A DIRECTIONAL ANTENNA FOR THE 20 METRE BAND

When the average radio experimenter decides that he would like to "dazzle" a friend or relative with a new antenna, he may either spend a considerable sum of money in buying a much advertised "super-gain" receiver that he has had in his mind for some time or else he adds more stages of R.F. amplification to his present rig. Little does he realize that an inexpensive, educational and very interesting means of increasing the range of his receiver is to construct a beam antenna. The flat-top consists of a pair of horizontal wires spaced 10 feet 5 inches apart. These wires cross over at the centre, dividing the antenna into two sections, each approximately one-half wavelength long. The overall length is about 55 feet. If the spacing of 10 feet 5 inches is inconveniently long a spacing of 8 feet 8 inches may be used. All the other dimensions remain the same except that the sections are made 28 feet 4 inches long.

FLAT - TOP WIRE MEASUREMENTS

None of these dimensions are critical, since a coupling unit is employed which will allow for any variance from these figures within a few inches.

The general construction of the antenna is shown in Fig. 1. Three spreaders of 1 inch by 1 inch light wood are used to give the 10 feet 5 inches spacing. A 1-inch dowel could be

(Continued on Page 5)
BRIMAR VALVES

CAN 'TAKE' IT

Shattering explosions that fairly rock the earth . . . jarring vibrations . . . yet Brimar Valves can take it. Lives depend upon the perfect operation—and Brimar never fails. Ten times tested, ten times more efficient, Brimar are built to 'stand up to the thunder of heavy guns.

In your radio you may as well have the best—at no extra cost. Fit Brimar Valves, be sure all replacements are Brimar—and enjoy long, trouble-free service at all times.

10 TIMES TESTED - 10 TIMES MORE EFFICIENT

OBTAINABLE FROM ALL RADIO DEALERS.

Standard Telephones and Cables Pty. Ltd., C.P.O. Box 638, Wellington;
P.O. Box 962, Christchurch; P.O. Box 362, Wanganui; Electric Lamphouse Ltd., 11 Manners Street, Wellington; Mr. G. E. Tyler, Napier; Swan Electric Co. Ltd., P.O. Box 307, Auckland.

IMPROVISATION IN BUILDING AND REPAIRS

(By RAHOB 762).

In this article it is intended to pass through the successive stages of a receiver and suggest methods of substituting or improvising components. It should be remembered, however, that there is a limit to this method and no one can improvise for a valve or an L.F. coil for example.

We will begin with coils. Builders of small sets can try using small round bottles as coil formers, and crystal set builders can use glass jars. The corks or lids are nailed down and the bottle or jar is then screwed or "corked" on to same. It should be remembered that this method is scientifically sound as glass is a good insulator and some experimenters prefer these formers to the usual cardboard type. The wire is fastened down by tapes.

Dia. 1.

Screwed Down.

Now a word about repairing commercial coils. If a winding has a break in it, it is often possible to carefully unwind and resolder the break, insulate with a piece of spaghetti, and re-wind the coil by hand. If this operation has been carefully performed, it should be possible to re-align the coil by means of the trimming condenser. Primary windings are not critical to a couple of turns, but secondaries must be more accurate. With L.F. coils using Litz stranded wire, it is necessary to see that the full number of strands are present and all cleaned of enamel. Naturally, it is better where possible to replace the unit, but the author has repaired coils by the above method several times.

Our next item is condensers. There are two possible ways of improvising condensers of small capacity which will prove very satisfactory. One is by twisting two insulated leads together and using one end of each lead for the connections. This type can be used for example to cut down aerial signal strength. The thicker the wire and the thinner the insulation (spaghetti preferred) the greater will be the capacity. Another method is made by winding a number of turns of bare tinned wire round a piece of heavy gauge enamelled wire. The turns of tinned wire are soldered together and one end of each of the wires is used for connecting to the circuit. This condenser can be given a coating of dope. The above methods are useful for capacities around 0.0001-0.00001 mfd. For larger capacities the experimenter will have to make them the same way as they are made in the factories, that is by rolling up two sheets of tinfoil with a sheet of waxed paper in between. It is sometimes possible to repair broken condensers of the paper type by coupling carefully, till you come to the place where the paper (dielectric) has been punctured and burnt through, then paste a piece of paper over the hole, using as little paste as possible, and then rolling the condenser up tightly and immersing in candle grease (melted). You can also make smaller capacity condensers out of old ones in the same manner. Resistors do not give much scope for the experimenter, but there are two possible ways of improvising.

Dia. 2.

A. Connections. Leads.
B. End of waxing.
C. Enamelled wire.
D. Stranded wire.
E. Tinfoil.
F. Soldered at points above one side.
G. Threaded wire.
H. Solder El Wire.
a resistor of unobtainable value, and you have some old copper wire or element wire, you can wind this round a former to give the correct value. If you use copper wire you will only be able to make small values, say up to 200 ohm and you must be sure that the wire is heavy enough for the required current.

The other method is by using carbon resistors so as to increase their resistance. For example, if you require a 1 Meg resistor for a grid leak, and you only have a quarter Meg, you can file the resistor till the value is brought up to 1 Meg. Of course if you are going to use these resistors to carry large currents, you must make sure that the resistor will carry them without overheating.

Now we come to the valves themselves. It often happens nowadays that you require a 42 tube and you can only obtain a 6P6 say. (Same characteristics but different base). Does this mean that you must put a new socket in the set? No, the proper thing to do is make an adapter. You break the base off the old 42 and screw a 6P6 socket on to this base, connecting the lugs to the correct pins in the old base. Then you insert the new valve in the adapter and the adapter in the set.

The method of screwing wafer to base.

A very common problem is that connected with ganged variable condensers. In the first case the experimenter may have a gang with a capacity which is much too large for the required purpose. One method of solving the problem is to remove some of the plates, either from the fixed or moving sections. (It is not necessary to remove both lots). Or pieces of insulating material such as mica, ebonite or varnished paper can be glued to one side of each plate. These sheets of material have the effect of decreasing the capacity. Other methods of altering the capacity are by placing condensers of either the fixed or trimmer type in series with the gang to reduce maximum capacity, or in parallel to increase maximum capacity. It should be remembered, however, that when this method is adopted, the range of the gang is shifted either up or down the scale as the case may be. However, this is the subject of page 22.

 directional antennas (continued from page 1)

used instead, or even bamboo, depending on the materials available. A coat of paint or varnish will not affect the results of reception ability, but will ensure that the system will be more lasting. The usual type and size of aerial wire is quite satisfactory.

The feeders should be spaced 6 inches by means of spreaders every 3 feet. If these are not available then may be constructed as shown in the diagram. If it is desired to reduce pick-up by the feeders a transposed feeder system could be employed using 2-inch spacing. Twisted pair feeders should not be used with this antenna. The feeder length should be 35 feet or 50 feet, depending on the constructor's choice. Feeders of this type, known as Zepp, should not be more than 100 feet long.

The coupler should be mounted preferably outside the building so that the feeders will not have to be twisted by bringing them through windows, etc. However, feed-through insulators could be employed on the wall of a house. Connection from the coupler to the receiver can be made by winding two or three turns of 'hook-up' wire round the centre of the coupling coil. This link connects to the 'doubled' terminals on the receiver. A single-pole double throw (S.P.D.T.) switch may be connected as shown, thus, the antenna may be made non-directional by simply connecting the two feeders together. The flat-top and the feeders now perform as a single wire for general reception.

This antenna, similar to all half-wave antennas, is directly directional at right angles to the plane of the flat-top. Hence, the antenna should be situated at right angles to the line joining the two stations, i.e., the receiver and the transmitter. If the antenna is placed so that it is mainly directional to signals coming from Europe then it should cover an area at least from England to Eastern Europe. Or similarly it could be situated to receive from North America.

For long distance reception, as mentioned, on 20 metres, a flat-top height above ground of 40 or 50 feet is helpful but less height such as 25 or 30 feet is satisfactory.

To tune the antenna it is only necessary to vary the tapping on the coil (Continued on page 15).
SMALL ADVERTISEMENTS

An advertisement in the Radiogram will dispose of your surplus radio parts. Hard to obtain items are often brought to light through a small Radio gram advertisement. Address instructions on this page cost 2d. per word payable with instructions. To ensure inclusion, your instructions should be received by us on the 15th of the month preceding date of publication. Advertisements addressed c/o "Radiogram" cannot be accepted. Address instructions to "The Radiogram," 11 Manners Street, Wellington, C.1.


FOR SALE—16 in. Atwater Scientific Model 357 Selective Set Servicer, with Valve Socket Selector, and Adaptors, as new. Without Carrying Case, 22s.-/-. Projector Snm. and Film. P. J. Cunnell, 25 James Street, Whakatane.

FOR SALE—9-watt Amplifier, perfect working order, complete; contains heavy duty power Transformer and choke, 12-inch Roll speaker, carbon microphone. £17/10/-; Write: R. Kelly, 574 Sandringham Road, Mt. Albert, Auckland.

HERE! English Bakelite Radio Knobs. Four different designs, colored brown. Cross Pattern, Six Sided, Paneled Round. All priced 1/- each. Small pointer—priced at 1/4 each. The Lamphouse.

TOASTER TRAYS—Moulded Bakelite, assorted colors. Dimensions, 101in. x Tin. For standing under toasters to catch crumbs, etc. 3/9 each. The Lamphouse.

WIRELESS JUG ELEMENTS—Can be fitted to any make of Porcelain Jug. Cannot burn out even if boiled dry. Complete with terminals. 9/6 each. The Lamphouse.

WANTED—0/1 Millia-meter (Universal scale preferred), or similar Multimeter. Dowdell, Okainawa, Taranaki. (Radio 111474).


WANTED—Plans for connecting Dodge Generators to Electric Arc Welder or/ and copy of Auto Power. M. Paterson, Forest Products, Tokorau, Pataua.

WANTED TO BUY—B. Battery Eliminator. Price and particulars to: W. Boyce, c/o P.O., Totara Flat.

WANTED TO BUY—Battery or Portable Radio. Apply D. G. Todhunter, Clarence Bridge, Glen Alton.


TEST PRODS. — Polished ebonite handles and complete with Rubber covered flexible leads. 7/- pair. The Lamphouse.

PUSH BACK WIRE—Best quality single strand. Use in wiring radio sets, amplifiers, etc. 10d.—10ft. Coll. The Lamphouse.

OUT THEY GO! Mullard Radio Valves. Type TDD2A—normally 14/4 each. SACRIFICE PRICE—7/- each. The Lamphouse.


STEREOSCOPIC Views, new or used. Write stating size, subjects, and price. M. W. Scott, Parawera, Te Awamutu.

ALL Types of Meters Rewound and Repaired. Special rate if job is finished quickly. 2/- per hr. M. J. Hogley, c/o A. Zeinert, Mangatuku, Pahiatua.

SOLDER—Resin Cored Flux or spirits of salts unnecessary. Small reel, 27in. Td.: large reel, 1lb. 7/6. The Lamphouse.
THE N.Z. RADIOGRAM
January 1, 1945.

II. VERNON WHEATLEY.
(Answers on page 19).

Take care for each question answered correctly. 100 per cent.—very good; 75 per cent.—good; 50 per cent.—very fair; 25 per cent.—not so fair.

1. There are windings and windings but bifilar windings are (A) non-inductive; (B) capable of producing more volts per turn; (C) inductive; (D) those which require more turns per volt; (E) more efficient as regards service; (F) free from hysteresis.

2. Ten seconds for this one! As a mathematician, you would say without hesitation that 8¾ inches equals (A) decmil equivalent A; 13625; B. 103575; C. 13625; D. 0375; E. 13625.

3. If you had a perikon detector in your crystal receiver, you would know that it can be used as a wire in contact with galena; (B) carbon turbid with silicon; (C) glass diode with tellurium; (D) diode with copper prites; (E) silicon diode with iron pyrites; (F) hessite diode with casserite.

4. If you came across a node you would immediately know it was (A) the grid of a radio tube; (B) the plate of a tube; (C) a point of zero current or potential in an oscillatory circuit; (D) a maximum point of current or potential in the same circuit; (E) any point of current or potential in a low frequency circuit.

5. If we were to estimate enough to be perking rapidly at the screen of a television receiver and suddenly the objects became interlaced we would know the name for this effect is (A) non-synchronous; (B) intercalation; (C) interference; (D) superposed; (E) synchrony.

6. The rating of a power tube covers immediate distance, a rated 10 watt output tube will, without any alarming temperature increases, dissipate 10 watts per second; (B) 100 joules in the same period; (C) 10 joules of energy in one tenth of a second; (D) 10 volts in ten seconds; (E) none. The term joule being not applicable in this case.

7. In a high turns ratio is necessary for high voltage amplification. This gives us a larger dis-tributed self-capacity and also automatically increases the leakage inductance of the transformer at the output frequency. Bearing these points in mind when selecting an audio transformer for general use, let us select one with a ratio of (A) 1.5: (B) 1.7: (C) 1:3: (D) 1:1: (E) 1:10: (F) 1:10.

8. If you designed an amplifier and wished to make use of a large signal voltage in the output stage, your choice for the final power tube would be (A) an output pentode; (B) a triode; (C) a beam power pentode; (D) push-pull pentodes; (E) two paralleled pentodes.

9. Quite a few things are fundamental. Shaving is fundamental slavery, but fundamental, when applied to the wavelength of a broadcasting means that the fundamental wavelength of a station on 400 metres is (A) 400 metres; (B) 200; (C) 800; (D) 1200; (E) 2000; (F) or any multiple of 400.

10. Even electrons get lonely and the term used to describe the manner in which electrons travel for a battery leave the cathode of a cathode ray tube is (A) beam; (B) unilateral; (C) unflamed; (D) electron fumigation; (E) strabismic; (F) supersonic.

CHEAP CHEMICAL EARTHS

If you are too tired to take the cells from worn out "I" batteries there is still no point in throwing them away. After removing the Fahan stock clips whose users are obvious—solder the blocks together. And this is the one time when your daughter had better leave the dog buried in the yard—avoiding spots where the dog burying its bones, because dogs always chose dry ground. A nice big hole too; down as far as you have energy to dig.

When a suitable wire for the earth connection, as stout as possible and preferably insulated where it contacts with the sides of the building, etc., has been sodden on the old batteries are buried with a pipe leading down to where they may be driven occasionally. Especially where the soil is poor and sandy the improvement may be vast since the earth is chemically renders the conductive area much greater.—Rahob 7040.

Girdling The Globe

DX observations of the month by Arthur T. Cushen, 105 Princes Street, Invercargill, DX advisor to the Radio Hobbits Club, and Short Wave Editor of the New Zealand DX Club's bulletin, "New Zealand DX-TRA." All communications to the above address will receive prompt attention.

BROADCAST

Australia.—The special broadcast from 5KA Headquarters, Macquarie Street, December 3rd was well received in this country. Many reports to hand show that reception was good throughout the Dominion, and many commentate that it is the best special programme they have heard. DXers in all parts of Aus-tralasia and the North American continent were called.

United States, Canada.—Here is a list of the best stations being received and should be a good guide for January reception. Many of these are audible any night at a good location.

Denotes opens at this time (o), 8.30 p.m.—11700ks, WWVA (o), 9.00 p.m.—11000ks, WTAM (o), 1110, WBZ (o), 11500ks, WFCB, 9.15 p.m.—15300ks, WCKY (o), 1020, KDKA, 1300 p.m.—7000ks, WLW, 750, WSB (o), 890, WLS (o), 920, WMNN, 990, WPTL (o), 1010, KLBA, 1030, WBZ, 1080, KRLD, 1100, WXOK (o), 1180, WHAM, 1320, KXYZ (o), 1360, WMBR, 1510, WNAI, 1550, WIRL, 1580, WBAW (o), 1600, 1460, KCNO, 1500, KSTP (o), 1510, WHLAC (o), 1530, 1630 p.m.—9500ks, WOW (o) — CMGY (o), 600, WMT (o), 690, CMO (o), 740, KTHB (o), 760, WJR, 870, WWL, 950, WSFA, 960, KMA (o), 1040, WHO (o), 1250, WAWE (o), 1350, WJRT (o), 1540, KXEL (o), 10.45 p.m.—9200ks, KARK (o), 970, WPFL (o), 1250, WCAE (o), 1480, WHK, 1600, WREC (o), 620, KGW (o), 650, WSM (o), 660, WREAF (o), 670, WMAQ (o), 750, KMJH.

9.15 p.m.—750ks, WWVA (o), 890, WLS (o), 920, WMNN, 990, WPTL (o), 1010, KLBA, 1030, WBZ, 1080, KRLD, 1100, WXOK (o), 1180, WHAM, 1320, KXYZ (o), 1360, WMBR, 1510, WNAI, 1550, WIRL, 1580, WBAW (o), 1600, 1460, KCNO, 1500, KSTP (o), 1510, WHLAC (o), 1530, 1630 p.m.—9500ks, WOW (o) — CMGY (o), 600, WMT (o), 690, CMO (o), 740, KTHB (o), 760, WJR, 870, WWL, 950, WSFA, 960, KMA (o), 1040, WHO (o), 1250, WAWE (o), 1350, WJRT (o), 1540, KXEL (o), 10.45 p.m.—9200ks, KARK (o), 970, WPFL (o), 1250, WCAE (o), 1480, WHK, 1600, WREC (o), 620, KGW (o), 650, WSM (o), 660, WREAF (o), 670, WMAQ (o), 750, KMJH.

SHORT WAVE—New Stations of the month

Megacycles, CALL LOCATION
21675, GVR London
15275, ZOJ SEAC, Kandy.
15160, VUD Delhi.
12580, DBC Batavia.
10010, WJO Boston, Mass.
9885, WNBR New York.
9750, WLWR Cincinnati.
9410, KGN Shepparton.
7865, SUX Cairo.
7470, GUM German.
6700, KOE Rome.

ITEMS OF INTEREST

Opens at 9 p.m., news 11 p.m.
Call in English at 4.30, signs 5.25 p.m.
News at 3.15 p.m.
Closed at 4.15 p.m.
Testing at 7 a.m.
Morgul programmes 7 a.m.
"Voice of America" 7 a.m.
Foreign programmes 7 a.m.
To Britain at 4.15 p.m.
News at 6 a.m.
Calls Spanish 11 p.m.
Home programmes, closes 7 p.m.

THE LAMPHOUSE, 11 Manners Street, Wellington, C. I.
Slips at The Mike

32B, 15-11-44. Shoppers' session:
"Prices to fit everybody's figure."

1YA, November 10, 1944, 3.10 p.m.:
"We will now present an expert from this Oratorian."

2YC, 20-11-44, 10 p.m., boxing announcer:
"The crowd are on their toes and they're swinging lefts and rights."

22B, November 24, 1944, 9.7 a.m.,
reporting from American meals: "They sometimes have their salad plain and then eat the dish."

Batteries in Enclosed Receivers

Nowadays batteries are often enclosed in the cabinet containing the receiver. When this is done, the batteries—which, it should be remembered, are large masses of earthed conducting material—should not be placed close to components or directly underneath them. This applies particularly to tuned circuits as the proximity of a large earthed object will have much the same effect as is experienced if, for instance, the hand is placed close to a coil or condenser.

THE LAMPHOUSE INSTRUCTION COURSE

This 48-page attractively covered booklet has been compiled from courses in previous Lamphouse publications, completely revised, and printed for those Radios who have taken up Radio as a Hobby, would like to gain some knowledge on Radio fundamentals and theory. We do not boast it as being a complete course as used in Radio Colleges, but it is a simple foundation study written in the language a beginner understands.

Ken-Rad GLASS OR METAL Radio Tubes DEPENDABLE

Kenrad Tubes are Standard Equipment in the famous LAMPHOUSE ENSIGN RADIO

ORDER FROM THE LAMPHOUSE

THE LAMPHOUSE, 11 Manners Street, Wellington, C.1.
ENSIGN MIRALITES REFLECTORS.

For economical lighting for windows, stores and homes. Special arrangement of mirrors in these reflectors enables you to obtain up to 33-1/3 per cent. more light. Miralites for ordinary lampholders. No special fittings required.

(1)

Angle window lighting reflector. The top of this type is angled enabling the reflector to be placed in front of a window so that the light will be reflected directly on the goods displayed in the window. For lamps 75 to 150 watts. Sizes 111/2", 5".
Cat. No. RF251
20/- each

(2)

Straight Top, 2/6 each

Made of translucent bakelite, these shades are fitted with a wire clip which clamps directly to the lamp bulb, making them ideal for adjustable table lamps, etc. Available in most popular colours. Diana 81/2".
Cat. No. RF255
2/6

(3)

Flat.

Insulated Staples are used by all who wish to make a neat job. The fibre insulation in these staples protects the wire and guards against loss of signal strength. British made.
Cat. No. RS118
3/2 D. doz.

THE LAMPHOUSE
11 MANNERS ST., WELLINGTON.

THE LAMPHOUSE, 11 Manners Street, Wellington, C.1.
Postmans Knock

For my part, I am fully satisfied with the Radiogram and each monthly copy leaves me looking forward to it. From a radio expert's point of view, improvements could possibly be made and no doubt such improvements will form part of the Radiogram's post-war policy.

Would it be possible to do away with the "Announcements" and in its place have a list of radio terms and their correct meanings. After all the Modern Dictionary is only put in for amusement.

I will stop now, wishing the Club every success.—Rahob 11978, Waimate North

With regard to Rahob 10650's letter in the November Radiogram, I agree thoroughly with his remarks about 2 valve sets. I have done quite a bit of DX-ing during the past year and have never used anything bigger than a 2 valve set. With this I have managed to log stations from all over the world, on short wave and broadcast.

There has also been a lot to say lately about the standard of the Radiogram. Well, I reckon that it has vastly improved over the 1941 issues and those about that time. I do not think that there is too much rejection in it, but could you not print some different types of circuits. I also see that you ask for our opinion on Postman's Knock, well I say, "Keep it," as long as it does not take up too much room.—Rahob 73263, Auckland.

I think what I owe the Club can never be repaid in money or words. Let me explain.

The dream since I first took interest in radio as a hobby was to some day enter into it for a living, but in my local town there seemed very little hope of this while both the chance came. A position was advertised and I applied. I think that my Rahob badge was no small factor in getting me the position in a well-known local radio firm.

Well, best of luck to the Club and my thanks for an enjoyable year.—"W." Ashburton.

On reading the November Radiogram Postman's Knock I think that Rahob No. 11048 and 11228 should not be allowed to make such statements and get away with it. It might be a bit different if their statements and remarks were correct, but they are nothing but falsehoods right from beginning to end. They do not give the facts, but what is done for them. If I were you I would not waste paper in the Radiogram on matters that are not worth time on them—just ignore them.

Surely we should all realise that the Radiogram is published under very hard conditions. It would not have survived at all if it had not been run and published under some very clever management and people who have devoted a lot of their time and interest toward it.

In conclusion I will say that I am very satisfied with the little paper and am quite confident that after the war is over it will be better than ever.—Rahob 10688, Pukokohe West.

In answer to your request for comments upon the "Postman's Knock" pages, it would like to say that this feature is both valuable and desirable.

I gain certain interesting information—not wholly statistically which is of value to me, and I would like to express my thanks to the many Club members who have written in appreciation of my efforts.

To the minority—those jolly Ph. Ds of mayhem who wish to see the club shot down, and made insensibly boring and monotonous, etc.—I shall express my thanks for supplying a slight measure of comic relief.

From the various statements appearing in the columns, it is reasonable to assume that at least someone reads my efforts, which is gratifying, and thus I gain pleasurable information and innumerable hilarity. As a result, I might add that a treat all correspondence which is in direct relationship to myself, ad valorem.

This has the effect of leaving me in a genial frame of mind and looking forward to the next month's issue of Postman's Knock.—H. Vernon Wheately, Christchurch.

I have been away in the jungles fighting Japs and have found out what a good thing this little book is. My dad always used to post it on to me and boy was it a treat to think that when this war is over our Club may rise to a new and higher standard than any other holder of your Club, Rahob 5726.
CIRCUIT REVIEW

SIMPLEST FIVE T.R.F. RECEIVER

The cut-out is an essential unit with a generator, so I'll deal briefly with that.

When the generator starts, a magnetic field caused by current flowing in coil A, pulls down the contact arm, and the battery receives the charging current. When the generator stops or is not revolving at a speed sufficient to produce the charging current, the low resistance coil B produces a magnetic field which cancels the magnetic field of coil A. This opposition releases contact arm, thus breaking the circuit. The points should be kept clean.

Should your generator spark excessively at the commutator, look for any of the following:

- Brushes incorrectly set as regards neutral axis; excessive currents; pitted or grooved commutator; proud mica; a flat on the commutator; dirty brushes or commutator; brushes incorrectly held; incorrect pressure on brushes; brushes not properly bedded, or broken, or even inserted wrong way round; partial breakdown of insulator between commutator segments.

These faults, with a few obvious omissions, are fairly easily corrected. If the armature, when rotated, produces an evenly blackened commutator to your view, clean in the normal way, but if it is blackened locally, the cause is a “flat” or “shoulder” at the spot where it is blackened. The only cure for this is to turn it up on a lathe.

Should your generator fail to excite, the cause may be that the commutator is dirty, or due to a high resistance deposit forming on the brushes due to the generator running for a long period and not producing current. A high resistance in the field circuit or a break, and turning the generator in the reverse direction causing a loss of residual magnetism, will cause a generator not to excite.

Again, the remedies are obvious. To re-excite, set the generator running normally, after removing the original fault, apply 1/4 volts or more in correct polarity across the generator output. Merely “flash” the wires from the exciting battery across the output. The exciting voltage should never exceed the rated voltage of the generator. 1½ volts (dry cell) is generally sufficient.

Your generator works on a very simple electrical law: When relative motion takes place between a conductor and a magnetic field, so that the conductor is “cut” by the field, an E.M.F. is produced. The rate of “cutting” determines the magnitude of this E.M.F.

As Faraday’s laws of Electro-magnetic Induction have it:

1. An induced E.M.F. is established whenever a change occurs in the magnetic flux linking with an electric circuit.
2. This E.M.F. is proportional to the rate of change of flux.

N.B.—The neutral axis mentioned previously indicates the point at which the brushes should make their changeover on the commutator. It is the exact point at which the armature coils are cutting no lines of force, or at right angles with the field. The axis varies with the load, because the lines of force become distorted in the direction in which the generator is turning.

Life Vernon Wheatley.
AUCKLAND
A. WALKER, President.

The outstanding event of the year was the judging of the entries in the junior and senior competitions on November 25 at Mr. Norman Christie's home.

The construction was of an excellent standard and the judges expressed their appreciation of the efforts taken by members in their work.

In the junior section all entries were battery operated and judging was very difficult due to the general performance in each case being so high. In the final summing up Mr. Wood was very fortunate to win both sections by a half-point in each instance.

In the senior section with the 3-tube Superhet's some keen rivalry was expected and this proved so when the entries were brought in. The construction and layout were exceptional in their class, although with the exception of Mr. Forrest (who went in for the Ham type receiver with home wound coils) the other entrants had a decided trend to the Commercial Dual Wave Receiver design. Despite this tendency the performances were really outstanding and the combined entry of Messrs. Garrett and Beere won the first section prize as well as the Bain Cup. Our worthy president carried off the other prize with his entry.

In the summing up of the judges it was an excellent show and the bumper attendance quite enjoyed the evening.

We will be commencing the New Year with our first meeting on Friday, January 19, 1945, at the Clubroom, 5 Abbots Chambers, Karangahape Road, when we shall renew old acquaintances. We thank Messrs. A. Bain, R. Garfield and Rhodes for their donations to the Club.

With best wishes to all for the New Year.

— J. FORREST, Secretary.

HAMILTON

Good news for Hamilton Radios! The Hamilton Club has arranged for the use of the Hamilton Welding Club's Rooms for their meetings, which in future will be held each fortnight. There is both a lecture room and a workshop.

Our Club recently co-operated with the welding club in a display of home made models and radio gear and much interest was created.

Watch G. S. Anchor and Co.'s window for notices about future meetings.

Particulars about our Club can be obtained from the Secretary, Rahob 0792, A. D. Nelson, 12 Ulster Street, Hamilton.

---

Handy Tool made from an Ordinary Match Box

---

February 1, 1945.

THE N.Z. RADIOGRAM

PEN FRIENDS WANTED

Rahob A392, Keith Howard, 4 Edith Street, West Cessnock, N.S.W. would like to correspond with Rahob A390, of Sydney, if he is willing.

Rahob 11608, T. F. Wildbore, Aptit North Island, N.Z., requires pen friends in Australia, interested in stamps, about 11-12 years of age.

ACKNOWLEDGMENTS
A photograph of the home of Rahob A146, of Melbourne, Australia.

A photograph of Rahob A433, of South Broken Hill, Australia.

A photograph of Rahob 12792, of Waiuta.

WINQUIZ ANSWERS.
(See page 8).

1. A 6. A
2. B 7. C
3. D 8. B
5. E 10. E

Library Donations

<table>
<thead>
<tr>
<th>Library No.</th>
<th>Donation, £ s. d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12817</td>
<td>10 0</td>
</tr>
<tr>
<td>11772</td>
<td>2 5</td>
</tr>
<tr>
<td>10062</td>
<td>4 0</td>
</tr>
<tr>
<td>10582</td>
<td>6 0</td>
</tr>
<tr>
<td>12094</td>
<td>8 0</td>
</tr>
<tr>
<td>10757</td>
<td>10 0</td>
</tr>
<tr>
<td>2988</td>
<td>12 6</td>
</tr>
<tr>
<td>6716</td>
<td>14 0</td>
</tr>
<tr>
<td>7726</td>
<td>16 0</td>
</tr>
<tr>
<td>11371</td>
<td>18 0</td>
</tr>
<tr>
<td>4808</td>
<td>2 18 8</td>
</tr>
</tbody>
</table>

Lamhouse Donation 2 18 8

Previously acknowledged 106 0 2

Total 111 17 6

Books purchased: £19/3/1

STAMPS

Thanks to the following Radios who have donated unused stamps to the Radio Hobbies Club's Collection: 10938, 12580, 12610.

OSRAM LAMPS

Most sizes and types of OSRAM LAMPS are available from the Lamhouse, but always ask for OSRAM for preference because OSRAM ensure brightest light and lightest light bill. All Osram Lamp types will be available soon after the end of the war.

TARMAG

TARMAG is a liquid preparation which you pour into the cells of your accumulators. The action of Tarmag is to dissolve the basic sulphate of lead crystals which get on the plates and prevent the normal chemical action of the battery.

TARMAG rejuvenates old batteries and makes new batteries last longer.

RA70 for 6-Volt Battery 2/9
RA70A for 12-Volt Battery 5/6

THE LAMHOUSE, 11 Manners Street, Wellington, C.1.
Rough-Riding Radios

The toughest of all pieces of radio equipment now engaged in fighting the war is the tank receiver. This brain of the tank, through which passes the instructions which enable it to take its part in complex actions, is a rugged brother of the amateur's equipment—compactness is the greatest virtue, but unlike it, that compactness must be joined with an ability to stand rough handling which was practically inconceivable to manufacturers of auto sets.

A demonstration was necessary to convince them. A police radio was installed in a tank and given a ride over rough terrain for just one mile. Then the remains were returned to the factory experts. After one glance at the wreck, they agreed that the Signal Corps' specifications were conservative. Not only were tubes broken, but a large number of the apparently solid soldered joints had come unloose, and even the coils were partly unwound. Rough handling is only one of the troubles; another is interference. To combat this, all tank radios use the principle of frequency modulation, which permits static-free and fairly clear conversation without the crew and from one tank to another. The problem is not so easy to solve, and much work is being done to find a way to overcome it. The grinders of gears, clanking of heavy tracks, and the deafening blasts of the guns are now the most insurmountable obstacle to easy communication.—“Radio Craft.”

New "FALCON-4"

(The attracive little receiver is a real war product, representing the experience of people faced with shortages, struggles and threats of invasion. Its design and construction embody several feature particularly interesting to American constructors.

The American experimenter can learn much from this European and Australasian colleagues who have been at war for four years. From Australia comes this five-band wave receiver, a set designed with the sole aim of reducing battery drain.

We imagine that we are facing a security, but the average Aussie thinks of us as sitting in clover. Batteries have been off scale for years in that country, and the radio magazines carry articles on “rolling your own.” Tubes cannot be obtained by the expedient of turning in old ones. They just don't exist. If one is needed to complete a layout, the would-be constructor advertises for it in the radio press, sometimes offering to swap some “unobtainable” component of his own for the desired type.

Thus an Australian set will be found to have the minimum in hard-to-get parts. Fancy French Design is as simple as it could be made, and components used are the fewest possible. The result is an attractive, easy-to-build receiver, the radio engineer experiences men who can still “put ‘em together” after four years of war.—Editor.

Most notable advance in battery tube technique during the past few years, the new 14-volt tubes represent an important step forward towards the ideal battery receiver design. Years ago 6 and 4-volt filaments gave way to 2-volt, and now designers have available a highly successful series of tubes requiring only 1.4 volts across the filament.

More important still, filament current has decreased in proportion, so that it is now possible to design a 4-tube receiver drawing a total filament current equal to that taken by a single tube several years ago, and with a total filament voltage only a fraction of that used in radios manufactured a few years ago.

"B" CONSUMPTION IMPROVED.

An equivalent advance has also been made on the "B" supply side. Receivers drawing up to 20 or 24 milliamps of 130 volts were the order of the day a few years ago. Today, corresponding performance can be had from a set drawing only 10 to 12 milliamps at 130 volts.

While this remarkable improvement in economy is largely due to advances made in tube design, part of the credit must go to the new type permanent magnet speakers. Sensitivity has been increased considerably, or in other words using a latest type permanent magnet dynamic speaker, considerably more volume is obtainable with a given output than from an equivalent type speaker of several years ago.

Receivers drawing up to 20 or 24 milliamps of 130 volts were the order of the day a few years ago. Today, corresponding performance can be had from a set drawing only 10 to 12 milliamps at 130 volts.

While this remarkable improvement in economy is largely due to advances made in tube design, part of the credit must go to the new type permanent magnet speakers. Sensitivity has been increased considerably, or in other words using a latest type permanent magnet dynamic speaker, considerably more volume is obtainable with a given output than from an equivalent type speaker of several years ago.

THE LAMPHOUSE, 11 Manners Street, Wellington, C.1.
The "Falcon Dual-Wave Four" is an amazing achievement with the new 1.4 volt tubes, high-gain coils and latest high-sensitivity speaker. A four-tube dual-wave receiver drawing 25 amperes "A" current at 1.4 volts, and approximately 10 mils, "B" current at 90 volts, it gives a performance comparable with that of earlier receivers with approximately double the "A" and "B" wattage.

USES READY-WOUND COIL UNIT.

The receiver uses a recent dual-wave coil unit and a pair of high-gain I.F. transformers (either air or iron-core types may be used). A 1AT6G is used as mixer-oscillator, and while this tube was designed primarily for broadcast operation, it works splendidly on the short waves as well.

Next follows one of the 1P5-4T multivane pentodes as I.F. amplifier, followed by a 115-G as diode detector and triode audio amplifier driving a 1Q5-G beam output pentode. This tube has characteristics broadly resembling those of the 1C5-G, but it operates with considerably less grid bias, and is therefore more sensitive. For those particularly interested in the "B" economy, the 1Q5-G has a further important advantage, in that it may be operated satisfactorily under over-loaded conditions, giving an appreciable reduction in "B" battery drain with serious increase in distortion.

The 1Q5-G has a 1.4 volt filament drawing 0.1 ampere. With 90 volts on both grids and screen, and a bias voltage of -4.5, the plate and screen currents are 9.15 and 1.6 mils, respectively. Load resistances are 8000 ohms, total harmonic distortion 7.5 per cent, power output 27 watt.

More than ample volume for domestic requirements can be obtained by using a good speaker with at least a six-inch cone. Constructors prepared to pay more can obtain even greater output with an 8- or 10-inch speaker of high sensitivity.

The circuit of the "Falcon Dual-Wave Four" is perhaps the simplest possible that could be developed while still incorporating every worthwhile modern feature. A simple and effective a.v.c. system has been included, operating on the 1AT7-G and the 115-G. A fixed tone control, consisting of a .003 mfd condenser, is in parallel with the plate to screen of the 1Q5-G has been included, though it would be a simple matter to incorporate a variable control if desired. However, as reproduction is very well balanced, the fixed control is actually all that is necessary.

The circuit is straightforward and with the constructional details given in the text, the average set constructor should have no difficulty in building this receiver.

Improvisation

(Continued from page 4)

This does not matter for such purposes as reaction condensers, bandspread condensers, etc.

As a guide, the following table may help to give some idea of the average values of ganges.

<table>
<thead>
<tr>
<th>Midget Condensers</th>
<th>Plate 1</th>
<th>Plate 2</th>
<th>Plate 3</th>
<th>Plate 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>0.00005</td>
<td>0.00005</td>
<td>0.00005</td>
<td>0.00005</td>
</tr>
<tr>
<td>Mfd</td>
<td>49</td>
<td>49</td>
<td>49</td>
<td>49</td>
</tr>
</tbody>
</table>

Standard size condensers.

<table>
<thead>
<tr>
<th>Plate 1</th>
<th>Plate 2</th>
<th>Plate 3</th>
<th>Plate 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Mfd</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Figures given are the total number of moving and fixed plates.

The following few hints should also be studied carefully, as they can be applied by nearly every experimenter. The values of many components are not critical. While it is necessary to use ganges and tuning coils of the correct values (all other coils) it is often possible to vary the values of other components. Thus bypass capacitors may vary from .02 to .5 mfd, if the exact value is not obtainable. The same applies to audio coupling condensers, but in all cases they must have the correct voltage rating and the polarity must be observed. Many electrolytic condensers are ruined by not observing the polarity and filter condensers have their life shortened by running the set with tubes removed. Do not alter the values of bias resistors or you will most likely ruin the tubes. Grid leak resistors, tone and volume controls, A.V.C. resistors and condensers can be varied over a fair range without doing any harm. And last but not least, treat all your material, including tubes, very carefully, so that there will be sufficient for every Radio to obtain his requirements.