and commercial concerns and from this several ideas were incorporated in the construction of a complete Model Antenna Table with additional equipment for measuring field strength, gain and other characteristics of aerials and arrays designed for lower frequencies. Full details of the construction of the table, together with some notes on the creation of similar conditions, examples of some of the plotted radiation patterns, etc., etc., are given in part 2 of this article.

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and other references given in the text.

# THE DESIGN OF MAINS TRANSFORMERS

by W. E. THOMPSON

## Part 4.

### Efficiency—once again

Having found the magnitude of the copper and iron losses, we can apply these figures and check whether our previous assumption of 85% efficiency was justified. Putting  $\text{eff.} = \frac{\text{output}}{\text{output} + \text{copper losses} + \text{iron losses}} \times 100\%$

should, with a good design, produce a figure round about 85—90%.

### Temperature Rise

The conditions governing temperature rise are several, and in many cases not entirely predictable, since they will depend to a large extent upon the circumstances under which the transformer is working. It is clear at the outset that an "open" type transformer mounted in free air will run cooler than a similar but fully shrouded type situated inside an enclosed piece of equipment. Half-shrouded transformers having one-half of the coil protruding through to the underneath of a chassis are virtually fully shrouded so far as heat dissipation is concerned.

As can be expected, the hottest part of the coil will be the inside winding, usually the primary. Such heat as exists there must pass through the other windings and any insulation therein, before being radiated from the surface of the coil. Very little heat will be transferred to the iron core, so this will not assist materially in getting rid of heat.

Transformers are not at all happy at temperatures of 100°C. or over; in fact it is asking for trouble to run them at such high temperatures, since insulation deteriorates fairly rapidly with excess heat. A safe maximum temperature is 90 to 95°C., and as an average ambient temperature of 40 to 45°C. is generally encountered, this limits the temperature rise to about 50°C.

It is possible, given known conditions, to evaluate the temperature rise to be expected with a specific design, but as such calculations are obviously beyond the scope of this article, we must content ourselves with a simple "rule-of-thumb" which can give a general indication in the majority of cases.

Consider the sketch of a typical pair of laminations, as shown in Fig. 5. Using the symbols for the dimensions shown thereon, we can calculate, *very roughly*,

$$\text{Temperature rise in } ^\circ\text{C.} = \left( \frac{20 \times W}{2D \times (H + 3E)} \right) + D$$

where  $W$  = total copper loss.

It is emphasised that this formula does not

give an accurate figure; it serves as a guide only. It is applicable mainly to the "open" type of construction, and will fall short if relied upon for fully- or half-shrouded transformers. The best policy is, of course, to see to it that iron and copper losses are kept as low as possible, especially if the transformer cannot be mounted where it will have good

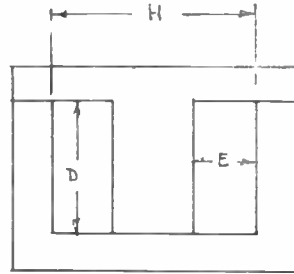


FIG 5. DIMENSIONS USED TO CALCULATE TEMP. RISE

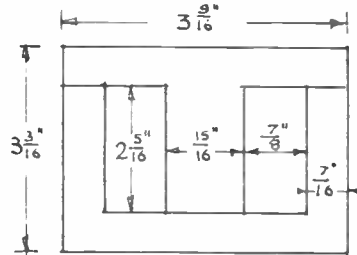


FIG 6a DIMENSIONS OF STAMPINGS CHOSEN FOR WORKED EXAMPLE

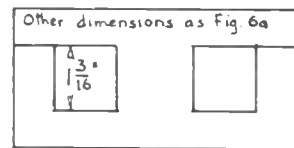


FIG 6b THE STAMPINGS AS USED, SHORTENED BY  $\frac{1}{8}$ "

ventilation. In this connection, it might be mentioned that if one can adopt an open coil construction, that is, wind the coil without end cheeks to the bobbin, ventilation is obtained from the edges of the coil, especially if the transformer is mounted with the long side of the winding window horizontal.

**A Practical Design**

We have now reached the stage where we have acquired sufficient information to enable us to design any transformer we might need. As predicted quite early in the article, the value of being able to design for one's own particular requirements is mainly a matter of cost; if we want a transformer which, for want of a better term, is "non-standard," our knowledge becomes more valuable, for we are then able to get out our own specification and make the transformer without delay. It is now proposed to work out such a design in full. This will serve to prove the point just made, and at the same time improve our appreciation of the method of design, since we shall need to make use of all the steps so far explained. The transformer is one that was produced by the author for a piece of testing equipment; as will be seen later, the design is a good example of how one can make use of material which happens to be on hand.

The requirements are that the transformer shall have a primary suitable for input voltages of 210V and 240V. There are to be three secondaries: the first to supply a half-wave rectifier at 250V 10mA, the second to be 6.3V 0.5A for the heaters of two valves, and the third a special winding to deliver 50mA at 50V, or 20mA at 120V. The primary is to be screened.

The secondary watts are therefore,

$$S1, \frac{250 \times 10 \times 2.46}{1000} = 6.15 \text{ W.}$$

$$S2, \frac{6.3 \times 0.5}{50 \times 50} = 3.15 \text{ W.}$$

$$S3, \frac{1000}{120 \times 20} = 2.5 \text{ W., or}$$

$$\frac{1000}{1000} = 2.4 \text{ W.}$$

$$\text{Total secondary watts} \\ = 6.15 + 3.15 + 2.5 = 11.8 \text{ W.}$$

At 85% efficiency the primary watts will be

$$\frac{11.8 \times 100}{85} = 13.9 \text{ W.,}$$

and from this the primary current will be

$$\frac{13.9 \times 1000}{210} = 66 \text{ mA.}$$

Note here that in finding the loading of the secondary S1 we multiplied by the factor 2.46, since a half-wave rectifier is being fed by that winding, and that the primary current is based on the lowest voltage to be used.

The core area for a primary loading of 13.9 W is  $0.16\sqrt{13.9} = 0.6$  sq. in., and from this figure the turns per volt is found to be

$$\frac{6}{0.6} = 10.$$

We now need to find a suitable size of stamping which will give us a core area of 0.6 sq. in., remembering that the shape of the centre limb should be square or nearly so. Among the author's stock there were stampings with a centre limb width of 15/16th in. (0.9375 in.), so to produce the required core area the stack must be

$$\frac{0.6}{0.9375} = 0.64 \text{ in.}$$

It was therefore decided to stack to 11/16th in. (0.6875 in.), which gives a nicely proportioned shape. At the same time, however, it was realised that the winding window might prove unduly large, and the method of overcoming this will be given. The dimensions of the stampings are shown in Fig. 6A.

As a first approximation for wire sizes, we find from the wire table that the following sizes are suitable,

- Primary, (66 mA), 37 SWG.
- S1, (25 mA), 42 SWG.
- S2, (0.5A), 26 SWG.
- S3, (50 mA), 38 SWG.

A current density of 2000 Amps per sq. in. has been used here. As the primary is an odd-sized gauge, we can with advantage make this 36 SWG, which will carry up to 90 mA, and for convenience in winding we can use 40 SWG for Sec. 1, for 42 SWG is rather a fine wire. Enamel insulation will be suitable, in all windings.

Coming now to the turns required for each winding, using the TPV figure of 10 already found, we have,

- Primary,  $240 \times 10 = 2400$  turns 36 SWG.
- S1,  $250 \times 10 = 2500$  turns 40 SWG.
- S2,  $6.3 \times 10 = 63$  turns 26 SWG.
- S3,  $120 \times 10 = 1200$  turns 38 SWG.

To get a rough idea whether these windings can be accommodated in the window of the core, we digress here and make a quick check.



Divide the turns by the *square* of the turns per inch, to obtain the area taken up by the windings. Add the winding areas thus found, and it will be seen how we are getting on, thus,

$$\text{Primary, } \frac{240}{110 \times 110} = 0.20 \text{ sq. in.}$$

$$\text{S1, } \frac{2500}{169 \times 169} = 0.09 \text{ sq. in.}$$

$$\text{S2, } \frac{63}{48 \times 48} = 0.03 \text{ sq. in.}$$

$$\text{S3, } \frac{1200}{135 \times 135} = 0.07 \text{ sq. in.}$$

This gives a total of 0.4 sq. in. The window in the core, Fig. 6A, is seen to be 2.3125 in.  $\times$  0.875 in. Allowing 0.3125 in. lost space in the length of the window, and 0.125 in. in the width (i.e. space taken up by bobbin and clearances for windings), this reduces to  $2.0 \times 0.75 = 1.5$  sq. ins. It is therefore obvious that even if we allow 50% extra space for the windings to give room for major insulation and the screen, we shall take up only 0.6 sq. in., and the available winding space is more than twice our needs. In this particular case, since a more suitable size of stamping was not available, it was decided to halve the winding window area by shortening the legs of the stampings. By snipping  $1\frac{1}{4}$  in. (1.125 in.) off each lamination in an improvised guillotine, they were made to the dimensions shown in Fig. 6B.

The length of the window is now 1.1875 in., so allowing about 0.3 in. lost space we can say the layer length will be 0.875 in. We can now proceed with the design of the windings. The full calculations in the original design are given to show how the windings can be modified to suit the core.

$$\text{Primary, 2400 turns 36 SWG enam. Turns per in.} = 110, \text{ so turns per layer} = 100 \times 0.875 = 96. \quad \frac{2400}{96} = 25.$$

$$\text{Winding height} = \frac{25}{110} = 0.227 \text{ in. Paper interleaving, } 24 \times 0.001 = 0.024 \text{ in.}$$

$$\text{Gross winding height} = 0.227 + 0.024 = 0.251 \text{ in.}$$

$$\text{Sec. 1, 2500 turns 40 SWG enam. Turns per in.} = 169, \text{ so turns per layer} = 169 \times 0.875 = 148. \quad \frac{2500}{148} = 17.$$

$$\text{Winding height} = \frac{17}{169} = 0.1 \text{ in. Paper interleaving, } 16 \times 0.001 = 0.016 \text{ in.}$$

$$\text{Gross winding height} = 0.1 + 0.016 = 0.116 \text{ in.}$$

$$\text{Sec. 2, 63 turns 26 SWG enam. Turns per in.} = 48, \text{ so turns per layer} = 48 \times 0.875 = 42. \quad \frac{63}{42} = 2.$$

$$\text{Winding height} = \frac{2}{48} = 0.042 \text{ in. Paper interleaving, } 1 \times 0.002 = 0.002 \text{ in.}$$

$$\text{Gross winding height} = 0.042 + 0.002 = 0.044 \text{ in.}$$

$$\text{Sec. 3, 1200 turns 38 SWG enam. Turns per in.} = 135, \text{ so turns per layer} = 135 \times 0.875 = 118. \quad \frac{1200}{118} = 10.$$

$$\text{(It is assumed here that we can wind 120 turns to the layer). Winding height} = \frac{10}{135} = 0.074 \text{ in. Paper interleaving, } 9 \times 0.001 = 0.009 \text{ in.}$$

$$\text{Gross winding height} = 0.074 + 0.009 = 0.083 \text{ in.}$$

We can now allow for the screen (say 1 layer 38 SWG enam.) and three turns of 5-mil Empire tape for insulation between windings; there will thus be a total of 0.015 in. insulation between adjacent windings, viz., between Primary and screen, screen and S1, S1 and S2, S2 and S3. The total thickness of screen and major insulation is therefore  $0.0062 + 0.06 = 0.0662$  in., say 0.067 in.

The overall winding height is  $0.251 + 0.116 + 0.044 + 0.083 + 0.067 = 0.561$  in. As we are allowing 0.125 in. lost space in the width of the window, we still will be left with 0.75 in. as a maximum winding height; we therefore can see that our winding will leave  $0.75 - 0.561 = 0.189$  in. spare space, which we can very well use. By judicious choice of larger wire sizes, we can reduce the copper loss and at the same time utilise the winding space to advantage to secure an efficiency as high as possible. So let us go over our winding calculations again, with thicker wires.

$$\text{Primary, 2400 turns 34 SWG enam. Turns per in.} = 93, \text{ so turns per layer} = 93 \times 0.875 = 81. \quad \frac{2400}{81} = 30.$$

$$\text{Winding height} = \frac{30}{93} = 0.323 \text{ in. Paper interleaving, } 29 \times 0.001 = 0.029 \text{ in.}$$

$$\text{Gross winding height} = 0.323 + 0.029 = 0.352 \text{ in.}$$

$$\text{Sec. 1, 2500 turns 40 SWG enam., as before. Gross winding height} = 0.116 \text{ in.}$$

$$\text{Sec. 2, 63 turns 24 SWG enam. Turns per in.} = 39, \text{ so turns per layer} = 39 \times 0.875 = 34.$$

$$\text{Number of layers} = \frac{63}{34} = 2. \quad \text{Winding}$$

$$\text{height} = \frac{2}{39} = 0.051 \text{ in. Paper interleaving, } 1 \times 0.002 = 0.002 \text{ in.}$$

$$\text{Gross winding height} = 0.051 + 0.002 = 0.053 \text{ in.}$$

$$\text{Sec. 3, 1200 turns 36 SWG enam. Turns per in.} = 110, \text{ so turns per layer} = 110 \times 1200$$

$$0.875 = 96. \quad \text{Number of layers} = \frac{96}{13} = 13.$$

$$\text{Winding height} = 13 = 0.118 \text{ in. Paper interleaving, } 12 \times 0.001 = 0.012 \text{ in.}$$

$$\text{Gross winding height} = 0.118 + 0.012 = 0.13 \text{ in.}$$

Assuming thickness of screen and major insulation to be 0.067 in. as before, the overall winding height now is  $0.352 + 0.116 + 0.053 + 0.13 + 0.067 = 0.718$  in. This is near enough to the 0.75 in. available, and it will permit a couple of turns of Empire tape over the completed winding for protection and appearance.

By using the formulae given earlier in the article, we can find the mean turn for each winding; these work out as follows:—

$$\text{Primary, 4.86 ins.} \quad \text{Sec. 1, 6.75 ins.}$$

$$\text{Sec. 2, 7.39 ins.} \quad \text{Sec. 3, 8.06 ins.}$$

From these figures the length and approximate weight of wire resolves to:—

$$\text{Primary, 324 yds.} = 0.25 \text{ lb.}$$

$$\text{Sec. 1, 469 yds.} = 0.1 \text{ lb.}$$

$$\text{Sec. 2, 12.9 yds.} = 0.057 \text{ lb.}$$

$$\text{Sec. 3, 269 yds.} = 0.14 \text{ lb.}$$

Adding 10% to each of these weights for wire covering, they work out respectively to:—

$$\text{Primary, less than 5 ozs.}$$

$$\text{Sec. 1, less than 2 ozs.}$$

$$\text{Sec. 2, about 1 oz.}$$

$$\text{Sec. 3, less than 3 ozs.}$$

As we have used thicker wires, the temperature rise will be less, so we can estimate the resistance of the wire to increase by about 5% under working conditions, especially as the transformer is intended to run for comparatively short periods. A convenient correction factor will be 36/34 instead of the figure of 36/30 we used for 20% correction in the earlier part of the article. The resistance of the windings is therefore found to be:—

$$\text{Primary, } \frac{324 \times 0.3612 \times 36}{34} = 126 \text{ ohms.}$$

$$\text{Sec. 1, } \frac{469 \times 1.327 \times 36}{34} = 660 \text{ ohms.}$$

$$\text{Sec. 2, } \frac{12.9 \times 0.0632 \times 36}{34} = 0.86 \text{ ohm.}$$

$$\text{Sec. 3, } \frac{269 \times 0.5292 \times 36}{34} = 151 \text{ ohms.}$$

We shall have a word to say about the 50V tap on Sec. 3 when we come to work out losses and efficiency.

The voltage drop for each winding now works out to,

$$\text{Primary, } 126 \times 0.066 = 8.3 \text{ V.}$$

$$\text{Sec. 1, } 660 \times 0.025 = 16.5 \text{ V.}$$

$$\text{Sec. 2, } 0.86 \times 0.5 = 0.43 \text{ V.}$$

$$\text{Sec. 3, } 151 \times 0.02 = 3.0 \text{ V.}$$

The copper losses calculate to,

$$\text{Primary, } 8.3 \times 0.066 = 0.55 \text{ W.}$$

$$\text{Sec. 1, } 16.5 \times 0.025 = 0.41 \text{ W.}$$

$$\text{Sec. 2, } 0.43 \times 0.5 = 0.22 \text{ W.}$$

$$\text{Sec. 3, } 3.0 \times 0.02 = 0.06 \text{ W.}$$

$$\text{The total copper losses are } 0.55 + 0.41 + 0.22 + 0.06 = 1.24 \text{ W.}$$

Turns correction is now made, deducting turns from the primary and adding turns to the secondaries,

$$\text{Primary, } 2400 - (8.3 \times 10) = 2400 - 83 = 2317 \text{ turns.}$$

$$\text{Sec. 1, } 2500 + (16.5 \times 10) = 2500 + 165 = 2665 \text{ turns.}$$

$$\text{Sec. 2, } 63 + (0.43 \times 10) = 63 + 4 = 67 \text{ turns.}$$

$$\text{Sec. 3, } 1200 + (3.0 \times 10) = 1200 + 30 = 1230 \text{ turns.}$$

Taking voltage ratios to find where the primary and Sec. 3 should be tapped, we have,

$$\text{Primary, 210V tap at } \frac{2317 \times 210}{2400} = 2027 \text{ th.}$$

$$\text{turn from beginning.}$$

$$\text{Sec. 3, 50V tap at } \frac{1230 \times 50}{1200} = 513 \text{ th}$$

$$\text{turn from beginning.}$$

From the dimensions of the core, Fig. 6B, the mean iron path is 5.875 ins., so for an effective core area of 0.6 sq. in. the volume of iron is  $5.875 \times 0.6 = 3.52$  cu. ins. The iron loss, at 1.0 W per lb., is  $3.52 \times 0.3 = 1.06$  W. The total losses therefore become iron + copper =  $1.06 + 1.24 = 2.34$  W.

The efficiency, being

$$\frac{\text{output}}{\text{output} + \text{losses}} \times 100\%$$

$$= \frac{11.8}{11.8 + 2.3} \times 100$$

$$= \frac{11.8}{14.1} \times 100$$

$$= 84\%.$$

This is so similar to the figure estimated in the early stages of the design that no further correction of windings need be considered.

(Contd. on p. 428)

# A SIMPLE NEGATIVE FEEDBACK DEVICE

by FRANK L. BAYLISS (A.M.I.E.T.)

## Introduction

Negative feedback—N.F.B., as it is commonly known—has so much to offer in the way of distortionless and noiseless reproduction that its inclusion in even the simpler types of receivers and amplifiers can be nothing but beneficial.

Nothing but beneficial, that is, *if it is correctly applied.*

Briefly, the benefits may be summarised as follows:—

1. If the percentage feedback is large enough, the gain of the amplifier tends to become substantially flat over the whole of the frequency range dealt with by the circuit.

2. The out-of-phase feedback cancels out parasitic oscillations due to poor component layout, bad wiring, etc., and gives increased stability and correspondingly better and clearer tone to the circuit as a whole.

3. Judicial use of N.F.B. reduces the internal impedance of a pentode to very nearly that of a triode and thus renders loudspeakers resonance much less noticeable and objectionable.

## Methods of Application

There are a dozen or more ways of applying N.F.B.—from the simple *current* feedback circuit of Fig. 1, where the omission of the

output valve bias decoupling capacitor provides the necessary feedback, to the two and three stage feedback circuits of public address amplifiers.

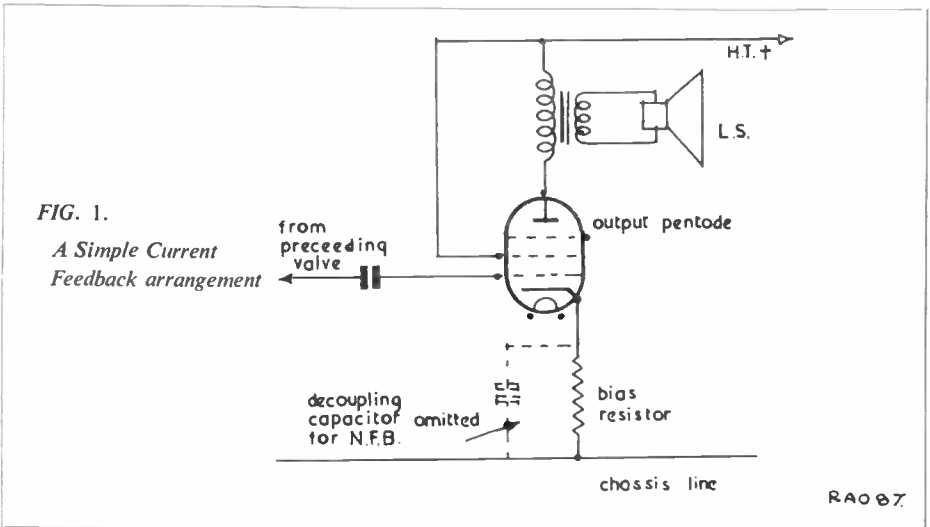
In this article, however, the writer proposes to concentrate on one method only. This scheme is simplicity itself and has a widespread application in the normal broadcast superhet.

Briefly, the grid of the usual duo-diode-triode is connected to the grid of the output pentode by a one or two-megohm resistor; this arrangement is shown in Fig. 2.

The formula giving the percentage feedback  $R \times 100\%$ .

$$\text{is } \frac{R_1 + R_3}{.5 (M \Omega) \times 100} = 20\% \text{ or, } R_3 = \frac{.5 \times 100}{20} = 2.5 M \Omega$$

Thus, if 20% feedback is required—and this figure is ample for all normal requirements—and if  $R = .5M \Omega$ , a usual value, then  $.5 (M \Omega) \times 100 = 20\%$  or,  $R_3 = \frac{.5 \times 100}{20} = 2.5 M \Omega$ . Thus, a  $2M \Omega$  resistor connecting the two grids in a normal superhet will give 20% feedback and much improved reproduction. There will, however, be just this amount of reduction in output volume and it is a good plan to arrange to switch the resistor in or out at will, so that maximum volume without



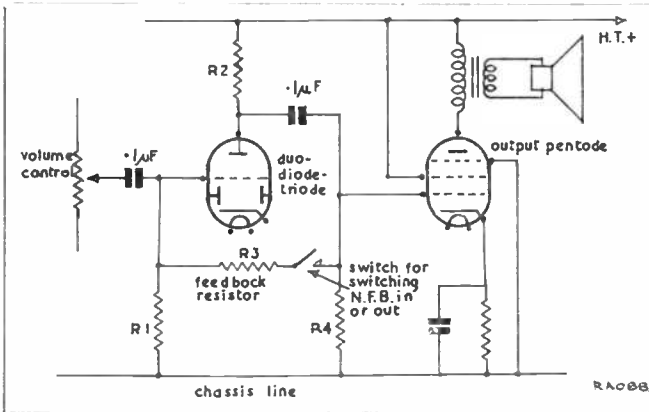


FIG. 2.  
The arrangement described in the text and successfully used by the Author

feedback may be obtained on weak signals, reserving the N.F.B. for strong local transmissions.

**Advantages**

The great advantage that this arrangement has over the more complex ones is that it is impossible to feed back positive N.F.B. instead of negative and thus cause oscillation.

As only one stage is involved there is no danger of phase shift causing self-oscillation and the circuit is practically foot-proof and cast-iron, and can be recommended for almost any circuit.

**A Variation**

Fig. 2 shows a variation of Fig. 2 for use in the output stage. This circuit is particularly useful in push-pull stages since the feedback

is applied direct to the pentode grids, where parasite oscillations are prone to appear.

The formula for this arrangement is  $R_1 \times 100\%$ .

$$R_1 \times R_2$$

Thus, if 20% feedback is required  $\frac{R_1 \times 100}{R_1 \times R_2} =$

$$20\% \text{ or } R_2 = \frac{R_1 \times 100}{20} R_1 \text{ M } \Omega.$$

Again, if  $R_1 = .5\text{M } \Omega$ , a usual value, then  $.5 \times 100$

$$R_2 = \frac{.5}{20} = .025 = 2\text{M } \Omega.$$

The value of the capacitor  $C_2$  should be  $0.1 \mu\text{F}$  and at least 500 volts working.

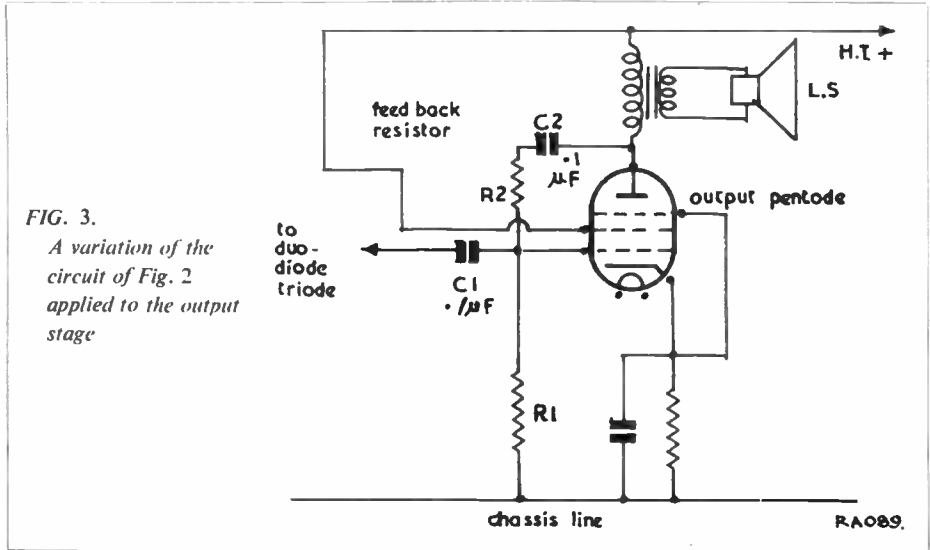


FIG. 3.  
A variation of the circuit of Fig. 2 applied to the output stage

# CONVERTER FOR MEDIUM WAVES

by W. CAMERON

Reading through mags which cater for the short wave enthusiast, experimenting with diverse radio, electronic and TV gear, we forget for a time that we do sometimes listen on the MW band. This latter point is brought sharply to our notice when the BC set fails.

It is very useful on such occasions to have a standby receiver, in order, mainly, to keep peace within the household! Standby receivers generally, have an inferior performance, so the writer decided that the communications receiver was the thing. It was decided that a converter ahead of this should provide performance that would be outstanding, when judged from ordinary BC standards.

The unit described here is exceedingly simple to construct, it is inexpensive, and does give the desired performance. Furthermore, it's alignment does not require the use of a signal generator.

Constructed originally for use with an Eddystone 640, it can, of course, be used with any receiver that will tune to 1.8 Mcs.

## Construction

The unit is built on a dural or mild steel chassis measuring  $7\frac{1}{2}$  in. by  $3\frac{3}{4}$  in. by  $1\frac{1}{8}$  in. The layout is not particularly critical, but the photograph shows the suggested layout above chassis, while the sketch shows the under-chassis layout. If a layout other than this is adopted, see that the aerial and oscillator coils are reasonably well separated, and preferably at right angles, so that no interaction occurs between them.

When bolting the trimmers (C1 and C9) to the chassis, take care to see that it is the *outside* plate which is earthed, i.e. the plate making contact with the adjusting screw.

Before mounting the tracking capacitor (C10) it will be necessary to drill a  $\frac{1}{4}$  in. or  $\frac{3}{8}$  in. hole in the chassis, to coincide with the adjusting screw.

The output from the unit must be taken via a co-ax lead. It is convenient to fit a co-ax socket on the rear of the chassis for this purpose. The inner conductor and outer screen is terminated at the receiver aerial and earth sockets respectively.

In the case of a 640 receiver the power leads should be connected to the octal plug provided with this set. With receivers without this facility, the leads must be taken to appropriate HT, LT and E points within the set,

although it is a good plan to fit an octal or similar holder, for this purpose.

## Putting the Unit into Operation

This is quite simple. There should be no difficulty in getting the converter working correctly in a very short time.

With the standard tuning capacitor, the aerial coil will tune approximately 1500 to 500 kcs.

The frequency coverage of the oscillator coil will depend on the frequency to which the receiver is tuned, or in other words, the IF.

In this case, the receiver is tuned to 1.8 Mcs (1800 kcs) so that for the convertor to produce an IF of 1800 kcs the oscillator coil must tune from  $1500+1800=3300$  kcs, to  $500+1800=2300$  kcs. The reason for this explanation will be seen later.

Screw in the cores of all three coils until about  $\frac{3}{8}$  in. only of the threaded rod can be seen. Loosen off the aerial and oscillator trimmers (C1 and C9) about three turns from maximum capacitance. Set the tracking capacitor at about three-quarters its full capacitance. Connect the convertor power leads to the receiver and switch on. Do not connect the co-ax output yet.

If a short lead is connected to the receiver aerial, and brought near to the oscillator coil in the convertor, it will be possible to tune the receiver to the signal generated by the oscillator, the receiver BFO should be switched on of course.

Turn the convertor tuning capacitor to minimum and set the receiver to 3300 kcs. Now adjust the oscillator trimmer (C9) until the signal is heard on the receiver. It may be necessary to "find" the signal first, and then "follow" it on the receiver whilst adjusting C9.

A similar procedure is adopted at the other end of the band. Set the tuning capacitor at maximum and tune the receiver to 2300 kcs. Now adjust the tracking capacitor (C10) until the signal is heard.

The core of L2 is already set to its approximate position, but if it is not possible to hit the correct frequencies by adjustment of C9 and C10, then the core may be adjusted. It is only necessary to screw it out if the oscillator frequency is low, or in, if the frequency is high. Remember that if the core is screwed in too far the frequency will rise again, as the core travels through and out of the other end of the coil.

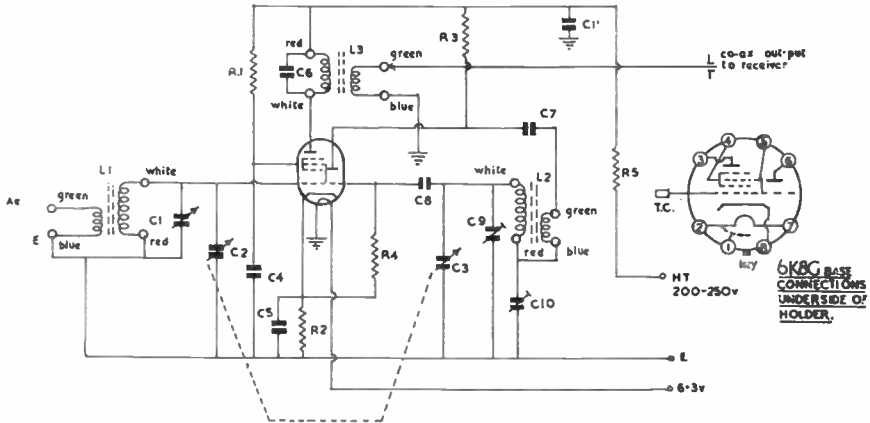


FIG. 1. CIRCUIT OF CONVERTOR

COMPONENTS LIST

- R1 68K  $\Omega$   $\frac{1}{2}$  w.
- R2 33  $\Omega$   $\frac{1}{2}$  w.
- R3 33K  $\Omega$   $\frac{1}{2}$  w.
- R4 47K  $\Omega$   $\frac{1}{2}$  w.
- R5 3.9K  $\Omega$   $\frac{1}{2}$  w.

- C7 75 $\mu$ F — Mica or ceramic.
- C8 75 $\mu$ F —
- C9 50 $\mu$ F Trimmer.
- C10 250 $\mu$ F Trimmer.
- C11 8.0 $\mu$ F electrolytic.

- C1 50 $\mu$ F Trimmer.
- C2 } 500 $\mu$ F Twin gang.
- C3 }
- C4 0.1 $\mu$ F 350V.
- C5 0.1 $\mu$ F 350V.
- C6 220 $\mu$ F—

- L1 HA3 }
- L2 HO4 } Weyrad.
- L3 HA4 }

Aerial and earth sockets } Belling Lee.  
Co-ax socket and plug }

Each adjustment at one end of the frequency range will effect to a smaller degree the frequency at the other, so it is necessary to repeat the foregoing operations until satisfied that the oscillator does tune to the correct frequencies. As a final check, the convertor might be tuned throughout the frequency range, by means of the tuning capacitor, following it (the oscillator signal) on the receiver.

Now connect an aerial to the convertor, connect the co-ax lead to the receiver (which should now be tuned to 1.8 Mcs) and tune in any MW station. Adjust the core of L3 for maximum output.

Tune now to a station near the HF end of the band (tuning capacitor near minimum) a weak one preferably, and peak the trimmer (C1) for maximum output.

Tune a station at the LF end, Hilversum or N. Regional will be quite satisfactory, and adjust the core of L1 for maximum output. Repeat these two operations.

When completely satisfied that the unit is giving good performance. The cores and trimmers should be sealed with a spot of sealing wax.

If the convertor is to remain in situ, an aerial change over switch can be fitted, so that the aerial is transferred from convertor to receiver merely by throwing over the switch.

The aerial switch is not fitted to the original, but it is thought that it may encourage IF breakthrough when receiving on the convertor. If this should occur, the receiver should be detuned slightly, thereby shifting the IF from the offending breakthrough.

An additional switch can be fitted if desired, to break the HT or LT (or both) supply to the unit.

To finish the convertor, a commercial dial can be fitted, the calibration will be correct if the alignment instructions have been followed correctly.

# STRICTLY FOR THE BEGINNER

by O. J. RUSSELL, G3BHJ

## Part. 1—GETTING STARTED

(We have handed over this feature to Mr. O. J. Russell, G3BHJ, who deals with some of the preliminary steps in getting an amateur transmitting station started. Ed.)

Having once received the magic "ticket," it is a good idea to put it to use without delay. There is no need to wait until an elaborate multi-band rig has been nursed through its teething troubles before starting in on serious transmitting. A small and simple rig will serve to provide valuable operating experience right away, and in any case will serve as a valuable stand-by for local rag-chews, cross town get-togethers and so forth. In fact by commencing with a simple rig and adding to it, one can arrive at the final elaborate rig in a series of easy stages. In any case a simple rig has many uses, quite apart from stand-by use in the event of rebuilding, or failure of the "big rig."

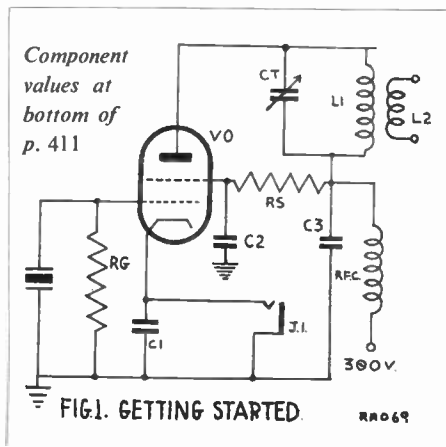
The simplest and safest form of equipment is the tuned plate crystal oscillator of Fig. 1. Such a unit is capable of very good results indeed upon 1.7, 3.5 and 7 Mcs operation. In fact for top-band use, this is quite a popular circuit, especially as for phone use the crystal oscillator may be successfully modulated, thus enabling an ultra-simple topband TX to be made for both CW and phone use. G2DGY of Kingston can be heard with a beefy 1.7 Mcs phone signal from a modulated crystal oscillator. With care, it is easily possible to run a full ten watts input with high efficiency, and this input is more than adequate for working many other countries than G! In fact the real QRP experts regard ten watts as in the high power class!

Assuming the reader is a genuine beginner, there are a few points to watch with this circuit. For feeding power to the aerial, it is advised that a link winding of from two to five turns be wound at the "earthy" end of the tank circuit. In this way, the output can be link coupled to a conventional aerial tuning system as with other transmitters systems, with consequently an efficient transfer of RF to the aerial. During the initial tests, a low-power bulb may be connected across the link coil to provide visual indication of RF output. A 6 watt car bulb will be adequate for most purposes, while a 6.3 volt dial light or a flash-lamp bulb will provide a more sensitive indicator if low power is being used.

The tank tuning capacitor can be a receiving type variable of 160 Pf. maximum capacity.

The "LC" ratio of the tank circuit should be kept at a reasonable figure for best performance. Thus for topband use, the coil should be pruned so that resonance is obtained with the condenser vanes about-two-thirds in mesh. On eighty metres, resonance is preferably with the vanes at about half mesh, while for forty metres the tuning position should be a little less than half mesh. Having once determined the resonance point with a given coil, turns can be added or removed to provide optimum capacity values, which are however not critical. The standard four pin plug-in receiving type coil formers will be found very satisfactory for the power levels likely with such a rig, and are convenient in providing pin connections for the link winding.

Almost any small power pentode or tetrode may be used in such a circuit, with the 6F6, 6V6, 6AG7 and the 6L6AS star performers. The 20,000 ohm screen resistor will be satisfactory for all these valves, while if a voltmeter is available to measure screen voltage, the circuit will give a little more output if the screen resistor is reduced to give as high a screen voltage as is permitted by the maker's ratings. In any case the total ANODE supply voltage should not exceed 350 volts, and 300 volts is less likely to cause trouble with crystal heating



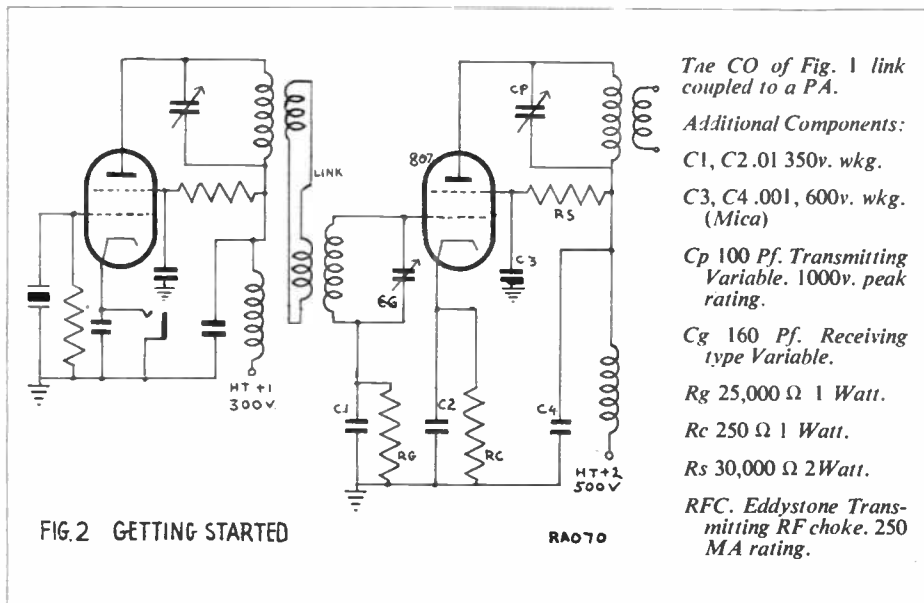
with the small surplus crystal units. A jack in the cathode lead by passed by a fixed condenser of .1 mfd capacity is a convenient means of inserting a key into circuit for keying. A millimeter of suitable range should be included in the lead to the power pack as a means of observing the tuning conditions.

With the appropriate coil and crystal for the desired band in circuit, apply the heater voltage, and after the heater has warmed up, apply HT. The tuning capacity should be at the minimum capacity setting, and with the key down the plate milliammeter will indicate a fairly high reading, say 50 Ma. If the tuning capacity is now slowly increased from the minimum position, oscillation will commence as indicated by a dip in the plate milliammeter. Further cautious increases in the tuning capacity will produce stronger oscillations, as indicated by a greater dip in the plate meter. With a further increase, it will be found that oscillation abruptly ceases, as shown by the plate meter jumping back to its initial high value. The optimum operating position for a good note, and instant starting under keying will be found with the tuning condenser set slightly BELOW the position giving maximum output. With the oscillator generating RF, a lamp connected to the link winding will light, the strength of glow indicating strength of oscillation.

Having obtained satisfactory oscillation, the note should be monitored upon a receiver with

the BFO running. It is better to tune to a harmonic of the crystal frequency on the receiver, as this prevents receiver blocking due to the strong fundamental, and incidental faults in the note . . . particularly chirp under keying . . . are magnified. It is quite likely that attempts to extract the last ounce of RF from the oscillator by heavy loading into the aerial circuit will cause chirp. Slacken off the loading in such a case, and adjust the oscillator tuning condenser to a point below that giving maximum oscillation strength. Obstinate cases of chirp may be cured by stabilising the screen voltage with a couple of neon stabilisers in series to give about 200 volts. If the neons are connected directly to the screen, the screen dropping resistor will provide the necessary series resistance for stabilising action.

The simple crystal oscillator circuit has been treated at some length, as it provides valuable adjustment and operating experience. The fact that even a crystal oscillator can give a chirpy note, should make the approach to a VFO suitably cautious! However, the next logical step after a simple crystal oscillator, is the addition of an amplifier, as a crystal oscillator at low input will give ample drive for an 807 amplifier running at anything from 25 watts input up to 60 watts input. An amplifier could be constructed and link coupled to the oscillator of Fig. 1. Such an arrangement is shown in Fig. 2. This requires a couple more coils and tuning condensers. However the arrangement of Fig. 3 shows a "sure-fire"





*C1* 100 Pf. Transmitting variable 1000 volts peak rating.

*C1, C5* 100 Pf. Mica. 350v.

*C2, C6* .01 Tubular 350v.

*C3* .1 Tubular 250v.

*C4, C7, C8* .001 Mica 600v.

*R1* 100,000  $\Omega$  1Watt.

*R2* 10,000  $\Omega$  1Watt.

*R3* 20,000  $\Omega$  1Watt.

*R4* 250  $\Omega$  1Watt.

*R5* 30,000  $\Omega$  2Watt.

*RFC1* Eddystone Receiving Choke.

*RFC2* Eddystone Transmitting Choke.

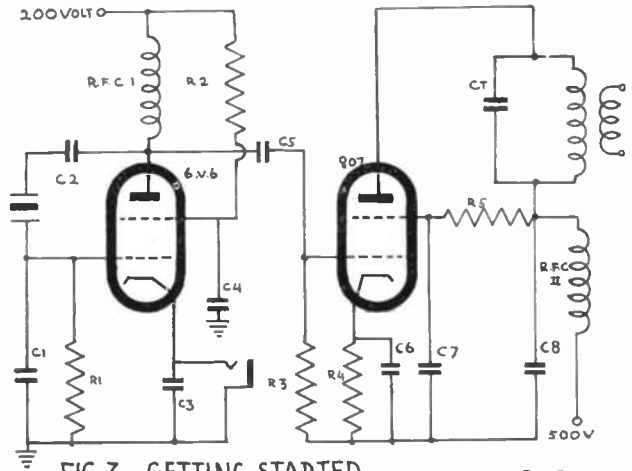


FIG. 3. GETTING STARTED

RAO 71

COPA circuit, which uses only one tuned circuit, so that it can be improvised from the simple oscillator of Fig. 1 with a minimum of extra components.

The crystal oscillator in Fig. 3, uses the Pierce circuit, which requires no tuning condenser. Operation is simply a matter of plugging in the appropriate crystal and tank coil, and swinging the amplifier tuning for maximum output ! The only point of importance, is that the voltage to the 6V6 crystal oscillator should not exceed about 200 Volts, as otherwise crystal overheating or fracture will occur due to the crystal being subjected to the full RF output of the oscillator. A further point, is that the amplifier in Figs. 2 and 3, can also be operated as a doubler with good efficiency, so that one crystal permits operation on two bands. By pruning the tank coil so that the fundamental frequency is tuned with the condenser at nearly maximum capacity, the second harmonic can usually be tuned with the tank condenser near the minimum position. This enables an ultra-fast band change to be effected ! With the popular 807 as amplifier, and 500 volts supply available, the input can

be anything up to 45 watts or so with good RF output both as a straight amplifier, or when doubling.

Finally, the VFO question. Sooner or later a VFO is regarded as a "must." If a VFO is available, and if it has a reasonable output, it can be used to drive the circuit of Fig. 3. All that is necessary, is to remove the crystal, and apply the drive to the grid side of the crystal socket. It will in fact be found that with reasonable drive, the 6V6 CO stage will act with equal efficiency as a doubler or straight amplifier if driven on the grid with a VFO. In this way the final becomes a straight amplifier on two bands, and by doubling in the amplifier stage, good output can be obtained on three adjacent frequency bands. Needless to say, this enables the circuit to be used for "air tests" of VFO designs, before they are incorporated in the final design for the "big rig." In this way any little troubles can be ironed out at the start, and not inflicted permanently on the air ! Finally . . . if you are a genuine beginner . . . all the best in starting on the air, while if still hesitating over the design for the "big rig," lash up a stand-by rig for the meantime and "have a go!"

CIRCUIT VALUES FIG. 1

*dar.* 350v. Wkg. *C2, C3* .001 Mica. 450v. Wkg. *C1* 160 Pf. Receiving Variable. *Rg* 100,000  $\Omega$  1 Watt. *Rs* 20,000  $\Omega$  1 Watt. *J1* Closed circuit jack. *RFC* Receiving type RF choke. (Eddystone 1010).

# BROADCAST BANDS REVIEW

by JACK FAIRS

All Times G.M.T.  
"Nf"—New Frequency.

We have a great number of reports and many interesting items of Broadcast News to deal with this month, so let's start off without any further waste of space!

## EUROPE

**Yugoslavia.** "Radio Yugoslavia" Belgrade, has dropped a number of frequencies, and now operates only on 6100, 6150 (both 10 kW) and 15235 kcs (100 kW). (*World Radio Handbook*.) Angelo Pingitore of Detroit, Michigan, U.S.A., is a new contributor to these notes, and he reports the 15 Mcs frequency with English for North America around 2245.

**Norway.** The students of Oslo University were operating a 400-watt station on 7240 and 11850 kcs for 30 minutes daily after the close-down of the Norwegian Home Service around 2200; these transmissions were scheduled for the period August 30th to September 7th last. Reports were requested to: Ukesenderen Universitetet, Blindern, Oslo. Sidney Pearce, Berkhamsted, heard the 7240 kcs channel with Norwegian music and songs, together with a few recorded English vocals; he adds that he never found the 11850 kcs signals and all that was audible here was ORU! However, "Ukesenderen" obliged with their QSL.

**Greece.** William P. Griffith of Ashtead lists the Forces Broadcasting Station at Kozani with Q4 S7-8 signals at 1800 on around 7940-7950 kcs. Sidney Pearce lists them on 7948 kcs to close at 2030.

**Belgium.** ORU, The International Goodwill Station, Brussels, now broadcasts the English programmes daily at 2015-2130; the DX Programme is on Wednesdays at 2015, and the present frequency is 11850 kcs. (Pearce.) Bert Clear, Sutton, reports good reception of this transmission, but says it is liable to some heavy QRM from a "jammer" during the first few minutes. ORU has been heard closing in Dutch and French on 17860 kcs at 1300 (Sunday, September 21st.). (Pearce.)

Arthur Cushen of Invercargill, New Zealand, sends along his usual list of FB Broadcast DX, and included is ORU, heard on 9765 kcs from 0200, while relay station OTC Leopoldville has moved to 9665 kcs (Nf): OTC leaves 9765 kcs at 0158. R. Pelegri (ISWL/W2-5409) of New York, is another new reporter from the other side of the Atlantic, who says he has not yet succeeded in logging the OTC relays and asks if anyone has been able to hear them. Angelo Pingitore reports OTC on

9665 kcs, OM, fair to good at 0200-0400. (Txn to you both for your listings in GMT.)

**Finland.** "Suomen Yleisradio," Helsinki, now broadcasts news and talks in English at the new time of 1200-1215, followed by the French programme and recordings; news in Finnish is read at 1245, and the frequencies: 9555, 15190 and 17800 kcs. (Sidney Pearce.)

**Spain.** Bert Clear has received a QSL card (after nearly 11 months) from EDV10 "Radio SEU" which gives the frequencies of 1333 (MW), 7088 and 7170 kcs, with 1 kW at 1300-2300. The QRA is: Estacion Escuela, Radio SEU, Madrid. "Radio Menorca" is now heard in the evenings after 2000 near 7420 kcs (Nf), and "Radio Falange de Valladolid" is strong on Sunday afternoons to sign-off at 1430 on a measured 7002 kcs. (Pearce.)

"Radio Mediterraneo de Valencia" has moved from 7037 to near 6995 kcs (Nf) and can be heard at the usual times during the evenings. (Scribe.) "Radio Juventud de Murcia" was, up to a short while ago, heard on a frequency near 7310 kcs, but now appears to have moved, and "Radio Juventud de Cadiz" has taken up the channel. (Pearce.) "Sweden Calling DX-ers" has mentioned an unidentified Spanish station on 7630 kcs, and we agree with the reporter that the slogan sounds like "Radio Zaragoza de la Falange," but the modulation is pretty rough!

## AFRICA

**Kenya.** G. Harris of Shortlands, Kent, reports for the first time, and mentions VQ7LO Nairobi on 4855 kcs, with a good signal on occasions and the B.B.C. News at 1800, followed by "Sunday Symphony" to close-down after the Epilogue—presumably on Sundays! (Please to have as many reports as you wish, G.H., but regret we cannot use any other items in your letter, as no times are given. GMT please, OM!)

**Uganda.** Arthur Cushen sends along more news about the new broadcasting station being built in this Central African colony. The medium-wave transmitter will have a power of 1 kW, and be located at Entebbe, with coverage of this town and possibly Kampala. The SW TX, using 7.5 kW, will give complete coverage of Uganda, and is expected to use a frequency in the vicinity of 4 Mcs. The station will not be completed for 12 months.

**Sudan.** "Universalite," published by the Universal Radio DX Club of the U.S.A., still lists Omdurman on 9708 kcs. Has any

reader over here heard them on this new channel?

**Northern Rhodesia.** From WRH we learn that Station ZQP at Lusaka has made a few alterations. 3275 (400 watts) and 4826 kcs (15 kW) are both Nf's, but 7220 kcs (2.5 kW) remains unchanged. The 3914 and 9710 kcs outlets have been abandoned; daily schedules run 1200-1900.

**Senegal (FWA).** "Dakar-Africa," Dakar, is heard on weekdays near 9560 kcs (Nf) from sign-on with a French march at 0700. (Sidney Pearce.) This must be a move from 9710 kcs.

**Mozambique.** The Portuguese-language programmes of the "Radio Clube de Mocambique," Lourenco Marques, are now on the air as follows: 0500-0600, 0930 (Sun. 0900)-1130 (Sat. and Sun. 1200) on 4830 and 9804 kcs, and 1600-2000 on 3440 and 9804 kcs. (*World Radio Handbook*.)

**Ethiopia.** "Radio Addis Ababa, The Voice of Ethiopia" has been heard to announce regular test transmissions, but the times of these do not appear to be firmly established. "Sweden Calling DX-ers" quotes 0300-0330 to America, 1000-1100 to the Middle East and East Africa, 1530-1630 (or 1600-1630) to India and East Africa, and 2000-2100 (or 2100-2130) to Europe and West Africa, on "17, 19, 31, 42 and 46 metres." Roy Patrick of Oldham, found them at 2020 on September 7th (presumably on the 15 Mcs frequency, OM?) with a test transmission in English and asking for reports; also noted on September 11th in English at 1430 and again at 1630. Manfred Lepple, Stuttgart, Germany, lists the European test transmission at 1600 through to 2000.

Sidney Pearce hears them on 15048 kcs from 1600 with News in French until 1630, when the Amharic programme commences. On Sundays they have a Missionary broadcast in English to 1600. Later, however (September 20th and 21st) a gramophone concert was featured with English announcements at 1600-1630.

#### NEAR EAST

**Afghanistan.** "Radio Kabul" has been logged regularly on 9975 kcs, with fair signals, though sometimes troubled by CW QRM. Sign-on time is usually around 1640 or 1645, a short news bulletin and talk being followed at approx. 1650 by a couple of recordings, to close around 1700. On Sundays the musical items are presented as "Listeners' Requests" and often continue until 1720 or later. (Manfred Lepple, Sidney Pearce and Scribe.)

Reception reports should *not* be sent direct to Kabul, but will receive immediate attention if forwarded to the London Correspondent, Sayed Edris Ali-Shah, who tells us that two new transmitters are to open-up soon. We repeat the address: 134, Fellows Road,

Hampstead, London, N.W.3. (Sidney Pearce, W. P. Griffith and your Scribe have received verifications from the above QRA.)

**Cyprus.** ZJM6 "Sharq al Adna," Limassol, 6790 kcs: good signals around 1830-1900 with the usual Arabic programme. (Bert Clear.)

**Turkey.** A larger transmitter at Izmir is being planned, and also a similar one at Malatya. Izmir is at present on 6830 kcs with a power of only 200 watts. (Roy Patrick.)

Arthur Cushen reports the University of Istanbul broadcasting on 7080 kcs, heard daily at 1830-2000 with fair strength; programmes consist of Turkish and classical music. This station has an output of 500 watts, is operated by the Radio Laboratory of the Technical University, and has been heard closing at 2000 with English announcements, acknowledging reports from Australian and New Zealand listeners. Mozart's "Turkish March" is played at sign-off.

#### ASIA

**Vietnam.** "The Voice of Vietnam, Radio-diffusion Nationale du Vietnam" at Saigon, is heard in Australia on 9620 kcs at 1000 with Vietnamese news in parallel with 7288 kcs (Nf). (URDXC.) This 7 Mcs outlet appears to be a move from 7090 kcs.

**India.** "All India Radio," New Delhi, has again changed the frequencies for the 1845-1945 European Service, and since September 1st they are 7120, 9570 (Nf) and 11780 kcs. (Pearce and Scribe.) B. J. C. Brown, Derby, reports an Eastern station on 4960 kcs from 1630 to after 1730, without any apparent announcement of identification. Well, it is almost certainly VUD2 on this frequency, OM, and we suggest you try again at 1800, 1830, or later, for the call in English.

**Sarawak.** This is yet another new country for Broadcast listeners, and is reported by Arthur Cushen to be developing a short-wave service; a station has already been heard by Edwin Knewstubb (while off Singapore in the "M.V. Etrickbank"), broadcasting on 7210 kcs at 0600 on Saturdays with race results. The location is believed to be either Jesselton or Kuching, and signals were only fair, with poor modulation.

**China (Communist Government).** A. J. Allmey, Worthing, has received an interesting letter verification from the "South West People's Broadcasting Station," at Chunking, which states the frequencies in use are 6154 and 11000 kcs, the former being "chiefly broadcasted to the minorities of China"; they use Pekin time (i.e. 8 hours ahead of GMT) and close at 1500 (0700 GMT). All programmes are in Chinese, and, for that matter, so was the letter! (Nice work, OM. We should think you had a tough time with the translation, though!) The 6154 kcs outlet, by the way, used to come through here very

well around 2300 last winter. (Scribe.)

Sidney Pearce has noted a strong Chinese transmission near 6650 kcs, from around 2200 or earlier. This will, no doubt, be Wuhan, OM. (Listed on 6645.)

**Taiwan (Formosa).** Station BED4 Taipei, now relays the "Voice of America" Programme to China at 2200-2230 daily on 11920 kcs. (VOA Schedule.) The address of Station BEC36 on 7400 kcs is "The Voice of Righteousness Broadcasting Station, Taipei, Taiwan, Free China." (Radio-Sweden.)

**Ceylon.** The Commercial Service of "Radio Ceylon" has announced that, as from September 1st, the transmissions directed to India commencing at 0145 were moved from 15120 to 11975 kcs. (Cushen.) The 7190 kcs channel is listed by Sidney Pearce this month, heard daily at 1530 with the VOA Relay to 1600 in parallel with 11975 kcs.

**Japan.** Ian Hardwick, Thames Line, New Zealand, quotes from a letter he has received from Mr. Isamu Yamazaki, Chief of the International Broadcasting Section of NHK, Tokyo. We repeat: "Kindly accept our humble apologies for our delay in answering your report owing to a large number of reports swarming our office all at once, since the inauguration of our International Broadcasting on February 1st, but I can assure you all reports will be verified, when time permits."

**Malaya.** "Radio Malaya," Kuala Lumpur, is now using new equipment, and broadcasts from the transmitter site at Kajang, 9 miles from Kuala Lumpur. The SW Tx using 5 kW is beamed north and south and operates on 6025 kcs, while two new 10 kW Tx's are in service on MW, one on 875 kcs with English programmes, and the other on 695 kcs in Chinese. Both close at 1530 (except 875 kcs at 1600 on Saturdays); these stations took the air on July 1st. (Arthur Cushen.)

The "Blue Network" of "Radio Malaya" is heard in English on 7200 kcs on Saturdays with "Rhythm on Records" at 1530 to close at 1600 with "God Save the Queen." (Pearce.)

## PACIFIC

**Australia.** "Radio Australia" is now using VLGI5, 15200 kcs (Lyndhurst) for the 0845-1400 transmission to South and South-East Asia; this replaces VLG11 (11850 kcs) with the exception of Fridays at 1215-1400. (Pearce and WRH.) The Central European broadcasts at 1800-2000 are now over VLC7 on 7215 kcs (Nf) in place of VLC9 (9580), still in parallel with VLA11 (11760). We logged these two both with fine signals recently at 1830, when an interesting talk on eucalyptus trees was featured. (Pearce and Scribe.) Sidney adds that the 7 Mcs outlet is announced as VLC7 on weekdays, and VLA7 on Sundays.

**Fiji.** Due to a typographical error in the *Review* for last August, we mentioned ZBJ

Suva on 17860 kcs. This should have been 17680 and we humbly apologise to any readers who have been vainly searching around the former frequency!

**New Zealand.** A full list of frequencies assigned to "Radio New Zealand," Wellington, is forwarded by Arthur Cushen, which we present herewith, though it must be remembered that many are not active at present. ZL7 6080, ZL11 6130, ZL12 7220, ZL13 7290, ZL18 9520, ZL2 9540, ZL8 9620, ZL3 11780, ZL9 11810, ZL10 15220, ZL4 15280, ZL5 17770, ZL14 17820, ZL15 21480, ZL16 21580, ZL6 25800 and ZL17 26000 kcs.

**Philippines.** DUH2 "The People's Station," Manila, 6170 kcs, have QSL'd by Air Mail to Ian Hardwick, using his own prepared QSL card. Ian adds that this is about the only way to get a veri from this station, due to the fact that they just haven't the time or the staff to reply to reports. At present, the 9570 kcs frequency (DUH3) is inactive.

**British Solomon Islands.** The ISWL journal "Monitor" has published an item reporting the inauguration of the British Solomon Islands Broadcasting Service on September 23rd. Station VQO Honiara on 1030 kcs (MW) will be on the air daily, except Sundays, from 0700 to 0800 GMT. News of meteorological and shipping services will take a prominent place in these transmissions.

## NORTH AND CENTRAL AMERICA

**Canada.** A new transmission, intended for Canadian Forces in Korea, is now broadcast daily by the CBC International Service, and is scheduled over CKNC (5970) and CKLO (9630 kcs) at 0825-0840. (Roy Patrick and CBC Schedule.) A new outlet for the European Service is CKLP on 9585 kcs (Nf), on the air at 2100-2330. CKLP was logged on September 28th in parallel with CHOL (11720) around 2230, but the Schedule still lists the former CKLO (9630) as an alternate frequency. (Scribe.)

Carl Shapiro of Belfast has built himself an O-V-O, and he found CKNC on 17820 kcs, Q5 S9 at 1930. (Hope the S29 is now in good shape again, OM.)

**United States.** The VOA floating relay base, "S.S. Courier," is, at the time of writing, anchored in a harbour of the Greek island of Rhodos, and the full schedule runs: 1394 (MW) and 6040 kcs (Nf) at 1700-2115 to the Near East, 2230-0000 to the Caucasian USSR; 7200 kcs (Nf) at 2230-0000 to the Caucasian USSR. The 7200 kcs channel is a fine Q5 S9-plus signal when opening at 2230 with the announcement, "This is the 'Courier,' seaborne Relay Base of the Voice of America." Needless to say, the frequency is usually jammed by 2231! (Patrick, Pearce and Scribe.)



*A view of Tetuan, Sp. Morocco. The building in the centre houses the studios of "Radio Tetuan" "La Voz de Espana en Africa."*

Extensive alterations have been made to many VOA stations, and we present our list herewith, so that those interested can keep their station lists up-to-date. The following are all new frequencies (or reversions to old ones): WABC, 6170; KCBR, 6040, 17770 and 17850; KGE1, 6075; KRCA, 6060, 9600 and 11755; Munich-2, 6105 and 15270; Tangier, 6080, 7200 and 9500; Honolulu, 6160 kcs.

These frequencies are now inactive for the stations stated: WRCA, 6020 and 9675; WRUL, 6140, 11710 and 11740; KRCA, 11790, 15270, 17800 and 17850; KCBR, 15105 and 15330; Tangier, 6040, 9520, 11775, 11835, 15175, 15340, 17810 and 17845; Honolulu, 15330 kcs.

**Dominican Republic.** Station HI9B "Broadcasting Hotel Mercedes," Santiago de los Caballeros, has been measured on 4916.6 kcs at 0200. (URDXC.) This one is listed on 6000 kcs.

**Haiti.** "R Radio Station 4VEH," Cap Haitien, has been noted to vary its frequency at regular intervals, and has been measured on 9624.5, 9628 and 9621 kcs. (URDXC.) E. W. Bury of Cleckheaton, Yorkshire, is another newcomer this month, and has been enjoying good reception of 4VEH on approximately 9600 kcs (see above!) with an English transmission at 2230-2300; some QRM was noted from Tangier, however. Reports were requested, with the promise to verify them

100%. Angelo Pingitore lists 4VEH on 9635 kcs with fair signals in Detroit around 2230.

**Honduras Republic.** "Radio Suyapa" broadcasts at 1400-0400 daily over HRQ, 6125 kcs, at San Pedro Sula, and also over HRQ5, 6075 kcs, at Tegucigalpa. (WRH.) Station HRLP "La Voz Popular," Tegucigalpa, 6410 kcs, is scheduled 1200-0500, but is heard by Arthur Cushen closing at 0605 on Sundays.

HRD2 "La Voz de Atlantida," La Ceiba, has been noted with good signals on 6235 kcs at 0315; also HRP1 "El Eco de Honduras," San Pedro Sula on 6351 kcs at 0340. (R. Pelegri.)

#### SOUTH AMERICA

**Ecuador.** Station HCEB4 "Radio Manta," Manta is still operating on 6870 kcs and not on 6015 as listed; sign-off is 0410. (Cushen.)

#### CONCLUSION

News and items of interest for this column are always welcome, whether your location be Yorkshire or Yokohama, and the deadline for next month is November 27th. The address is: J. Fairs, 2a, Durham Road, Redcar, Yorkshire, England, and the Honour Roll will appear as usual next month.

The Editor and your Scribe thank all contributors to this month's "Review," and regret that there just isn't room for all items received.

Until next month, 73 and Good Listening.

# ON THE HIGHER FREQUENCIES

## *Monthly Notes and News*

by

H. E. SMITH, G6UH

There have been a number of requests received during the past Month for a VHF Contest to be staged during the winter, and suggestions have been made that January would be a good Month to hold one. Apart from the fact that conditions are usually not so good during the winter, there is no reason why a contest should not be held, and we are quite agreeable, *provided* that a measure of support will be promised. Even with the small "sprint" contests that we run, a fair amount of work is involved in getting the event organised and in judging the entries. We do not in any way object to doing this work if the support justifies it, so if we receive a minimum of 30 indications from transmitting readers that they would like a contest to take place in January, we will arrange it. Send your letters direct to your conductor by the 1st of December, and state whether you prefer a points system or the usual Height above Sea level one. If the necessary support is forthcoming, we shall give the details in the January issue, and will arrange the contest for the second or third week in January. So we leave it to you OM's.

### September Conditions

The conditions during September seemed to favour 70 cms operation far more than 144 Mcs. In fact, the period September 14th to 16th is reported as being the best ever for 70 cms operation. As will be seen by the report from GW2ADZ, S9 signals were being received from London. It is rather a pity that more stations do not operate on the 70 cms band, and more of a pity that such misleading statements are printed from time to time regarding operating on this band. Our attention has been drawn to certain statements made recently (*not* in this journal), regarding the necessity for a station operating on 70 cms to be "in the clear." One has only to take a few examples to see how these remarks do not apply generally. Take the case of G3FZL, a station consistently working GW2ADZ (160 miles). His QTH is not only a poor one, it is a *bad* one. Then there is G3GZM (Tenbury Wells), just have a look at the map and see what kind of terrain lies between this station and GW2ADZ. It is so easy to generalise, and thus present a different picture than that which really exists. We ourselves have always advocated the Height above Sea Level theory for two metre operation, but we have never said that this is the only factor involved. As for 70 cms, we have never put forward any

theory at all, because we do not as yet operate on the band, and we do not think anyone is qualified to offer up any suggestions regarding operation and propagation on *any* band until they have had first hand experience. Little enough is known about the two metre band as yet, but it is fairly certain that some theories which may hold good in one location do not apply in others. Do not be put off "having a go" at 70 cms because you have read somewhere that to obtain results you must live on a mountain top, but you will of course, remember that you are most likely to get *better* results if you do live on one!

### The Low Frequency End

Do you always listen right down to 144 Mcs after a CQ? There are a great number of Continental stations operating on the band these days, most of them between 144 and 144.600 Mcs. In quite a few cases recently we have found that the converter has been aligned with the accent on the High Frequency end (after EI2W we expect!) and the sensitivity at the low end leaves much to be desired. Valves such as the 6J6 when used as push-pull RF amplifiers often tend to become regenerative, and instead of being a broad band stage are often a sharply tuned device, efficient over a range of a few hundred kilocycles. Is this the reason why so many people say they never hear much on the Low Frequency End? If your Pre-amplifier seems to peak up sharply when tuned, it will certainly not be efficient over the whole of the two metre band and will require re-trimming for each end of the band. This is a point worth noting, because when the European Record is broken again, it will probably be on the LF end. Before getting down to the month's news, we will deal with our usual little chat for the newcomer, so you case-hardened Old Timers can skip the next few paragraphs.

### The VHF Newcomer

The question of TVI from 144 Mcs Transmitters crops up again and again. Most of the questions come from those who are using 8 Mcs crystals. Unless the crystal and first trebler stages are thoroughly screened, TVI will persist when this frequency crystal is used, for the following reason. When a trebler is used, on *any* frequency, the efficiency is high, provided of course the valve used is a suitable one. It follows then, that if an 8 Mcs crystal is trebled, there will be a strong 24 Mcs signal in the anode circuit, with a correspondingly strong harmonic at 48 Mcs.

Furthermore, the 24 Mcs carrier is usually of far greater amplitude than is actually required to drive the next trebler stage to 72 Mcs. Unless completely screened, the first trebler will radiate enough harmonic on 48 Mcs to cause serious interference to London area viewers for a distance of half a mile or more. Remember that it takes far less harmonic radiation to ruin a TV picture than to cause interference on the sound channel. The best frequency crystal to choose is one in the 6 Mcs band, and *quadruple* in the next stage. Do not use a tritet oscillator, but a straight-forward crystal oscillator with the next stage quadrupling. A VT52 will provide just about enough drive as a quadrupler, for a T111 or a pair of Z77's trebling to 72 Mcs.

The amount of 48 Mcs harmonic present in the anode of the VT52 is not sufficient to cause the slightest interference on a TV picture, even with the TV aerial placed only a few feet from the transmitter itself. With overtone oscillators of course, it is easy to dodge these TV harmonics, but we are dealing only with the simpler types of gear. Another often unsuspected cause of TVI is the use of an unsuitable type of key click filter.

We always key in the cathode of the final, using a 400 ohm resistor in series with a 1mfid across the key, and an ordinary 10 Henry LF choke in series with the key lead (cathode side). This method of keying not only prevents any thumps or clicks in nearby TV or BC receivers, but ensures a steady note, free from any "whoops" or "tails." If the QTH has been badly wired, and the lead covered cable or conduit has been improperly bonded and earthed, some trouble may be experienced by viewers and BC listeners in the immediate vicinity. While a key click filter may eliminate most of the CW interference, it will be almost impossible to use phone. Apart from fitting a good filter in the mains lead to the transmitter, there is little else that can be done at your end. A low pass filter fitted to the mains input to the sufferers set will often eliminate the trouble however. Series wave-traps in the aerial lead are usually a sheer waste of time on 144 Mcs.

Another point which may be of interest to the newcomer on the band, is that it is *not* necessary to use high power. You may have been used to 150 watts on the LF bands, but always remember that a great number of stations are doing good work with only a *tenth* of that power on 144 Mcs. The more power you use, the greater the chance of causing local QRM. A good aerial (if possible) and a steady note, plus of course a good receiver, are all that is really necessary for good results on VHF.

It is often forgotten that on VHF it is possible to erect aerials which will provide a

gain of 10 db or so, which means of course, that 20 watts input looks like 200. Even with simple arrays giving gains of approximately 8 db or so, our 20 watts looks like 120, so there is really little to be gained in running your gear at the maximum power allowable.

We are also asked from time to time for details of a suitable super-regen. circuit for 144 Mcs. It really makes us shudder when we receive these enquiries. *Never* attempt to construct a super-regen. for *any* band unless you intend to put a stage of RF in front of it. Even then, great care must be taken in screening the whole works. The super-regen. is probably the most sensitive type of receiver existing, but it is also the best radiator of QRM that it is possible to devise. Its signal to noise ratio is far too poor for effective operation on the VHF bands (meaning that it is not efficient as a weak signal "finder"). There is a strong movement to popularise the super-regen. for 420 Mcs work, and there is no doubt that it "has something" for this band, but the beginner is most strongly advised to leave it alone on 144 Mcs.

As a tailpiece to this section this month, we should like to point out to those who request certain items to be dealt with in these notes, that we cannot turn this section into a questions and answers column. We are sorry but space does not permit. All who write for advice or assistance on VHF matters will naturally be helped as far as we are able, and we certainly welcome letters from readers of these VHF notes. Another point is that it is not possible to include and explanatory diagrams into these "Beginner" notes due to the time factor as well as the space problem.

We do thank all those who have taken the trouble to write and say how much they enjoy reading our jottings for the Newcomer. It is gratifying to know that so many of you are thinking of joining the VHF fraternity, and when you finally get going, you will find the VHF man ready at all times to give you a helping hand in any little difficulties you may have.

#### Station Notes and News for the Month

We should like to open this month by thanking those who have taken the trouble to drop us a line even though they have not been active, due to business and other reasons. Although we like to receive reports, its quite refreshing to get these cheery little notes which show the true Ham spirit, and judging by the comments contained in them, we are pleased to know that we are still being read in the best quarters. Hi.

G5ML (Coventry) continues to be active on 144 Mcs. A total of 132 stations have now been worked on this band. G5ML operated from a site near Coventry at 400 ft. ASL during the RSGB Field Day on September

21st. Results were disappointing due to the site being too low for the conditions, which were very poor. However, during the five hours of operation, 20 stations were worked, ten of them being Portables. G3EHY at 101 miles was the best DX worked.

A 16 element stack was in use, with 16 watts from an 832 in the final. G5ML hopes to find a better site next year, perhaps to the Edge Hills (800 ft. ASL) some 25 miles from Coventry.

G3CC (Hull, Yorks.) has not been quite so active of late due to being away from home a lot. He came on for a few hours on the September 21st, and worked several Portable stations, including G4JJ/P (Barnsley), G4BP/P (Olivers Mount, Scarborough), G3ERD/P (Derby), G3FFV/P (York). A QSO was also had with G3WW.

Signals were down on the usual, conditions being poor with high wind and driving rain. G3CC uses an 829 in the final with 50 watts input and a G21Q converter, crystal controlled, into an AR88D.

Aerial is a six element stack with  $\frac{3}{4}$  in. self supporting elements fed with 400/500 ohm open wire line.

G3HBW (Wembley, Middlesex) reported last month but unfortunately his report was received just after we had gone to press, due to a postal delay. Some of his most notable QSO's recently have been with G5MA/P (Rutland), GW5MA/P (Brecknock), G4GR (Monmouth) and G3FFV (York). Signals from G2BAT (Falmouth) have been most consistent.

As many readers will know, G3HBW is still in H.M. Forces and his operating time is confined to leave periods.

Stations heard recently, but not worked: G2BAT, FCL, FTL, FTS, FZU, UQ, G3AUS, CQC, DVK, GHO, HVO, HXJ, IAI, WW, G4MW, G5SK and G5YV.

GW2ADZ (Llanymynech, N. Wales) reports on the extremely good 70 cms conditions which prevailed on September 14th and 16th. Both G3FZL and G3FKZ were received at S8/9 on the loudspeaker, and G3APY was worked cross band, G3APY giving Bill S8 on 70 cms. An S8 report was also received from BRS 19317 (London). GW2ADZ says that there are many stations keen on 70 cms work, but few seem to complete the rig, and he urges more people to get started. On 144 Mcs, Bill heard his first PA station this year, PAØJOB, but says Bill, "he was too keen on G3WW to hear me" (Hi). G1BGQB (144.130 Mcs) has also been heard several times recently but has not been raised yet. Those Welsh mountains again!!

G8AO (Capt. E. Clarke, O.B.E., South Shields, Co. Durham) is not operating from the s.s. Chessington at the moment, as he is expecting

a change of ships. Operation is confined to his home QTH for the time being. The five over five Yagi is now up to 48 ft., and is well in the clear. Results seem to justify the effort as stations up to 100 miles distant can now be worked with comparative ease with only 15 watts input. The gear which is normally used in the ship is now in use at the home QTH, and on September 15th a solid phone QSO was obtained with GM3EGW, and another with G3BW. Later G1BIL was worked. In the evening of the same day, G5YV, G6PJ and G2DRA were worked. Since this date there have been gales from all quarters, which have given the beam a good testing before the winter sets in. The new converter is a cascade, using a 6AK5, and 12AT7 mixer, a 6J6 Xtal Oscillator, and a 6AG5 IF Amplifier at 24 Mcs.

A great effort is being made to get new two metre recruits in his home area, and the latest ones who have expressed hopes of starting up on the band, are G6VG, G4WG and G3ATU. This latter station is of course, our old friend Stanley Herbert who conducts the Amateur Bands section of this journal, and nothing would please us more than to prise a VHF report out of him!

We shall look forward to G8AO's return to the band as G8AO/MM, and we wish him good sailing and the best of luck.

G5MR (Hythe, Kent) has for various reasons, not been quite so active on the band of late, although he has been almost exclusively on two metres since the end of April. During the periods that he has been able to get on, the conditions have been very poor, and Vernon thinks that conditions have not been so good as in the preceding two or three summers. A notable exception was August 23rd and 24th when stations to the west were extremely good, and on August 29th, when he worked his first DL station, DL6EP on approximately 144.140 Mcs. G5MR still asks for more activity between 1800 and 2000 on weekdays, and on Sunday mornings. He rarely hears anything except semi-locals at these times. He would also like to hear more CW on the band.

G3VM (New Costessey, Norfolk) says his activities during the past few months would make most uninteresting reading, as he has been too busy in other directions, and has only been able to manage an odd hour or two. A few hours were spent on the air in a recent contest, but conditions could not have been worse, and the activity matched the weather. G3VM hopes to be more active in the coming months, provided that the conditions warrant it.

G3AJP (Fritton, Nr. Great Yarmouth) is another of the Eastern stations who is compelled to be inactive for the time being due



to heavy business pressure, coupled with the fact that he lost his 4 over 4 during a freak windstorm, and he has no opportunity to replace it on its 34 ft. perch. G3CFK and G3EQS are also inactive for the time being. (Note for the anti-pirate squad: G3EQS does *not* operate on 3.5 Mcs. His main activities are on 144 and to a lesser degree, on 14 Mcs, so if you hear G3EQS on 3.5 Mcs, it is a *phoney*.)

G3CVO (Gerrards Cross, Bucks.) has been calling CQ on 13 cms. No replies have been received so far. (His converter must be "duff" Hi!) The transmitter is a CV67 modulated with a carbon mike and G3CVO may have it on show at the RSGB Exhibition. The B.A.T.C. will definitely have G2WJ/T in operation at the Exhibition, relaying pictures from A to B on 70 cms. On 144 Mcs, the new 4 over 4 at 45 ft. is working well. Being still at Cambridge, G3CVO is unable to put in many hours on two metres.

G6QN (Colliers Wood, London, S.W.19) is a real busy type, yet he finds the time not only to put in good appearances on the band, but to carry out numerous experiments as well. Being one of the real OT's, Reg does not need sleep! He has a lot to say on the subject of converters, and his latest efforts have provided some interesting results which are worthy of note.

Having read so much about the cascode circuit, G6QN decided to build one in the hope that it would improve the signal to noise ratio. One was built, tested, and promptly scrapped! It was not as good as the old 6J6-EF54-EF50 osc/dblr. arrangement, and Reg is convinced that the EF54 has got something that the B7G types haven't. There does not seem to be a valve to touch it for 144 Mcs work, not even the 6AK5. (We should like to say here that we made certain noise tests some time ago, and the EF54 did in fact prove to be superior to the 6AK5. The only trouble with the EF54 is that noise may develop due to the pin connections becoming slightly corroded, but as Reg points out, if the ring fixing type of holders are used, this trouble will not be so readily encountered, as the valve is under pressure all the time in the holder.)

G6QN says that anyone who wants to build a really good and stable S/E converter; should follow the procedure given by G2FMF in the May, 1949, issue of the Bulletin. Although the article dealt with the modification of a Type 27 unit, the circuit may be laid out differently provided the details are followed. Using this circuit, the two metre band can be spread over some 120 degrees of the tuning dial.

G6QN further states that the EF50 is as good as osc/dbler. as there is, and it *can* be

made to give a T9 note (agreed OM).

Since working G5MA/P in Rutland, with his aerial at 8 ft. from ground, G6QN has now raised it to 30 ft. necessitating a feeder run of 120 ft. Much work has been done on feeder matching, especially with regard to balance to unbalance. His signals are now beginning to appear in places where they have not been heard before.

G6QN is trying to revive the "Breakfast Club" schedules which came to an end with the passing of G2BN. He will be transmitting a 1 kcs note at 0855 until 0900 each morning on 145.280 mcs, and hopes to meet some old friends and new ones.

(We should like to mention that if anyone calls G6QN on CW, its quite OK to take off the bug weights.)

G3HZK (Hayes, Middx.) has been busy with examinations and things, but says, "The only moan I have is the marked lack of CW stations on the band, and the greater lack of phone stations who can still read CW." G3HZK is limited to operation with indoor aerials, and although he has tried an indoor stack, he still prefers a simple dipole, which seems to give him better coverage. (Anybody got any good ideas on a really good indoor aerial for G3HZK?).

G3WW (Wimblington, Cambs.) is still one of the most active stations in the country. It's little short of amazing how he manages it. September started under poor conditions. On the 6th, G5MA/P (Brecon) was worked at 569 both ways, also G3BEX/P for a new contact on phone, and on the 7th, a repeat contact with G5MA/P.

On the following Sunday night, contacts were made with G3GHO, G6CW, G2XS, G3CXD, G5YV, but very little was heard from the south. Conditions then deteriorated, but on the 10th, G2XC was worked on phone and G3EHY was pounding in.

A newcomer to the band is G3QS (Peterborough) who is operating on 144.080 Mcs.

On the 13th and 14th, the band once again came to life, with many QSO's being made including several new contacts, G3GUU (Blackpool), G2DRA (Harrogate), G8NM (Lincoln), and on the 15th, G3ASC (Oswestry). Although the barometer started to fall during the evening of the 16th, contacts were made with Leics., Yorks., Surrey, Herts., Suffolk, Staffs., Derby and Berks. The 20th produced locals plus GW5MA/P (Merioneth) and GW8UH (Cardiff). 12 portable stations were worked on the 21st, G3HSD/P and G4BP/P were first ever contacts, and G3AVF/P gave G3WW his first Devon QSO since September 1st. On the 22nd, the band seemed deadish, but two good phone contacts were made with G3FAN, followed by QSO's with G2DKH/P (Durham), G2XV, G6PJ, G3HVO,

# AMATEUR BANDS COMMENTARY

by STANLEY HERBERT, G3ATU

The big news this month concerns the 21 Mc band. We have it officially that, with effect from 2400 hours on October 9th, U.K. Amateurs will be permitted the use of the whole 450 kcs, i.e. 21000 to 21450 kcs. Phone is still not allowed, but permission to use it is expected very shortly. At the same time, the RSGB is negotiating with the G.P.O. for permission to operate in the 3635 to 3685 kcs. portion of the 80 metre band.

Conditions during the last four week have varied very considerably and have disappointed the early morning and late evening brigade. Twenty, especially, has produced a very different state of affairs for the lucky few able to be on that band in the afternoon.

Our VK friends have put in their expected appearance from about 1300 onwards and on good days, Twenty has been full of signals from Australia, The Far and Middle East, Madagascar and Reunion. When those areas faded out, up came the W6's and 7's, often at great strength, almost like old-times, in fact!

The beginning of October found the band in poor shape once more, but we imagine solar disturbances were responsible for this state of affairs, indeed things are picking up once more, during the hours of daylight. As Winter approaches, Twenty will fade out earlier in the evening and DX working will be impossible, much after sunset.

In the meantime, let's see what the bands have produced and what they are expected to produce.

## Twenty Metres

N. C. Smith (Petts Wood) finds things poor, generally, although his results look good. He had a week off and found the DX coming in at 0900 on Twenty and at 100 on 21 Mcs.

Twenty CW was good for CR8AB (we heard someone calling a CR8, too, at 0830), KR6JX, VK4FJ (1250), VK7RM, VP8AP, VR2CG, VS6CR, ZL4FO (2045), CR7, FB8, FP8, KG6, KH6, KA, ST, VE5 and 7 and ZS3.

Phone hot ones were AP2K, 2L, CR6AJ, EL9A, FR7ZA, FM7WF, VP2LA, VQ8AL and 4UAJ. All of which adds up to quite something.

R. Goodman (Edgware) starts with a leading question. "Do you think it possible," he asks, "to receive VR4E at 2117, with W and VE coming in at S9?" Just possible at this time of the year, we'd say, but rather unlikely. What strength was he?

Ron has been rebuilding, aerial included. He now has a dipole, on which he heard his first CP. He heard a PY on Eighty, which was a new one up there.

Phone catches were CO2CY, CP6JB, CS3AC, CT3AF, KA3RR, KL7ADR, MP4KAC, VK2, VP6, VS9AW, W5 and Ø ZP, ZS6AFF, 6OY and the aforementioned VR4E.

No DX at all has been heard on Forty, although R.G. has listened at all imaginable times.

P. M. White (Williton) is having receiver trouble, with the result that only two weeks' listening has been possible. This resulted in Phone being heard from IS1BIV, KG4AL, LU, PY, TA2EFA, TF5SV, W4IIL/MM and Y12AM.

P.M.W. asks whether KG4 is a separate country from Cuba, to which the answer is yes and whether Labrador counts separately from Canada, to which the answer is no. VE, VO1, 2, 3, 4 (Newfoundland) and VO6 (Labrador) are now all one country for DX purposes.

The score is 60C, 22Z since April, but P.M.W. hopes to acquire a R1155, which may improve matters.

J. Whittington (Worthing) had the pleasure of a personal QSO with SU5EB, who is on leave in Hove.

John has been enjoying himself on Phone to the tune of CR6BW, EAØAC, EQ3NA, FM7WF, 7WH, FQ8AJ, HZ1MY/VQ6 (he didn't sign /VQ6, but he was there, right enough. More of this anon.), VE7VC, ZD4AE, ZS7C and ZS6ZU/P (Marion Is.).

CW produced EAØAC, ET3R, HH3L, KV4AA, TG9RB and XE1TR, none of whom are exactly common or garden.

John passes on the news, via VS1EG, that VK6HM has been given the call VK1HM, for use in the Cocos Is. Why, we wonder, not a ZC2 call, especially after ZC2MAC's unfortunate contretemps!

K. B. Ranger (Strood) is beginning to get results on CW and his 1952 score has jumped to 128C, 35Z, CE7AA, FL8AP, FR7ZA, FY8AA, EA9AP, VQ3TV, KA8BW and ZS1H were all using the Code. AP4HQ (KP4HQ?), CR6AT, FF8GP, FQ8AJ, VQ5DQ, EQ3NA and VS7EA were heard via voice. Keith comments on the pronounced flutter often present on quite strong Africans.

**G3HSL (West Hartlepool)** returned refreshed from an I.O.M. holiday and proceeded to put his bug to good use, knocking off HZ1AB, VS6CG, 4X4, KV4, CT2BO, EQ3TT, KG6FAA, ZC4, VK2 and 4, HE9LAA, V57XG and DU3JS. KX6AI was heard on several occasions around 1300, but got away. (We tried him, too, with the same result.)

Fred finds he can work DX much more consistently with his new 150 watt rig and is busy winding coils for 21 Mcs. He wonders whether the DU boys QSL. In our experience, they do—most of them with commendable speed.

**V. Doidge (Callington)** reports variable conditions, but his battery two-valver pulled in Phone from CE1CR, CN2AW, CO2CJ, CR5AC, CT3EA, FA, KG4AA, OD5A, AR8BC(?), HC, TI2HP, VP3MCB, VP7NR, ZD4AX, MP4KAG and ZS1BV.

**R. Balister (Croxley Green)**, lucky fellow, has been on a tour of France, Monaco and Switzerland. He found Twenty much improved on his return and collected his first VK, VK6DX, on Phone. Others were CE7AA, FF8AP, HK1HU, KP4, four OX's, PJ2AA, VP9BC, VQ5DQ, VS2DB, VS7FG, 7WA (a YL op. name Soma), YS1MS, EL9A and HZ1MY. CW catches were MF2AG, DJ1BZ (he's a German—is used instead of DL1AAA, etc.), TI2TG and W.

**R.B.** queries LB4R—wonders if he's portable. The LB prefix is used by stations working away from the home QTH and most are in Norway, but the exceptions—LB6XD and 6ZD on Jan Mayen and LB9AC, who was for a time on Spitzbergen, are worth looking out for.

The 1952 score is up to 92C—26Z.

**W. Hardie (Hawick)** finds work interfering with his DX activities, but he still found time to weed out DL4IM/AM (over Tripoli), W2SAI/AM (800 miles East of U.K.), EL9A, OD5, SU1TX, TA3AA, VS1AD, IEV, VS7FG, W6SHW (W6 Smoke-House Willie used to be very active on Ten!), YI2AM, ZS3S and YH1IH (where in the world?)

**D. L. McLean (Yeovil)** found things not so good, especially in the early morning, but 1700-1900 has generally produced something in the way of DX, as for example CR6BX, EA0AC (14150), EL9A, FF8CN, HZ1AB, 1MY, 1SD, OQ5BG, VQ5CY, 5DQ, VS7, VS9AW (Oman-14140), VU2MA (14145), ZC6AG, 6UNJ, ZD4AX. Early morning listening was not entirely a waste of time, if you're interested in KA5CW (14202-0753), KL7AFR, ZK2AA and ZK2AB (both 14198-

0745). VK2BX was heard to say he was listening for ZK2AB, who immediately popped up on the frequency, followed by ZK2AA. Very nice, too!

**B. J. C. Brown (Derby)** continues to check all the bands. He found Twenty in rather a bad way after the first two weeks of September, with early mornings producing only an occasional VK and KL7. Africa was good and provided two new ones—CR6BW and FQ8AJ on Phone, with CE7AA (2240), LU5, PJ2AD, 2CB, TI2HP, VE8BO (1805), VK3, VK4FJ (1420), VK7SA, VP5AK, VQ2HN, 5AU, VS7, VS9AW, ZD4AX, ZP5CB and ZS6Z. VE3KF was heard to say that VP1AB should have a Rhombic beamed on Europe in a month or so. Pleasant news.

Bernard heard VK4FJ talking to - - 5VR, somewhere in Borneo. The prefix letters sounded like ZC, but there's no such animal as ZC5! Even so, the chap is genuine and is working from Sandakan, British North Borneo, with the call ZC5VR. Wally, of VS1EV told us about him. He uses very low power and it seems doubtful if his signal will be readable in Europe in the prevailing conditions. (If he used Morse, he'd probably make it.) The VS1 boys are trying to contact him—a difficult job, owing to skip, and hope eventually to get him organised with an orthodox VS4 call-sign.

B.J.C. is attending classes for the RAE. We wish him the best of luck and look forward to hearing him on the air with a brand new G call-sign.

**B. A. Richmond (Coventry)** writes for the first time. He has been listening for some two years and thinks it's a grand hobby. The receiver is a Regentone BC set and numerous aerials have been tried, the best to date being a 15 Mcs folded doublet made of 300 ohm twin. Over 500 stations have been logged and Basil has received 44 Veries from 14 countries; his most consistent station of late has been VS7EA (Colombo).

**P. M. Crawford (Darlington)** is afraid his pipe-line to the Pacific has developed the odd leak! He makes rude comments on conditions in general, but continues to unearth some juicy CW from EL2R, KC6DX, KJ6AR, K56AA, KW6AZ, ZD9AA and our old friend Z2ZAA, who is currently filling The Indian Ocean with RAC!

The best on Phone were CS3AC, ZC4RX, KV4BB (14185-1943), KG4AF (14210-1940), PJ2AD, FPAQ, X9S4AD (Thailand), EQ3NA, CR6BW and FB8AB.

Martin mentions two "Royal" stations—AC3PT and HZ1TA and wonders whether

Vin Sanh, exiled Prince of Annam is still active as FR8VX. At the moment, the only station active from Reunion is FR7ZA. We don't think '8VX has been on, post-war.

P.M.C. heard a rumour that VQ4RF was planning activity as ZD8RF, but *our* grapevine has him scheduled to pop up with a VQ9 call from the Seychelles.

R. Moore (Clacton-on-Sea) picked up no fewer than nineteen new countries on Phone. They were EAØ, ET1C, FF8AL, HA, HC5AE, MP4KAC, OA4, OX3, SU5EB, TF5TP, VE8MA, VP9AV, VS2CY, VS7WA, ZC6UNJ, YU and ZS6AFF, which makes the score 62C-20Z.

"Anon" (Ellistown, Leics.) has been pulling in some Phone DX. We know he reports in these pages, but his latest effort is unsigned and our intelligence system fails to reveal his identity!

His best are ZE4JW, YI2AM, EA8AZ, ZS6KO, 6BW, FQ8AC, CR6AG, AP2K, YK1AC, SU1AS, CS3AC, CT3AF, KG4AA, ZD9AA, KA7RW, ZD6UN (Hm!), ZB4RX (Hmm!) and VU5VH (Hmmm!).

#### Fourteen Metres

Activity is on the increase and will receive a big fillip as Phone operation becomes more generally allowed. At the same time, we hope that the CW boys will occupy their full frequency allowance. It would not be a good thing, we feel, if Fourteen went the way of Ten and was considered as more or less a Phone only band.

N. C. Smith used his week off to good advantage and raised his score on the band to 56C-21Z. He concentrated on CW and raised CE3AG, CN8, FA, FF, KP4, KZ5WZ, LU, PY, OA4C, SU1FX, TA3AA, VE2NI, VK9GW, 4HR, VQ4, W, including W5LF and W6AMA, 6TZD, Y13BZL, ZC4, ZE, ZS1, 2, 4FF, 6RX, ZD9AA and 4X4RE. There are 22 countries in that little lot alone, which shows what we can expect when the band really opens.

J. Whittington didn't devote much time to the band, but heard TA3AA and short skip.

D. L. McLean, listening for Phone, found week-ends, 1700-1930 the best time and hung on to FF8AR, 8CN, OQ5BQ, 5CA, PY2JU, 3SP, 4IE, 6QM.

B. J. C. Brown weighs in with CW from W6VX and Phone from VP6SD (1735 and again at 2135), OD5AB and short skip.

#### Other Bands

The LF bands, as expected, are beginning to show signs of Autumn life and are producing

DX any time after dusk, but digging it out is becoming more and more of an effort through the ever increasing non-amateur din and the inevitable amateur QRO cross-town chatting.

We would have said that Ten was as dead as dead could be, but even if we hear only the occasional 11, others are still pulling in the DX.

D. L. McLean, for instance, decided that Ten Phone was not very good (he's lucky he doesn't live up here!) and then pulled in a bundle of Africans, to wit VQ2HW, 4AQ, W2NXO/MM ("Robin Kirk," off St. Helena), W4DGW/MM, ZE3JD, ZS30 (1530-28270), ZS6AFF, 6IH, 6OP, 6OY and 6WG. All these came through between 1500-1600. Between 1700-1900 the band opened to S. America with CE3CZ, CX4CS, 5AM, 7BH, thirteen LU's, PY1AGP and PY7DC. Whew!

N. C. Smith dismisses Ten with a reference to the very fine Phone from VQ2NS.

Forty, however, is a different story. Norman has long specialised in extracting DX from the babel and emerged this time with CE3AG, CM8BR, FF8AP, HK3HR, KP4UW, KZ5GO, K5FBB, LU, PY, PJ2AD, UA9KCA, 9CX, 9DC, UL7KAA, VK3PG, VP6AG, VP8AP, W5KTD, W7CRB and no less than 13 ZL's, all CW. Phone DX was LU4DJJ and ZL1QB!

During recent CW activity on the band, we heard LB9IC (QTH unknown, but he sounds interesting), worked VK2 and 5 (1600), ZL, VK2 and 3 (0800) and heard ZL2FA calling KB6AY (0830).

On Eighty, Norman collected EA9AP, YO3RI, 6CA, and Novices KN2BDE, WN3VYS, 4UST, 4VFR, 4WPE, all CW, with a good one, W5JHY (Shreveport, La) on Phone.

B. J. C. Brown found Forty CW good for CO2OZ and EA9BC. Ten Phone netted him a new one—ZS3H, PY's and some short skip. He thinks Top Band is showing signs of life and has heard some Phone "G-DX," despite a local (non-amateur) carrier which is on all the time.

J. Whittington got a kick out of hearing his first real Top Band DX—OK3AL on CW.

Ten Phone gave John CE3LE, CN2, CR6, PY, VQ2, ZS6 and W4DGW/MM (off Angola).

Forty Phone gave EA8, LU and PY, with CO8GA, KP4KD and W4BMR on the key.

K. B. Ranger's activity on Forty CW resulted in his pulling in ZB1KL, TF and an XE who unfortunately was blotted out by a

strong ON4. The Forty Metre score is 24C-7Z.

On Eighty, Ron Goodman's O-V-O was successful in receiving PY7GC, TG1NA (2330), CTICL and IIRLH.

**QSL's Received**

B. J. C. Brown has a 21 Mcs card from IS1CYZ, who returned the I.R.C. W2VYH obliged for 3.5 Mcs.

W. Hardie has cards from 4W1MY and SP2KGA.

D. L. McLean—CR6AM (17 months), EA9AT, KG6ABC (10 months), HK4FV (nine months), VQ3PBD, PJ2AA (return Air-mail), ZP5DC (Air-mail) and W2FXE (mobile in a car).

J. Whittington—DL1MN (21 Mcs), FB8BB, FQ8AD, KH6WU, KP4KD (Forty CW).

**DX Miscellany**

HZ1MY has struck a snag. At the moment of writing, it appears that the ARRL will not accept Dick's QSL's for DXCC credit from anywhere except Saudi Arabia. Before accepting cards from 4W1MY, FL8MY, VQ6, etc., they will require proof that operation did in fact take place from these various DX locations. So Dick is now engaged in collecting signatures, affidavits and other necessary documents.

We sympathise with him in the tremendous extra work involved and hope he soon gets things organised.

In the meantime, Dick hints at imminent activity from both Crete and Rhodes. He understands that two 4X4 amateurs have permission to operate from these two islands. They will sign SV5 and SV6 and are expected to fire up during the last week of October.

Further DXpedition news concerns a forthcoming trip to Easter Island. CE3AG has at last permission to travel on a Chilean destroyer, which makes the trip once a year and stays about one week.

CE3CZ will go along to help with the operating and the station may be active in December, although a later date may apply. The call-sign is expected to be CEØ. Further news in due course.

We QSO'd VS1EV recently and asked him when he was going to VS4. He told us he'd already been, using a very QRP rig indeed. Conditions were right on the bottom and he was unable to raise a single European. But don't despair. Wally is building a new Phone rig, using an 832 PA. Armed with this, he will be active from Nicobar Is. (VU5) for two weeks. He expects to open up in the second or third week of November and should be assured of plenty of business! Incidentally, he would appreciate some "G"

QSL's for his VS1 contacts. So far, out of more than fifty cards sent, his return is exactly six.

Remember to keep listening for the ZD7 expedition. It was due to get cracking early in October, so an almighty pile-up may well be in progress as you read this.

W6KIP tells us that VK2QZ will shortly be active from New Hebrides (YJ) and advises watching 14005 for VR4AE (QRS) and KG6IG (Iwo Jima).

As G3HSL has already said, KX6AI is active (14060 1200); he is on Kwajalein and has been peaking S5.

ZS6ZU/P, already mentioned on Phone, is active also most evenings on CW (14055). He has a DX flutter and fades out at latest by 1800.

Lots of FR7ZA QSL's have gone astray. Louis thinks the trouble is that certain individuals are keen collectors of Reunion stamps!

4UAJ (Kashmir) is now home on leave, but 4UAG (Karachi) is active on CW as are two new Jordan stations, JY1BB and JY1RT. MP4HBK, a recent arrival on CW, is at Sharjah (Trucial Oman). TA2AD (T4c), might be anywhere. When asked for his QTH he seems to consider QRT a good idea. VP2AJ is active on 14 Mcs Phone with a nine watt input. HS1WR is active again, CW (1430-14100). PX1AA was heard recently on Forty CW. Which ties things up for the moment.

**DX QTH's**

AC3PT.	Maharaj Kumar of Sikkim, The Palace, Gangtok, Sikkim.
EQ3NA.	APO 235, c/o U.S. Embassy, Tehran, Iran.
FR7ZA.	Box 330, St. Denis, Reunion Is.
HZ1TA.	H.R.H. Prince Talal, Royal Palace, Riyadh, Saudi Arabia.
15PR.	c/o P.O. Balkais, Somalia.
KH6MF/KB6.	c/o Contractor, Canton Isl
KG6 Bureau.	Box 145, c/o CAA, Agana, Guam.
VP2AJ.	Box 103, Antigua, Leeward Is., B.W.I.
VS9AW.	R.A.F. Salalah, Aden Command.

Good luck with the various DXpeditions. Let's have your gleanings and comments, SWL and Transmitters—the more the merrier. Deadline, November 6th to Roker House, South Cliff, Roker, Sunderland.

Good hunting and 73.

## FILING

One of the most abused tools in the Radio Shack is the common file. Used indiscriminately first on iron, then aluminium and perhaps wood, it soon blunts and becomes choked. Yet it is still put to use, so much so, that much energy and sweat is expended in work with very poor results. Also the correct use of a file requires considerable skill and to be able to file perfectly flat it takes years of practice and patience.

### Choice of Files

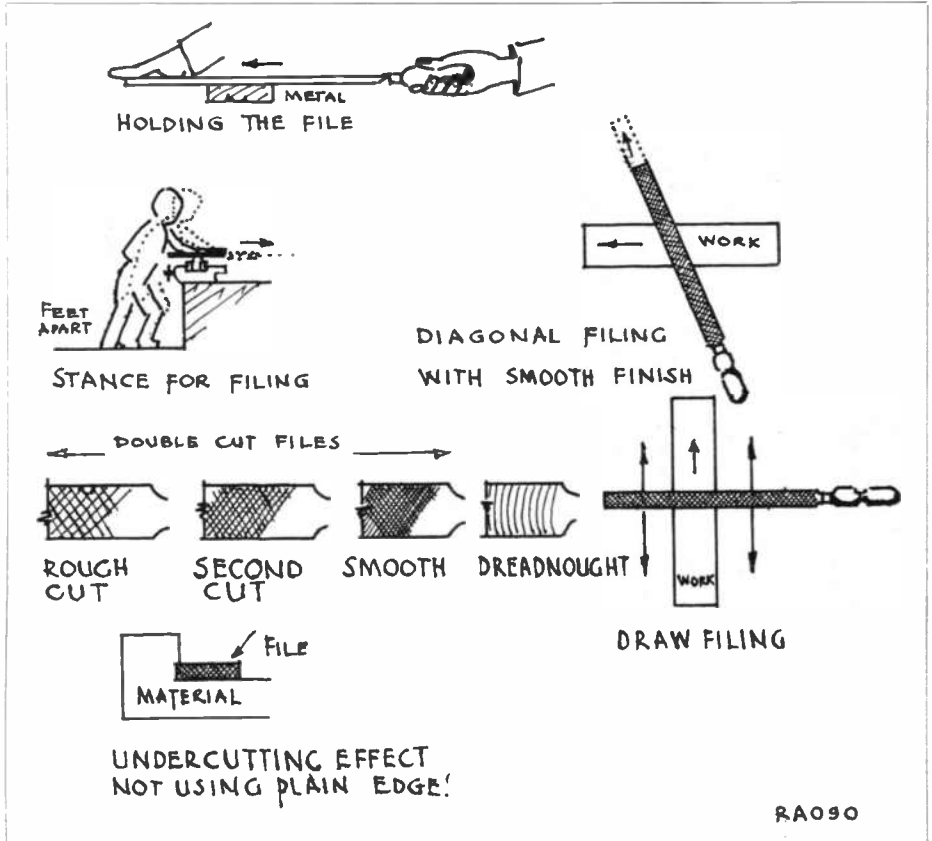
There are quite a number of shapes and cuts standardised, i.e., flat square, triangle, half-round, round, rat tail and knife, each for its own particular job, so it is advisable to purchase a set, as these tools are not unduly expensive. Most of these are also made with

the various cuts, bastard or rough cut, second cut, smooth and dreadnought.

For cast iron use rough or bastard cut. Brass and aluminium, rough cut; mild steel, second cut; and tool steel, smooth cut. For soft non-ferrous metal dreadnought can be used.

### The Action of Filing

First make sure that the handle is of suitable size and fix it rigidly and squarely. With a new file, wear out one side first and keep the good side for brass and aluminium and special work. It is essential to have a vice so as the work can be gripped rigidly. Choose a stout bench on which to fix the vice so as there is no vibration when filing the material. Keep it as low as possible in the vice and



RA090

within the width of its jaws using the full grip of the vice. Avoid unnecessary overhang as poor surface finish and wasted effort result from loss of rigidity. Work at an angle to the material, first to the right and then to the left, as it is a mistaken idea that filing along the length will produce a flatter surface. Move the file parallel to the plane of the work, as any racking motion is likely to produce a rounded surface, which is the usual fault experienced by beginners. Also do *not* use a file without a handle otherwise serious injury may result through the tang of the file slipping and penetrating the palm of the hand. Stand with the feet apart and the left foot set forward, the right arm being close to the body, the position adopted for filing being similar to that of sawing. Take the handle in the right hand, this giving direction and pressure to the file, the left hand maintaining a balance of pressure at the point. It is permissible to file diagonally across the work the movement being in the direction of the length of the file. Introducing a cross movement of the file produces the marks of the file teeth on the work. Commence the stroke with a slight bodily movement forward and continue with the arms, the body following the movement through. On the return movement pressure is transferred to the left leg, and the load on the file is relieved. The right hand gives the direction and pressure to the file. In the case of draw filing the file is held evenly at each end and moved parallel across the work. This produces a finer cut permitting greater

accuracy with a smoother finish. When filing into corners a "safe edge" file should be used. This has a plain edge so as the work is not undercut. Where a large amount of metal is to be removed start filing the first near corner and then attack the far corner; then remove the ridge thus formed. It is heavy going to attempt to use the whole of the file surface in working contact with the material.

#### Care of Files

A file is composed of rows of cutting teeth which although having a clearance angle have insufficient length behind the cutting edges to allow the metal to fall free. This results in the file becoming choked, not cutting properly and sometimes scoring the work with the particles embedded in it. To remove the material use a stiff wire brush, or file card as it is sometimes called. Odd pieces which will not yield to the brush can be picked out by a penknife or similarly pointed tool. Chalk rubbed over the face of a file, helps to prevent this clogging and sometimes oil is used, but this is not so satisfactory.

Files should be stored separately and not jumbled together in a box, as the cutting faces coming into contact with each other will rapidly destroy them.

Always use new files on brass and aluminium, as when they are worn out for filing these metals, they are as "good as new" for using on iron.

#### On the Higher Freqs. (Contd. from p. 419).

and last but not least G2BAT, giving G3WW his 40 counties since September 1st.

During a business trip to Cheltenham on the 28th, a quick visit was made to G5BM and G8DA and G3EHY were worked from there.

On October 1st a new contact was made, G3GIT (Royston, Herts., Radio Club) and G3WW dropped his QSL through the Club HQ letterbox before 0900 hours on the 2nd on his way to London. (Is G3WW *never* at home?) G5BD and G3ABA were worked on the 3rd, and he heard from GM3BA, who was guest operator at Northampton Radio Club, that GM3BDA is moving to North Berwick and will be badly screened to the south. G3WW was heard by GM6WL on October 2nd.

Other local news from the Cambridge area is that G2XV is still busy getting ready for 70 cms, G3GGJ is rebuilding the transmitter, and G2CNT in Cambridge is again active with an aerial in the roof space.

G6GX (Leven, Yorks.) has had his operating hours drastically curtailed by the arrival of twins, a boy and a girl. (Congratulations OM.) Malcolm says that they both have S9 plus voices, but the readability is only HI!! G5GX has made no exciting contacts apart from working GI3BL, and since taking down the 12 element stack and erecting a four element Yagi, he finds it difficult to hear anyone. The only explanation he gives for taking the stack down, is that it gave him the creeps waving about on the top of the tower. (Hi). G5GX still has his 70 cms gear "at the ready" if anyone wants a sked. At the moment, apart from holding one or the other of the "twin feeders," a rebuilding programme is in progress. A new 150 watt two metre transmitter, a new receiver, and a complete portable station for the Vanguard. In addition to this, some 20 ft. is to be added to the tower, making it 60 ft. (Let us hope that you will find some time for operating before long Malcolm. In the meantime, give our 88's to the little YL and OM.)

(Contd. on p. 427)

# CLUB NEWS

*Club Secretaries are invited to submit notes for this feature by 10th November, for inclusion in next month's issue.*

**Pontefract Area Transmitting Group.** T. R. W. Farrar, G3ESP, Stanton, Hemsworth Road, Ackworth, Pontefract.

Informal meetings are held at 8 p.m. on Thursdays, at the Fox Inn, Knottingley Road, Pontefract, the next being on November 13th, and fortnightly thereafter. Licenced amateurs and those intending to take up transmitting are welcome.

**The Worthing and District Amateur Radio Club.** Hon. Sec.: Mr. R. Chidzey, 33, Bruce Avenue, W. Worthing. Meetings are held at the Worthing Adult Education Centre, Union Place, on the second Monday in each month. New members are being looked for and all who are interested in amateur radio will be welcomed at all meetings. Next meeting, November 10th. All ISWL members are particularly welcome at the Club meetings.

**The Rochdale Radio and Television Society.** Hon. Sec.: J. Riley, 1, Darley Bank, Britannia, Bacup.

Meetings are held every Friday at 7.45 in the Club Room at 1, Law Street, Sudden, Rochdale. A class for morse is starting on the first Friday in November. Visitors and anyone interested in radio will be welcomed at any of the meetings. The winter season promises to be very interesting as all types of gear are to be built including transmitting, receiving and test gear.

**Romford and District Amateur Radio Society.** Hon. Sec.: Douglas L. Coppendale, G3BNI, 9, Morden Road, Chadwell Heath, Romford. Programme for November: 4th, Junk Sale. 11th, Rag-chew evening. 18th Electric Circuitry (G3FNL). 25th, Lecture by G3CRR.

**Admiralty Electronics Society.** G3BPU. Hon. Sec.: W. J. Green, G3FBA c/o Electrical Engineering Department, Admiralty, Bath.

The opening meeting of the Society was held on September 30th, when Mr. C. J. Manning described his experiences of radio reception in a Japanese P.O.W. Camp. On October 28th, Messrs. Amos and Johnstone gave a lecture on "The Design of Radio Receivers." Arrangements are being made to hold a series of lectures on the building of television receivers, and also to hold morse classes for those interested in becoming "Second Ops" on the Society Tx. Other projected lectures include Domestic A.F. Amplifiers, Tape Recording and Projection Television.

**Coventry Amateur Radio Society.** Hon. Sec. K. Lines, G3FOH, 142, Shorncliffe Road, Coventry.

All members turned out on September 7th to operate, help or hinder in the Low Power Field Day, and the event was a great success. Although aptly named, Fred Bowman (G3FAB) failed to shoot the aerial over a tree with bow and arrow (how much did the window cost, Fred?)—and the thanks of the Society are due to Ted Jesse who risked life and limb in an epic climb. Thanks are also due in particular, to all the stalwarts who operated and to Dave Harris (G3RF) for his supply and efficient handling of transport.

The 2-metre Field Day on September 21st again was strongly supported although the weather was unkind. Freddie Miles (G5ML) and Ray Bastin were prominent and Bert Chater (G2LU) qualified as a Beam-turner.

At the Annual General Meeting on September 15th, the Committee elected was as follows: Chairman: L. Gardner G5GR; Hon. Treas.: H. Chater G2LU; Hon. Sec.: K. Lines G3FOH; Members: Ray Bastin, F. Bowman G3FAB, J. Faldon, D. Harris G3RF, H. Montgomery, A. Noakes G2FTK.

Meetings continue at Y.W.C.A., Queens Road, at 7.30 p.m. Forthcoming programme is as follows:—

November 6th: Sausage and mashed at the Hertford Arms.

**The Television Society.** Hon. Sec.: G. Parr, M.I.E.E. Hon. Lecture Secretary, Mr. G. T. Clack, 43, Mandeville House, Notre Dame Estate, S.W.4. Programme of meetings for November: Thursday 13th, Component Reliability in TV Receivers. Dr. G. D. Reynolds, Murphy Radio Ltd. Friday 28th, High Quality Front Projection TV Receivers. P. D. Saw, Aren Radio Ltd.

All meetings unless otherwise stated, are held in the Cinematograph Exhibitors' Association, 164, Shaftesbury Avenue, W.C.2, and commence at 7 p.m.

**West Lancs. Radio Society.** Hon. Sec.: B. J. Whitty, G3HWX, 46, Argo Road, Waterloo, Liverpool, 22.

Mr. S. Sugden has had to relinquish his job of Hon. Sec., due to his commitments in London and Mr. Whitty has taken over. Meetings proceed as usual every Tuesday at 8 p.m. in the room over Gordon's Sweet shop, St. John's Road, Waterloo. Morse classes are held every week, and technical lectures given once a month. It is hoped to arrange trips to local places of radio interest in the near future.



**East Surrey Radio Club.** G3ISR. Hon. Sec.: R. L. Esheridge, 22, Brighton Road, Purley, Surrey.

At the October meeting of the East Surrey Radio Club, Mr. Harry Knowles of the Mullard Research Laboratory delivered a most interesting lecture on "modern UHF valves and their characteristics." So interesting was this evening that we hope Mr. Knowles will present another lecture in the near future.

The Club has now been issued with the call sign G3ISR, and it is hoped that this call-sign will soon be heard on top-band, eighty and two metres.

**Edinburgh Amateur Radio Club.** Hon. Sec.: C. L. Patrick, 19, Montgomery Street, Edinburgh.

Weekly meetings are now being held on Wednesdays at 7.30 p.m. in Unity House Hillside Crescent, Edinburgh. Intending members and visitors will be welcome.

**On the Higher Freqs.** (Contd. from p. 425)

G5LK (Reigate, Surrey) has been spending a little holiday with GW3CYB in Tumble, South Wales. GW3CYB is also blind, and has a QTH that most two metre hams dream of, 750 ft. above sea level.

GW3CYB would also like to operate on 144 but has no local hams to give him any assistance. (Any volunteers in that area?) Leslie (G5LK) is still unable to work G3EHY or G5YV, and thinks that the former is due to demand rather than lack of possibility. The SCR522 is off the air due to breakdown at the moment, but Leslie hopes to have it in operation again before very long.

That appears to be the end of the Transmitter reports for this month. We are sorry to say that the usual breezy report from E12W has not reached us in time for publication this month. However, we shall look forward to another contribution from him in next month's issue.

**Listener Section**

Our listeners seem to have almost deserted us again this month. Perhaps this is mainly due to the indifferent conditions, and they have not considered the report worth sending in. We again stress that it does not matter if you have only heard two or three stations, and have only listened for an hour or so. Let us know what you are doing, it is always of interest to *somebody*.

R. L. Bastin of Coventry (2nd Op. at G5ML), begins by sending a tribute from G5ML and himself to the memory of G2BN, "a true OM of Amateur Radio, although not known personally, the remarks on his QSL card outlined his personality."

Ray reports two new stations active in his area, G3HAN (Nr. Leics.) on approximately 144.520 Mcs, and G3BKQ (Blaby, Nr. Leics.) on approximately 144.450. The latter

station issuing a 16 element stack. 70 cms news from the area is that G6YU is active with a QQVO 06/40 with 5 watts of RF. He has worked G3BKQ. The aerial is a City Slicker using three folded dipoles with reflectors, and the receiver is a crystal controlled converter with a crystal mixer.

G3ABA is also active on 430 Mcs with an 832 tripler and a 16 element stack. He has also worked G3BKQ, and has been heard by G2FNW (36 miles). Ray uses an ASB8 and a 16 element stack, and has heard G3BKQ, G6YU, and G3ABA during the past few weeks.

On two metres, no continentals have been heard since July. The receiving gear is still the same, G21Q/6J6/6J6, plus 955 acorns, with a 640 Rx. Aerial is a three element Yagi, the same as G5ML.

Eric Lomax of Bolton, has done very little listening during the past month or two as holidays and business have had him completely tied up. What little time has been spent on the bands has been very disappointing due to poor conditions and low activity.

Eric says this season has been inferior to last year, and he is hoping that one more good period may set in before the winter.

The persistent cold winds that have prevailed this summer has had a marked effect on the DX. Real DX has only been in evidence on two occasions, while the south has had many more openings.

Eric would be grateful for any information on the "Navy P38 VHF Set." He has managed to pick one up and it is such an attractive looking job that he would like to convert it to a variable tuned oscillator. So if anyone has done this conversion, please drop Eric a line at 28, Welbeck Road, Bolton, Lancs.

Local news is that G8SB is moving from south Manchester to the north side, near Bury, and will be on the band again before this appears. And that is the sum total of listener reports this month.

**Late Report**

There is just time to include a late report from G3GBO (Denham). Don has now reached the total of 301 stations worked. Highlight of September was the 16th, "Cambridge night" when he worked G3WW, G3EDD, G3BK and G2PU. General activity has been down a little due to college QRM. Don hopes to be in circulation until Christmas, after which he expects to be spending a year or two in H.M. Forces. Sorry to cut your report down OM, but we did at least manage to include it!

Thank you all very much for the interesting reports this month, and we feel really honoured with the growing support we are receiving. Don't forget that the zero date for reports is the 5th of each month, direct to your conductor at 176, Station Road, Hayes, Middlesex.

**VHF Converter** (Contd. from p. 395)

allows of the transmitted signal being monitored (the frequency-changer continues to function as a diode with, of course, greatly reduced gain). As the regulation of the small power unit is none too good, the voltage rises at standby causing a change of frequency—only a small one, but it was thought better to avoid it altogether. Hence the addition of the stabiliser which was at first omitted. There are two conditions under which it can safely be left out. One is when the standby switch is not used (e.g. by a listener or when muting is accomplished on the associated receiver), the other when a separate high tension supply of good regulation is employed.

**Power Supply**

In the writer's case it was desirable to incorporate a power supply, thus making the converter self-contained. Although not heavy, the power requirements (6.3 volts, 1 ampere and 200 volts 25 mA) are such that often it will not be fair to expect the power unit in the receiver to provide them. There is sufficient space for the necessary components, albeit they have to be chosen with an eye to physical dimensions and fitted in where room can be found.

The resistor R9, which drops the oscillator volts, is used in conjunction with C15 as part of the smoothing system and it was hoped to dispense with a smoothing choke. In fact, the notes of received signals are reasonably good without a choke but the half wave rectification introduced a slight 50 cycle ripple and the small choke removed this. The choke is an ex-AM miniature type bearing the reference number 10/7912, but any similar component will serve.

*The second part of this article will deal with constructional features and will appear next month.*

**Design of Mains Transformer** (Contd. from p.404)

It may be noticed that our estimated primary watts came to 13.9 W, and the figure attained on completion of the design is 14.1 W. This bears out the statement made previously that 85% can be approached in the design of small transformers.

Coming now to the conditions when the 50V tap on Sec. 3 is in use, and delivering 50 mA, because we based the design on 1200 turns for 120V it follows that we shall use only 500 turns of this winding when drawing 50V 50 mA. By checking back through the calculations, we can find that the mean turn for this lower part of the winding comes to

7.8 ins., and that the resistance will amount to 60 ohms. At 50 mA, the voltage drop will be 3.0V, which is the same figure as before for this winding. The efficiency is therefore unaltered, and this result is not unexpected because we saw when finding the secondary loads that for Sec. 3 they were 2.5 W and 2.4 W for the 50V and 120V taps respectively.

We can round off our design by finding the approximate temperature rise. Applying the dimensions of the core in Fig. 6b where they apply to those shown in Fig 5, we find that temperature rise is, roughly,

$$T = \frac{20 \times 1.24}{2.375 (2.7 + 2.6)} + 1.2 = 3.2^{\circ}\text{C}.$$

We conclude from this that in free air the transformer will barely get warm, so our design seems to be fairly satisfactory.

Although this design has worked out quite well, it is by no means unique in this respect. By following the methods described in this article you will find that you can invariably produce a design which "fits." Of course, the figuring involved occupies an hour or so, but if you can waggle a slide rule effectively, and remember to put the decimal points in the right places (most important, this!) it is surprising how quickly a design can be produced with a bit of practice. If you don't have a slide rule among your possessions, then log tables can ease the calculations; if you've forgotten what they taught you about logs, then there's nothing for it, chum—you'll have to do it the hard way!

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