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IMPROVED BASS FOR SMALL RADIOS

SMALL loudspeakers do not radiate efficiently at low frequencies. If one attempts to compensate for this deficiency by feeding greater low-frequency power to the speaker, the speaker will be driven to such an extent that it will introduce non-harmonic distortion.

The shock to the cone on reaching its limit of travel due to large signals will be translated into vibrations at speaker resonance. Because the cone will break into multiple modes of vibration, the radiation efficiency will be further lowered. The effect is that the speaker booms, not that there is greater low-frequency radiation.

SYNTHETIC BASS PRINCIPLE

It is not economically feasible in small receivers to use speakers that have flat response to low frequencies. The sizes of speaker and baffle are limited by the receiver dimensions, therefore poor low-frequency radiation is an inherent characteristic of small receivers and phonographs. Synthesised bass provides a solution.

What makes such a system possible is that the ear itself is a non-linear device introducing harmonics into the sound that it receives. Because of this characteristic of the ear, the aural effect of a low note can be produced by introducing into the ear the harmonics that the ear would generate itself if it were really receiving that low note. Physiologists have long known that a combination of odd harmonics of a low frequency give the impression to the hearing organs of the presence of that frequency even though the fundamental is itself absent. This characteristic of the ear is used by organists to play, in effect, notes that are lower than the ear can actually hear.

Applied to small radio receivers and phonograph amplifiers, the technique consists of introducing non-linearity into the output stage, but only at low frequencies. This non-linearity introduces odd harmonics, chiefly third, in place of the low-frequency note. The odd harmonics are efficiently radiated by the speaker and heard and interpreted by the ear as if they were the low note from which the harmonic series was originally derived.

In taking advantage of the ear's characteristic to produce the appearance of low-frequency reproduction through the loudspeaker, the system also augments the receiver's output characteristic to compensate for the changes in frequency response of the ear with volume level.

The ear's sensitivity for low tones at low volume is relatively less than its sensitivity for low tones at high volume. Thus in listening to low-level reproduction, to the ear the set appears to have

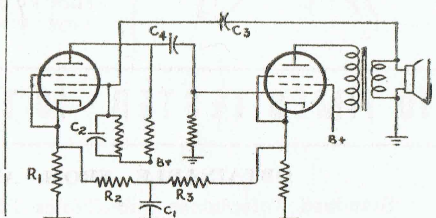

Fig. 1—Application of Synthetic Bass to the output of a typical table-model radio-phonograph, showing essential additions to the circuit.

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Improved Bass

(Continued from Page 1)

less bass output than at higher levels. Or, putting it another way, changing the volume—although it actually does not change the frequency response of the receiver—nevertheless gives the ear the impression that the frequency response has been changed. Nor is the effect limited to actual changes in receiver volume setting; quiet passages of music will be reproduced with apparently less bass than loud passages.

CIRCUIT

The circuit incorporates automatic increase and decrease of the amount of effective bass response for loud and soft passages, introducing relatively greater bass at low volume levels than at high, thereby counteracting the ear's loss in bass sensitivity at low levels.

The circuit is shown in Fig. 1. Negative feedback in the output through C_3, by lowering the dynamic output impedance of the circuit, damps speaker-cabinet resonance which would otherwise become annoying, noticeable with the increased bass response of the amplifier-speaker system.

Hum voltage from the positive high-voltage source is introduced on to the screen of the driver tube in such a polarity by the voltage divider C_2—C_3 as to counteract hum voltage on the plate, thereby lowering the hum signal. This hum-bucking circuit is especially necessary in a circuit whose function is to increase the apparent low-frequency response.

Third harmonic of the fundamental—necessary to give the aural effect of the fundamental—is produced by positive feedback through the network R_1—R_2—R_3—C_1. The action of the positive feedback can best be described in reference to the dynamic plate characteristic of Fig. 2. The tube is biased at the symmetrical mid-point of its characteristic. Positive feedback from a signal that has been affected by the tube's characteristic serves to emphasise the non-linearity of this characteristic. If however the signal is so small as not to be distorted in passing through the driver, there will be no increase in non-linearity.

The accentuation of the non-linearity of the characteristic is limited to low frequencies by making the positive feedback network a low-pass circuit. The extremely non-linear but still symmetrical characteristic produced at low frequencies introduces strong third harmonics of these low tones.

To attenuate the strong low-frequency fundamental which could overdrive the speaker, the plate-grid coupling capacitor C_4 is made smaller than usual. The ratio of C_1 to C_4 determines the shape of the apparent speaker response, especially the frequency of maximum apparent response.

ACOUSTIC EFFECT

The effect of the strong third harmonic in place of the fundamental is that, for a speaker which does not radiate low frequencies, acoustic output (taking into consideration all frequencies present in the output) is actually a rising response as frequency is reduced, thereby compensating for aural insensitivity at these low frequencies, instead of a rapidly falling response obtained if the speaker is required to radiate the fundamental. Acoustic output curves illustrating this bass synthesis and the volume-level bass compensation previously described are given in Fig. 3.—Reproduced from and by courtesy of "Electronics" of U.S.A.

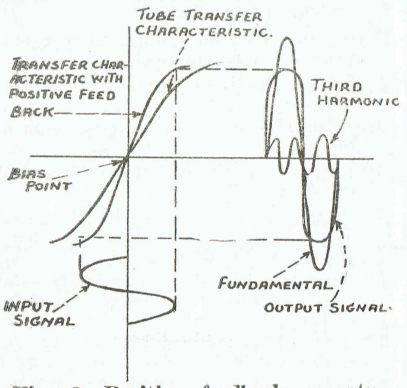

Fig. 2—Positive feedback accentuates non-linearity of the transfer characteristic, increasing generation of third harmonic necessary for aural appearance of bass response of small speakers.

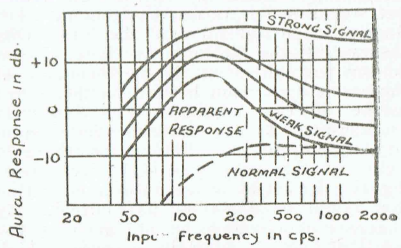

Fig. 3—Relative frequency-response curves indicate compensation for ear's change in sensitivity-frequency characteristic with intensity level and the aural appearance of notes below the radiation register of small speakers. Normal small-speaker response is shown by the dashed line: the solid lines indicate the apparent response using the synthesised bass arrangement.

RADIO OLYMPUS

(Contributed.)

Sir Ernest Fisk put forward an interesting but highly improbable suggestion recently, and, spurred with this idea, I went into a close conference with those two brilliant scientists, Professor Plinckensnurcher and Doctor Eustache Montmorency Suggers. The former had recently perfected his remarkable "age" oscillator, whilst the latter was responsible for that marvellous piece of apparatus, the "period" mixer. With an excess of zeal and my customary smooth diplomacy and tact, I managed to get these two eminent gentlemen interested in my scheme.

My argumentative slogan was: "What happens to the radio programmes after they have been squirted out into the air, and, if so, where do they eventually go?" They saw my point.

I followed up this shrewd question with the remark that the human voice must go somewhere also, and then suggested a mighty Bedlam somewhere in the planetary system. They saw this point also.

I then suggested an ultra sensitive superhet using the revolutionary units invented by the two scientists. They agreed to pool their resources and the result was a superhet which was able (we hoped) to pick up sounds uttered years ago. This is where the "age" oscillator did its stuff, and the "period" mixer was mainly responsible for converting the intelligence and dishing it up so that we would have no trouble in understanding what issued from the speaker.

Night after night we twiddled the knobs, but without tangible result. At one stage we thought we heard Byron discussing swimming with Leigh Hunt, but we missed it in our excitement. Dr. Suggers then put forward the interesting theory that the dielectric in the grid condenser was affecting the performance of the receiver, inasmuch that, as the power factor of the condenser was inversely proportional to the interelectrode capacity of the "age" oscillator tube, the grid swing of this tube was seriously throwing the 1st R.F. stage into a condition that could be described as neutral. By a series of changes he at last got the 1st R.F. stage going in reverse, which was just what we wanted. Prior to this he had the stage going in 1st, then 2nd, and finally in top "gear," with the result that we heard the results of the Melbourne Cups for '46, '47 and '48. (Note.—I'll pass on this information to anyone interested for a substantial monetary consideration.) If he had been able to produce a fourth forward speed, so to speak, I'd have had the result of the '49 Cup also.

However, with the R.F. stage behaving as it should, all went merrily, and in the interests of posterity I took notes of what we heard. It appears that broadcasting as we know it was not thought of, but their system consisted of perching Stentor on Mount Olympus and letting him give full tongue. Stentor was the equivalent of a short wave station, and thus he roared through our speaker with almost indecent heartiness. Entertainment was organised, regimented and dessicated exactly as in our age, and the following was what I noted: Stentor was R. max. The rest about 6 or 7.

7 p.m. "There's Profit in Pigs." Talk by Circe.

7.15 p.m. Hercules: "How to clean stables."

7.30 p.m. Hanneus (Dramatic Critic). "What's Clarkor Gableus got that I haven't got?"

7.45 p.m. "Solving Puzzles." Talk by Œdipus, of the Hellenic Taxation Department.

7.55 p.m. Propaganda from the Home Front. "How Hercules slew the Hydra that wouldn't wash its fourteen ears."

8 p.m. Commentary on the Centaur races, including a description of the special running race between Atalanta and Meilanion.

8.30 p.m. Orpheus Trio. Orpheus (lyre); Arion (harp); Pan (pipes).

8.45 p.m. The Corybantes Orchestra.

9 p.m. Bacchus: "Hints on putting a kick into homebrew." Topical talk.

9.30 p.m. Vulcan, dramatic monologue —"The Blacksmith."

9.40 p.m. Charon: Song, "River stay away from my mausoleum."

9.45 p.m. Talk by Psyche, "What the plumber saw."

10 p.m. Hermes and Argus, comedy duo.

10.15 p.m. Talk by Pilot Officer Bellerophon, "Flying for Everyone."

10.30 p.m. "Who Stole the Trident?" Mystery play, featuring Detective-Inspector Nemesis.

10.45 p.m. "How to make wooden toys." Talk by Ulysses and Helen of Troy.

11 p.m. Eros: Song, "The only girl in the world."

11.5 to midnight. The Bacchantes Swing Band. Vocal refrains by Niobe, Helios and Phaeton.

The instrument now began to act in a queer fashion, as we heard a disjointed

(Continued on Page 28)

WATCH YOUR BATTERIES

SIMPLE AIDS TO GOOD RECEPTION

It is a pity that country listeners, who need their receivers most, should have to use sets requiring the most attention. Even the best battery set needs intelligent handling for the best results.

Fortunately the things the battery set owner must remember are commonsense precautions which probably will be obvious to him once they are pointed out. We propose here to outline some of the things the country man should know if he is to get the best possible results from his radio. We are not concerned for the moment with battery set faults —we will commence by assuming the receiver is in perfect order.

The chief concern of the battery set owner is, of course, the batteries. These are the source of the set's power, and the set cannot be expected to give results unless the right batteries are connected in the right way.

The usual type of battery receiver has three batteries, each with a different purpose.

The first of these we will consider to be the "A" battery, or filament lighting battery.

As the accumulator is probably the most often used, we will consider it.

CHARGING, THE SECRET

The correct charging rate of an accumulator is almost the whole secret of long and useful life. Undercharging will simply take a long time. Overcharging is quicker, but the battery, sooner or later, will begin to fall to pieces under this heavy treatment.

The more the charging rate exceeds the maker's specification, the quicker will the battery be spoiled.

So don't drop your accumulator in the nearest garage to be charged, unless you are sure it can be charged safely at the same rate as a big car battery. If it is itself a big one, of at least 100 amp. hours, it may not be harmful to charge it thus.

Generally, one is safe in reckoning a charging rate equal to 1-15th of the battery's capacity. Thus, a 60 amp. hour battery could be charged safely at 4 amps.

The voltage rating has nothing to do with the charging rate. It is the battery's capacity which determines this.

Always look for the safe rate, as marked on your battery, and make sure it isn't exceeded.

WHEN TO CHARGE

The right time to charge an accumulator is just before it becomes fully discharged. Never allow it to run to the last gasp. This might give you a few extra hours, but it is very bad for the battery.

Always keep a hydrometer near by, and always when it registers nearly discharged, send the battery away without delay.

Keep the level in the accumulator so that the plates are always well covered.

And don't look to see with a match. The accumulator will give off hydrogen, and it might easily pop in your face if the match comes too near the filler hole.

"B" BATTERIES

The most expensive of the three batteries is the "B" battery. This is generally made up of three 45-volt units connected in series—that is, with the positive terminal of one connected to the negative terminal of the next.

Many people have the idea that in advising the bigger and more expensive type of "B" battery we are in league with the battery makers! This, of course, is simply due to lack of understanding.

It is far more economical to use the larger sizes of "B" battery if the set has a consumption of more than about 8 mills.

The performance of any Battery Receiver can be made or marred by its "B" Supply. A little care and thought when selecting "B" Batteries will be amply repaid by the service they will give.

The selection of "B" batteries should be determined by the type, number of valves in use, and before purchasing batteries, the user should ascertain the total "B" Current to be drawn, or, if this cannot be done, state, when ordering, the number and types of the valves in use. The order can then be handled intelligently, and the best type of batteries forwarded.

It is not economy to buy Light Duty Batteries for a large set drawing heavy current, and, by the same rule, it is not advisable to use Heavy Duty Batteries on a small receiver.

CONNECTION

Never connect old and new batteries together to make up the voltage. As a "B" battery wears out its resistance increases, and a high resistance in the power supply is a bad thing.

It will prevent the maximum current from being passed through the chain of

(Continued on page 8).

SMALL ADVERTISEMENTS

An advertisement in the Radiogram will quickly dispose of your surplus radio parts. Hard to obtain goods are often brought to light through a small Radiogram advertisement. Advertising on this page costs 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" or "Lamphouse" cannot be accepted. Address instructions to "The Radiogram," 11 Manners Street, Wellington, C.1.

FOR SALE—Radio Parts, must sell. A. Dick, Miro St., Ohakune.

FOR SALE—Hiker's One, New Batteries, Earphones. G. Southee, Walton, Rotorua Line.

FOR SALE—Hikers One, with phones, new batteries, 45/-. Write G. Smythe, 515 Gladstone Rd., Gisborne.

FOR SALE—Hiker's Two, complete metal chassis, also quantity radio parts. J. Norris, Grey St., Whangarei.

FOR SALE—National B Eliminator, 45-135 volts variable, new condition, £4. S. Day, 93 Wellesley Rd., Napier.

FOR SALE—Hikers Amplifier, 50/-; a One Valve Set, four pound, phones, £1. Maurice Tutton, 75 Hassall St., Timaru.

FOR SALE—One 10in. Speaker, 350V. field, push-pull Transformer, rattles; one 3-Gang Condenser, clumsy, 80, 42, good. M. Claridge, Surrey St., Hawera.

FOR SALE—Hikers Two, neat, complete with 8in. Speaker, no batteries, £5. C. Howes, 33 Great North Road, Newton, Auckland.

FOR SALE—Valves 45, 33, 6V6G, 6C5G, 80, 7/6 each. Kodagraph practice Set, 15/6. I. Barnett, Motukarara, via Christchurch.

FOR SALE — Hiker's One, complete, with or without headphones. Wanted to Buy, Used N.Z. Peace Stamps. Particulars W. Chee, Kaikoura.

FOR SALE—Radio Parts, Valves, Resistors, Condensers, etc. Send for list, nothing but the best. Sutherland, 29 Domain Drive, Hamilton.

FOR SALE—Philip's Trickle Charger (.15 amps) with change-over Switch. Good condition. 30/-. Denholm, 7 Patna Street, Wellington, N.4.

FOR SALE—1 Feeler Gauge to measure from 1½ to 25 thousandths, 10/-; 1 3-gang Condenser, 15/-; another, 10/-. N. Finch, Kaihuiu, via Hokitika.

FOR SALE—Hiker's One, in Cabinet, complete with valve, batteries and phones, £3/15/- Valves, 1F4, 9/-; 1H4G, 6/-. W. Ireland, Goodwood, Otago.

FOR SALE—Hiker's Two, complete with 'phones and batteries, good condition, about £3—£4. K. H. F. Wilson, 62 Sarsfield St., Herne Bay, Auckland, W.1.

FOR SALE—2-Valve Receiver, 49 1D4 Valves, new 45 volt battery and headphones, only £4. Morse Lamp, Tripod, Batteries, and key in case, 30/-. Oscillator, keys, buzzers, etc. Send for list. S. Allen, 20 Sheridan St., Auckland, C.1.

FOR SALE—One 4 Gang, one 3 Gang Variable Condenser; both .0005 mfd.; 4-gang, £1, 3-gang, 15/-. Also, set of 3 shielded coils for .0005 condenser, 10/-. W. E. Armstrong, Allen Street, Morrinsville.

FOR SALE—2-Valve Octal Hiker's, almost new, includes Broadcast, 2 Shortwave Coils, Valves, Batteries, Horn Speaker and Cabinet, £5/17/-. Also Quantity used components. Particulars A. Elton, 59 Rintoul St., Wellington, S.1. Phone 25-819.

FOR SALE—Valves, 80, 24A, 3 224's, all used, and 1 1A7GT, as new; 1 4-gang Condenser, .00035; 2 wet 8 mfd. Electrolytic Condensers; 1 8½in. Electro Dynamic Speaker, or will exchange for PM. Dynamic type. T. Corbett, 12 Dartmoor Ave., New Plymouth.

FOR SALE—Nilson and Hornung's "Practical Radio Communication," Gheradi's "Radio Physics Course," Drake's "Radio and Electronics Cyclopaedia," all in new condition, 30/- each. Latest "Stark De Luxe Tube Tester," guaranteed new condition, tests all latest types of valves, £25. L. Stewart, Moorhouse St., Morrinsville.

FOR SALE—12A7, 10/-; 6F6, 6/-; 6SJ7, 6/-; 500,000 Ω potentiometer, 3/-; .00035 Tuning Condenser, 9/-; 30782 Tuning Condenser, 5/-; Aerial Eliminator, 5/-; 4000Ω Phones, £1; Elect. Hikers Transformer, £1/10/-; Radio Instruction Course and Radio Circuits, 1/3 each; A.R.R.L. Handbook, 1944 Edition, 7/6; Hornby Elect. Train Set and Trans., £12. A. T. Price, 11 Sturges Ave., Otahuhu, Auckland, SE7.

SMALL ADVERTISEMENTS.—Continued.

FOR SALE—Philco 8-Valve All-Wave Radio, just overhauled. 3 "B" Batteries and 2 wet Batteries; £25. B. Peterson, Warepa, Sth. Otago.

FOR SALE—Two 1N5G Valves and 1 1H5G. All new. 14/- each. B. Peterson, Warepa, Sth. Otago.

FOR SALE—Electric Gramophone Motor Pickup Unit, Induction, exceptional condition, £12/10/-; R.C.A. Console 6v. Distance Getter, £9/10/-; Amplifier, A.C. in attractive Du-Lux Metal Cabinet, with separate Permag. Speaker, 25ft. Extension, £12; Table Gramophone, fitted magnetic pick-up, £6/10/-; "Columbia" Portable, £6; Portable and New Crystal Pick-up, £7/10/-; "Columbus" 5v. Shortwave Broadcast, Electric, £18/10/-. BARGAINS. Money-back guarantee. Rahob Ramsey, Torbay Post Office, Auckland.

10 MFD. 450 volt Electrolytic Condensers with wire ends, Cat. No. RC559, 3/6 each. The Lamphouse, 11 Manners St., Wellington.

WANTED TO SELL—One 49 Valve, second hand. Apply R. G. Barker, Opapa.

LOW VOLTAGE LAMPS NOW AVAILABLE! 6 volt, 12 volt, 25 volt, 32 volt, 50 volt, and 110 volt, in practically all popular sizes. The Lamphouse, 11 Manners St., Wellington.

10-WATT W.W. RESISTORS—I.R.C. Wire-wound 10 watt Resistors:—

Cat. No.			
RR30	....	200 ohm ..	3/4 each
RR31	....	250 ohm ..	3/4 each
RR32	....	300 ohm ..	3/4 each
RR33	....	400 ohm ..	3/4 each
RR34	....	500 ohm ..	3/4 each
RR35	....	750 ohm ..	3/4 each
RR36	....	1,000 ohm ..	3/4 each

—The Lamphouse, 11 Manners St., Wn.

2-GANG CONDENSERS, 14/- each; 3-gang Condensers, 16/- each. The Lamphouse, 11 Manners St., Wellington.

CAN ANY RAHOB supply instructions how to alter Dodge Four 12-volt Starter Generator to be used as a Spot Welder. H. S. Arnott, Tasman-Upper Moutere, Nelson.

.004 MICA FIXED CONDENSERS at 2/- each. The Lamphouse, 11 Manners Street, Wellington.

PALEC 0/1 3in. Moving Coil Meters, ONLY 75/- each. The Lamphouse, 11 Manners Street, Wellington.

WANTED—Pifco De Luxe Rotameter in good order. D. A. Ross, Moa Flat, Heriot R.D.

WANTED—Cone for Wright De Coster 12 Permag. Speaker.—Claridge, Surrey St., Hawera.

WANTED — Pair Crystal Headphones, must be good. Sutherland, 29 Domain Drive, Hamilton.

WANTED—Radio for car, 6-volt system, must be in good working order. M. Savage, Tapawera, Nelson.

DXERS! Send 6/6 for badge, certificate, 12 months TUNE IN, to Secretary N.Z. DX. RA. Inc., 20 Marion Street, C2, Wellington.

FREE QUOTATIONS for supplying Power Transformers and Chokes to order, any size. Write for particulars, sending stamped, addressed envelope to Walker & Smith, Radio and Sound Specialists, Box 221, Wanganui.

VICTORY SENIOR AMPLIFIERS with pre-amp. stage and Dual Channel at £15. The Lamphouse, 11 Manners Street, Wellington.

LOCK-UP METAL TOOL BOXES with removable tray, priced at 40/- The Lamphouse, 11 Manners St., Wellington.

2¾in. CATHODE RAY TUBES, priced at £5/16/-. Sockets for same at 4/3. The Lamphouse, 11 Manners St., Wgtn.

TRIMM HEADPHONES (U.S.A.)—Priced at 22/6 per pair. The Lamphouse, 11 Manners Street, Wellington.

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23 AITKEN STREET, WELLINGTON

Batteries

(Continued from page 5)

batteries, and may cause coupling effects between circuits to set up oscillation audio howls.

Once a 45-volt battery drops, when tested on load with a high-resistance meter, to less than about 37 volts, its end is near. Use it till you are tired of the poor results if you like, but, when renewing, make a clean sweep.

LOWER VOLTAGE

Sometimes fairly good reception may be had from a set using only 90 volts of "B" battery instead of the 135 volts.

Distance, tone and volume will suffer, however.

Plenty of people ask us whether such operation is advisable. If the above points are borne in mind, there is, as a rule, nothing against it, and the set could scarcely be harmed.

THE "C" BATTERY

Which brings us to the matter of the "C" battery.

Its purpose is quite different from that of the others. It doesn't have to supply power. It is required simply to create a potential difference between the grids of the biased valves and the "B" minus or earth.

As there is no grid current flowing, there is no discharge from the battery. It will last, therefore, until it just dries up.

This may be a matter of months, or years. One "C" battery will probably outlast several "B" batteries. But don't forget to check it up every few months for all that. It is a very important item in your set's equipment.

As a rule, if you cannot light a torch bulb quite well from the "C" battery, it can safely be considered as worn out.

EFFECT ON "B" BATTERIES

If the bias applied to the set is not enough, excessive "B" battery current is almost a certainty. This means that the "B" batteries will run down much more quickly than they should.

George: "I only know of one man who blew his brains out and lived."

Rosemary: "How did he live?"

George: "He worked for the Government."

* * *

First Showman: "I believe you've made a fortune out of your flea circus."

Second Showman: "Rather, and I started from scratch."

INCREASING CONDENSER CAPACITY

To increase the capacity of a Variable Condenser, cut out a number of pieces of mica the same size as the rotor plates of the condenser, and glue one sheet of mica to each side of each rotor plate. Doing this increases both the minimum and the maximum capacity.—Rahob 3675.

SERVICE SANS INSTRUMENTS

PRACTICAL METHODS OF TRACKING DOWN TROUBLE WITHOUT EQUIPMENT

By VIRGIL R. SEARS.

(Reprinted by kind permission of "Radio Craft," U.S.A.)

The writer has seen many articles written on how to service radio receivers with the aid of various test equipment, but he cannot recall having read anything on servicing **without the use of any equipment**. The just-concluded struggle has taught us that it is sometimes possible and even necessary to work with little or no apparatus. There will be some, no doubt, who will look askance at these methods and denounce them as "screw driver" tactics. In such cases, the author will defend himself to the last drop of his ink. To apply what follows, one must know his radio theory and be conversant with radio circuits in general.

Only those defects which are most likely to occur will be taken up in what follows.

Let us assume for sake of illustration that you are confronted with a "dead" receiver; the trouble could be any place between antenna post and voice coil. Further, assume that the circuit hook-up conforms to that shown in Fig. 1. The only service equipment available for our work is a screwdriver. A signal generator may be needed when it is found that the owner decided his set had a few loose screws that needed tightening up—the screws being located on I.F. transformers. For the present, assume that the alignment screws have not been molested.

The first thing to suspect is of course the tubes. Since we have no tube-tester, we must devise some system to determine if the tubes are in working order. Plug the receiver into the A.C. receptacle. The tubes should light up. It will be impossible to see whether or not they light if they are of the metal type. In such a case, try substituting their glass equivalent or a reasonable facsimile. In other words, a 6K6G or a 6V6G may be used in place of a 6F6, 6L6, etc., for test purposes. Any tube that doesn't light should be replaced, of course.

During the plug-in operation stand ready to unplug the set should the rectifier tube (or any other tube for that matter) show signs of colour. Suppose upon turning the receiver on, the plates of the rectifier get red hot. This would indicate a short-circuit existed from point "X" to ground. An inspection of Fig. 1 reveals that C_1 would cause this condition if it were shorted. If it is at fault, the receiver should become operative when it is disconnected from the circuit; however, a loud hum will result. Should the filter choke, CH, become shorted the plates of the 5Y3 may show colour after a few minutes of operation. It is doubtful whether a short at C_2 would overload the rectifier to such an extent that it would show signs of colour. In this case CH would heat up to a dangerous degree within a very short time. In making all of these tests do not leave the receiver on too long at one time. Work fast and with care. A short at C_2 may be found by shorting momentarily from point X to ground and repeating at point Y. If we get a strong spark at X but none at Y, disconnect C_2. If still no spark, suspect an open filter choke. Disconnect the rectifier at point Z. From this we can ascertain whether or not CH is open. We should get a strong spark each side of CH providing that it is not open.

Some insist that shorting the high voltage to ground as pointed out above is detrimental to the receiver. The writer is not of this opinion, for he has done this many times without any ill

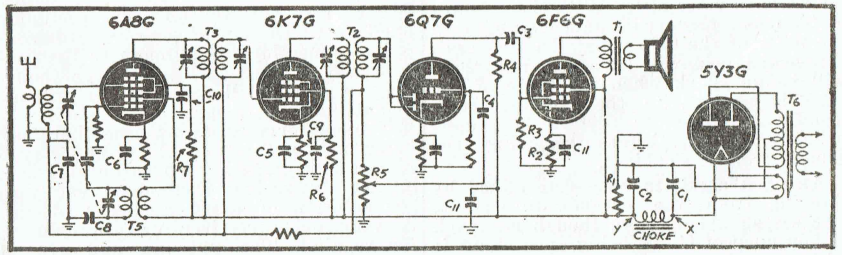


Fig. 1—This schematic is typical of many used in moderate-priced radios. Slightly different techniques will work on any radio receiver.

effects whatsoever. However, it should be made plain that this should be done only momentarily.

In our set-up, an open at R_1 would not be evident without test equipment. The receiver would still perform. In some receivers this resistor or a part of it furnishes bias for the set. Should an open develop in this case, the receiver would be inoperative. If we suspect the resistor of being open, disconnect it at point Z and short the end of the resistor to point Z; a spark should be seen. The spark ordinarily will not be very large.

The writer has never seen a shorted resistor at the point of R_1. If it were found to be shorted, it may be found by the same procedure as outlined above for a short at C_2. If C_1 and C_2 should lose part of their capacity, a hum will develop, the magnitude of which will depend upon the amount of capacity lost. In some cases severe distortion and oscillation may develop.

One word of caution before leaving the rectifier section—never replace a dead rectifier tube without questioning the condition of C_1, C_2 and CH. Such practice will prove expensive in terms of rectifier tubes.

Now that the rectifier section is not at fault, let us proceed to the power output stage. This stage is marked 6F6G in Fig. 1.

We will start at the speaker and work backward to the antenna. The first thing to confront us is the voice coil of the speaker. Should no sound whatsoever come from the speaker the fault is either in the high voltage supply (no voltage) or the speaker is defective. The latter includes the output transformer.

An open voice coil can usually be found if it is the only defect by tuning the receiver to a strong station and advancing the volume control. The lamination of the output transformer will vibrate and the station may be heard faintly when the ear is placed near the transformer. Care should be taken not to prolong this test as the insulation on the output transformer may puncture. If the secondary side of the output transformer is open, it can be found by the same procedure as outlined above for an open voice coil. With the primary of T_1 open, there will be no voltage on the plate of the 6F6 tube. In this case, the screen grid will turn red, and there will be no spark when the plate of the tube is shorted to the chassis. It is usually possible to detect an open primary of T_1 before removing the chassis from the cabinet.

An open at R_2 may be determined by shorting from the cathode to chassis. The set should operate, though not well. If you suspect C_{11} of being open shunt it with a good condenser. If it is shorted distortion would develop and shunting it with a good condenser would not clear up the trouble. If R_3 opens, the grid would become so negative in a short period of time that it would block.

From an inspection of the diagram, it will be obvious that a positive grid would result should C_3 develop a short circuit. The set would develop a case of severe distortion or may fail to perform altogether. One case the writer recalls was a receiver that would play for about 30 seconds and die away. It was found that the control grid of the output tube was several volts positive. Observation showed the grid was red hot.

If all output stage parts are in order we should hear a faint click if the grid of the 6F6 tube is touched with a screwdriver. Next touch the grid of the 6Q7; in this case the sound in the speaker should be louder. If we get no sound we must stop and search for the trouble in this stage. Try a new tube. Short from plate to chassis for a second. The voltage here will not be very high, as R_4 is usually large. Should this portion be in order, advance the volume control and touch the diode plates with your screwdriver. A click of about the same volume as from the grid should be heard.

We may expedite matters a little by placing our screwdriver on the grid of the 6A8 mixer tube. If no sound here, touch the plate. No sound, touch the grid of the 6K7 I.F. tube and hence to the plate of the 6K7. Suppose we get a sound by touching the grid of the 6K7 but a similar action on the plate of the 6A8 tube yields no response. The trouble will likely be in the input I.F. transformer, T_3. If the primary is open, there will be no voltage on the plate of the 6A8.

A shorted trimmer on either primary or secondary would put the transformer out of action. You will have to use your own ingenuity in order to find whether or not they are shorted, once the trouble is isolated to the transformer. Suppose a noise is heard when the antenna post is touched yet the receiver will not respond to a station signal. Now, what could be the trouble? This condition is likely due to the fact that the local oscillator is not functioning. Check for voltage on the oscillator anode with the tip of your screwdriver.

By connecting the antenna to the control grid of the 6A8 the receiver should play to some small degree if the primary of antenna coil is open.

The author recalls one case that may bring out the fact that the ordinary type of test instruments, such as multimeters, do not always lend themselves readily to the solution of tough service problems. A very noisy receiver was brought in for repairs. The antenna and ground terminals were tied together to help determine if the noise was originating within the set or being picked up from the outside. It was found to be coming from within the set. Upon switching from the broadcast band to the 25 metre band the noise disappeared. This indicated bad broadcast coils. A little theorizing isolated the oscillator coil for the broadcast band as being at fault. A visual inspection was made to see if it was arcing, but with no results. The anode of the mixer tube was shorted momentarily to the chassis, upon which the coil opened. It was replaced with good results.

Many other defects can and do occur which, of course, cannot be covered in an article of this length. A few will be mentioned.

1. Rubbing condenser plates on tuning assembly.
2. Noisy volume and tone control.
3. Oscillations due to open filter condensers, by-pass condensers, loose shields, grid wire near plate lead in R.F. stages, floating metal tube shield (tube housing), etc.
4. Hum due to open or partly open filter condensers.
5. Motor boating (audio oscillation) due to open filter condensers.
6. Failure of A.C.-D.C. sets to light up because of opening tube filament or an open panel lamp.

The author has used a simple receiver for sake of illustration. The same line of reasoning, along with a sound knowledge of radio theory, may be applied to any receiver. Many defects require the use of test instruments to repair; this is especially true where the intermediate frequency alignment has been molested.

HOW IT WORKS

PRIMARY AND SECONDARY CELLS

(H. VERNON WHEATLEY)

Before discussing cells, I feel it would be appropriate to introduce a couple of kindred subjects, namely, the means of producing current, and, of course, our old friends (or enemies, as the case may be), volts, amperes and resistance.

Electro motive force is another name for the volt and is designated by the letter E.

The ampere is known as I and resistance as R. A definition of the International Ampere is:—"That unvarying current which when passed through a saturated solution of silver nitrate ($AGNO_3$) will deposit silver at the rate of .001118 grammes per second."

An ohm, incidentally, is that resistance which will cause one ampere to flow at a potential difference of one volt.

To find the value of, say, a current, we divide the known volts by the known resistance. In other words, $I = \frac{E}{R}$.

The following diagram will be of assistance to some readers.

To discover the value of either volts, amps or resistance, simply obscure the letter which indicates your choice.

Therefore, by the diagram, $R = \frac{E}{I}$, $I = \frac{E}{R}$ and $E = RI$.

Watts are discovered by multiplying volts by amps. $W = EI$.

Current may be obtained by means of four methods.

1. Chemical means: Wet and dry batteries. Chemical energy transforms into electrical energy.

2. Thermo-electric, attained by heating the junction of two dissimilar metals. The greater the heat, the greater the current.

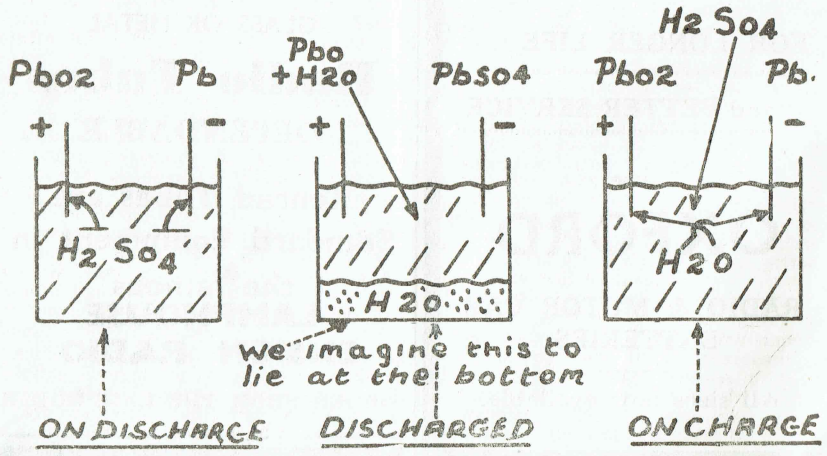
3. Frictional. By using mechanical energy to cause friction—i.e., rubbing dry ebonite with dry flannel.

4. Electro-magnetic. The potential energy stored in a magnetic field may be combined with some kinetic energy in such a manner that some of the kinetic energy is transformed into electrical energy.

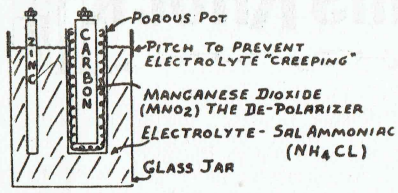
Well, to start on the original subject, there are two main types of cell. The primary cell is one that cannot be charged, or a dry battery. A secondary cell, or wet battery, may be charged.

A typical wet battery, or to give it its correct name, a lead acid accumulator, has a number of lead plates and lead oxide plates in a dilute sulphuric acid solution (H_2SO_4).

The three diagrams illustrated below show what happens during the three cycles of the cell's action.



The primary cell may be found in your torch and radio dry battery. It is simply a dry version of the Leclanche cell depicted below.



Your torch battery is the same as this, only the zinc rod is dispensed with, and a zinc outer casing is used. The carbon rod is enclosed in a cotton sac containing the manganese dioxide, and the electrolyte is in the form of a gelatine paste.

The inert type is exactly of the same construction, only the gelatinous electrolyte is dry. Water is added through a tightly-stoppered vent and the battery becomes ready for use in a few hours. The advantage of the inert type is that it can be stored for years in a dry place, and upon the addition of water will deliver its full life.

Another secondary cell worthy of mention, but not in popular use, is the Alkaline cell. It utilises a nickel oxide plate for positive and an iron plate for negative. The electrolyte is caustic potash. A comparative table may prove of interest.

The alkaline cell discharges in a straight voltage drop.

To close this discussion, I would like to mention that there are three types of current, and three effects.

1. Conduction current, where electrons move to adjoining atoms.

2. Convection current, where electrons themselves flow. An excellent illustration of this is a neon sign.

3. Displacement current. Is an oscillation of the electron orbits about their protons.

The effects are:—(1) Heating.
(2) Magnetic.
(3) Chemical.

In conclusion, do you know which way current flows?

No one does, but the accepted rule is that it flows from positive to negative.

Comparison Factor.	Lead Cell.	Alkaline Cell.
Average voltage	2v.	1.2v.
Charging volts	2.4v. per cell	1.7v. per cell.
Amp. hour efficiency ..	85–90 %	75–80 %
Working hour efficiency	70–75 %	60–75 %
Internal resistance ..	Low	Higher
Cost	High, compared with other sources of supply.	Even higher.
Life	About 1,100 to 1,300 charges and discharges.	About 5 years.
Strength	Needs careful handling.	Stands all abuses.
Weight and space	About the same for both for the same energy output.	

Re Rahob 13934's suggestion in the March "Radiogram," I am entirely in support of his suggestion of a small transceiver, as I am sure that many members would appreciate the constructional details of such a set to be published in the "Radiogram."—Rahob 14691.

I am writing to express my appreciation of the Club services and aims. I have only been a member for about one year, but have seen the work of your organisation in many fields, and I am proud to be a member. You may therefore take anything I may say as constructive criticism. Firstly, with respect to the "Radiogram." Its size is a great drawback. The "Radio and Hobbies" which I take is the Australian equivalent, is infinitely larger and covers a greater field for 6d. in Australia. It usually consists of about 44 pages of about 6 x 10, covering science. This is how it works: Aircraft and model planes, concise news of the world of science, 15 pages of theory and practice, the rest consisting of Kinks, D.X., New Record release, and advts. I would like to see the "Radiogram" increase in size. The "Lamphouse Circuit Book" and Annual are excellent. I have never regretted receiving them.

I am at present a University student in the faculty of engineering. Most of my spare time at home is spent at station 4GR, whose transmitter is at Drayton, Qld. I have quite a few hours to my credit. 4GR Transmitter is 750 watts, Class B plate modulated using a vertical tubular steel antenna, situated on the flat of the top of St. Matthew's Hill, Drayton, about 100 yards from the old corroboree site of the blacks. 4GR is the oldest commercial station in Queensland and one of the oldest in Australia. It was opened in August, 1925, and has been serving the Darling Downs and surrounding districts ever since. It operates on weekdays and Saturdays from 6.30 a.m. to 10.30 p.m., and on Sundays from 8.30 a.m. to 10 p.m. The station is thus on top of the Dividing Range, with studios in Toowoomba. Reception here is good. I am now listening to 2YA Wellington, which is coming through with the strength of a local.

The recent sunspots had quaint effects on reception in these parts. Stations unheard of in the daytime before cropped up all over the dial. I am including a few paper clippings taken from the "Brisbane Courier" during the sunspot cycle. Spot, incidentally, was easily visible all through the day.

I am sorry to be ending this letter with a growl, but my December "Radiogram" has not yet arrived, and as I wish to bind my year I would be pleased if you could supply me with a copy. Wishing you all success.—Rahob A817.

* * *

[Apologies for missing your December issue. This has now been posted.—Ed.]

I am very sorry my subscription is late. I hope it is not too late for the March issue of the "Radiogram." It is certainly an excellent magazine, and I am sure someone goes to a great deal of trouble to edit it.—Rahob 10981.

I think I am getting my 6/- worth O.K., but I thought the "Radiogram" could be improved a lot, and for goodness sake keep photography out of it. Radio and photography are two different hobbies.—Rahob 12898.

Now that 0-1 M.A. Meters are in supply, could you not print in the "Radiogram" the circuit and other particulars of a good Valve Tester and other test equipment?—Rahob 11011.

* * *

[Your wish is our command. See page 24 of this issue.—Ed.]

The Data Book is a great little book, simply a mine of information, and mine is in use continually. I also think the puzzle corner a great idea, and have obtained several tips from it.—Rahob 11955.

I have built the 3 Valve A.C. Set for beginners described in the 1945 Annual by Mr. F. H. Adams, and it looks like he sure knows his stuff. As I write this letter I am listening to this set, and it's really wonderful, considering its simplicity and number of parts. I have made coils for this set with the same connections as my Hikers Two, and the short wave coil is the ideal one for amateur 80 metre band on the 3 valve A.C. job. This might be an idea for other Rahobs who have built this set. Well, that's all for now, so just post that aerial and I'll be satisfied.—Rahob 12317.

We have had a letter from Rahob 10732 telling us of the success he has had with his Hikers Two Receiver. He made up a special coil for the Amateur Band consisting of 8 turns aerial, 20 turns grid and 11 turns reaction winding and he logged something like 40 different "Hams," and also has heard American and Australian stations.

The M.A. Meter and other goods arrived in first-class order. I thank you for your prompt attention to my order, and I am enclosing receipt for balance of money returned from same. I also congratulate you on the Lamphouse Data Book. It is certainly chock full of charts, tables, etc., and it is a very handy book to have. Thanking you once again.—Rahob 3340.

In the January Postman's Knock I see that Rahob A639 suggests to have a "Picture for the Month" competition. Well, I strongly disagree with him. Why have Radio magazines catering for photography when you will never find photograhy magazines catering for Radio? Let the Rahob photographers have a magazine of their own. As Rahob 13994 says, "Give us a few more circuits." I think that Rahob 12983's suggestion is a very good one, and also Rahob 6328.—Rahob 14658.

I wish to endorse the opinion of Rahob 13994 in the February issue of the "Radiogram," and I must say I heartily endorse his remarks re the photography and crossword puzzles. The "Radiogram" seems to be including more and more outside material, and what Radio matter is printed in it appears to be gleaned from back numbers of the Lamphouse Annuals, not to mention the cheap forms of advertising or rather testimonials which fill Postman's Knock. Granted that you receive many letters praising the Club and being pleased about the badge, etc., but we don't want to read all about it. After all, it's a Radio Magazine, not a testimonial page.

If this letter does appear in Postman's Knock, I think the majority of Rahobs will agree with me, so how about righting the ship and giving us something worth while. I'm sure many of us would pay the extra price to secure a good magazine, and I suggest you run more pages such as "Transmitters and Transmitting," also pages on Servicing, Interesting Experiments, etc.

We have seen many of the midget 4-5 valve sets, so how about an article on them? Also the principles of Radio-controlled Model Boats, etc. I quote boats just as an example, as many radio-controlled experiments could be made with other things.

In closing, I would say I am not "thanking you sincerely for the badge," etc., as other letters run. I joined the Radio Hobbies Club to learn about Radio, not photography, etc. Go to it. —Rahob 13221.

ELECTRONIC MARVELS

ExGovernor Charles Edison, of New Jersey, has his father's love of a joke. The inventor's distinguished son is an M.I.T. graduate and knows his way around in electrical and electronic matters, as might be surmised. Recently, after listening to an amateur electronics enthusiast become eloquent about post-war electronic marvels, Gov. Edison asked whether the spell-binder had yet witnessed a demonstration of "the electromagnetic ray that can stop an automobile." "No, I've heard about such a ray," replied the electronic prophet, "but I didn't know it was yet practical." "Well, jump into my car and come down to our laboratory and I'll show you."

As the car approached the main street of Orange, N.J., the traffic signal turned red, and the Governor's chauffeur put on the brakes, bringing the car to a grinding stop. Pointing through the windshield at the red traffic light, Gov. Edison chuckled: "See, just as I told you; there's the ray that stops automobiles—and it is thoroughly practical, too!" — From "Electronic Industries," New York.

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Non-Inductive Condensers with wire ends.

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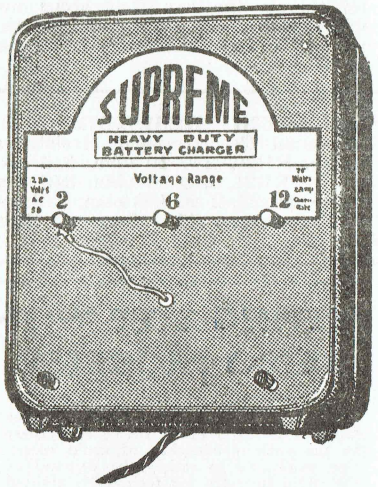
SUPREME BATTERY CHARGERS



Heavy duty type Battery Chargers. For operation from 230 Volt A.C. mains. Current consumption approximately 75 Watts. Will charge 2, 6, or 12 Volt Batteries at 2 amps. Size 9in. x 10½in. x 4in. deep. Complete with 3 wire cord, and instructions. Contained in strong metal case.

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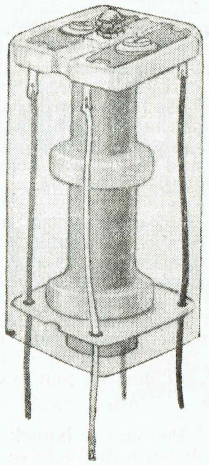

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A Welding, Brazing and Soldering Tool, which will save you time and money. Works from any 6 or 12 Volt storage battery, providing instant, concentrated, even heat. You can do all your own soldering, brazing and welding with this indispensable tool.

Rugged construction. Battery leads are specially heavy flexible conductors giving maximum transfer of power to the Welder.

The Ensign Welder is especially applicable for Auto repairs (mudguards, radiators, etc.), also for light inside work. For the farm it is invaluable for mending buckets, cans and light farm implements. Battery firms use them for lead burning, and they are especially useful for battery repairs on the roadside. The Radio man finds them invaluable for quick soldering.

Supplied complete with electrode, flux and full instructions.

Cat. No. RE8 ..... **52/6**

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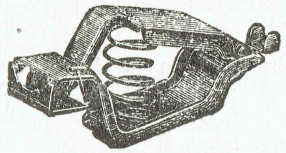
UNIVERSAL BATTERY CLIPS



British made, these Clips have good strong springs that make a sure contact.

Cat. No. RC20—5 amp. (Pee Wee) 6d. each
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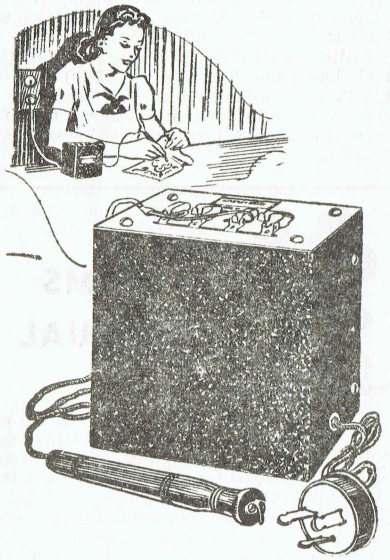
THE "HOMECRAFT" ELECTRIC POKER MACHINE



For use from standard 230-volt light socket or power point. Point gets very hot and by changing leads on to different terminals heat can be varied for different classes of work. Metal box measures 3¾in. x 3in. x 4¾in.

The introduction of the Homecraft Poker Machine will undoubtedly advance this art in New Zealand. By using this machine the artist can concentrate all his or her attention on the pokerwork itself, as, when the heat is regulated to the required strength it automatically remains at the same heat. This enables the work to be executed at great speed. Homecraft Machines are perfectly safe in use.

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Designed for one-hole fixing to panels. Between 1/16 in. and 7/32 in. thick. With highly polished nickel-plated bush-nose and coloured insulated plunger. Silver-contacts make sure and trouble-free contact. With terminal screws, one pole live to bush. Rating: 1 amp. at 10 volts or 100 M.A. at 100 volts.

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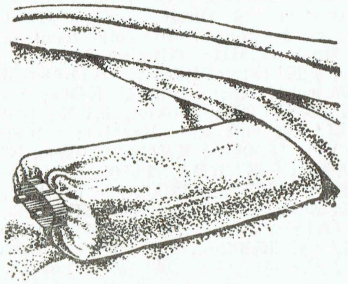


Waikari Hospital, Dunedin.

Just a line to let you know how satisfied I am with the electric bed comfort I purchased from your firm recently. As I am a patient in a hospital it is extremely useful to me, especially this cold weather. I have a plug alongside my bed to which I connect the "hotty" at any time of the day or night. The nurses here wish every patient could purchase one and so save them a lot of work filling the old hot water bottle.—Yours sincerely, A. McK. (Rahob 5343).

* * *

My wife suffers from cold feet and cannot go to bed without a hot-water bottle. You have no idea how much time the Monarch Bed Comfort saves us. It's great. Several of my friends will be getting one when the winter comes.—H.H.F.

Plug into hotpoint or light socket for five minutes. Disconnect and put it into your bed—that's all, and the "Monarch" Bed Comfort will retain a comfortable heat under the bedclothes for 5 or 6 hours. Compare that with messing around with the old type hot-water bottle. Contained in metal case and complete with cover and plug and cord. Cost about 1d. per week for current.

Cat. No. RE82 ..... **28/6** each

Or, complete with plug and cord—
Cat. No. RE82A ..... **33/-** each

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

Girdling The Globe

DX observations of the month by Arthur T. Cushen, 105 Princes Street, Invercargill, DX adviser to the Radio Hobbies Club, and Short Wave Editor to the New Zealand DX Club's bulletin, "New Zealand DX-TRA." All communications to the above address will receive prompt attention. Times in NZDST (12 ahead of GMT), frequencies in kilocycles.

BROADCAST

South Pacific.—9AD, Morotai, 1440kcs. was closed down on March 3rd, according to recent verification, and has been replaced by 9AO on 980kcs. using 10 watts.

North America.—Between 6 and 7 p.m. most evenings these stations should be able to be logged in fair locations:—590kcs., KGMB; 610kcs., KFRC; 680 kcs., KPO; 710kcs., KIRO-KMPC; 760kcs., KGU; 810kcs., KGO; 860kcs. XEMO–KTRB; 910kcs., KLX; 930kcs., KHJ; 1000kcs., KOMO; 1020kcs., KFVD; 1050kcs., XEG; 1070kcs., KNX; 1090kcs., XERB; 1110kcs., KXLA; 1190kcs., KEX; 1260kcs., KYA; 1390 kcs., KGER; 1450kcs., KFMB; 1490kcs., KTOH; 1500kcs., KSTP; 1510kcs., KGA; 1530kcs., KFBK; 1560kcs., KPMC.

SHORT WAVE

Hawaii.—KRHO, Honolulu, now uses 9650kcs. in evening transmissions, news on the hour, 11 p.m., etc. Verification by coloured card, from P.O. Box 3740.

Kenya.—VQ7LO, Nairobi, 1500 watts, comes in fair on 4950kcs. at 6 a.m., has English news broadcast at 6.25 a.m., and closes at 7 a.m.

Borneo.—"Radio Biakpapan" being received at fair strength on 9125kcs. daily, 12.30 to 2 a.m. Has 125 watt transmitter and relays news in Dutch from PCJ at 1 a.m.

Luxembourg.—"Radio Luxembourg," 6090kcs., has fine signal at 7 a.m. on Mondays, when an hour request programme for British listeners is commenced. Request reports on reception of this transmitter.

Germany.—American Forces Network, 6080kcs., now broadcasts from Frankfurt, having recently shifted from Munich. A news broadcast at 8 a.m. is well received. German home programmes have been heard at 7 a.m. on 6035kcs., and at 7 p.m. on 9688kcs. under GRX, London.

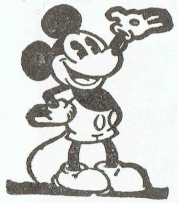
Canada.—CKRX, Winnipeg, 11720kcs., runs a request session, relayed from broadcast band transmitter CKRO, each Sunday to 7 p.m.; signals are good.

China.—Verification letter from the Director, Station XORA, 7 Chung Cheng Road, Shanghai, requests further reports on the transmissions, now received on 11700kcs., when news is presented in English at 11 p.m. Further Chinese signals which have recently improved in strength are XTPA, Canton (11650), XGCA, Kalgan (9625), and XGOL (9995), Yungan, all received at 11 p.m.

Singapore.—"South East Asia Command" broadcast now heard on 6770kcs. as well as the 11735 outlet, with extended schedules, English news at 12.15 and 2 a.m.

United States.—Latest San Francisco frequency and schedule changes are:—KCBF (15270) 6.00–9.45 a.m.; KGEI (15130), 6.00–9.45 a.m.; KNBX (11790), 4.15–8.30 a.m.; KGEX (11730), 3.15–5.00 a.m.; KNBI (15340), 6.15–8.45 p.m.; KGEI (17780), 1.00–5.00 p.m.; KNBX (15330), 3.00–4.45 p.m., 8.45–11.00 a.m.; KCBR (17770), 3.00–6.00 p.m.

Chile.—CE1173, Santiago, relaying CE-106, has been heard from 11.30 p.m. on 11735kcs., and also on this frequency to closing at 4.05 p.m. and later. Interference in the afternoons is heavy from WRUL.



ITEMS UNUSUAL

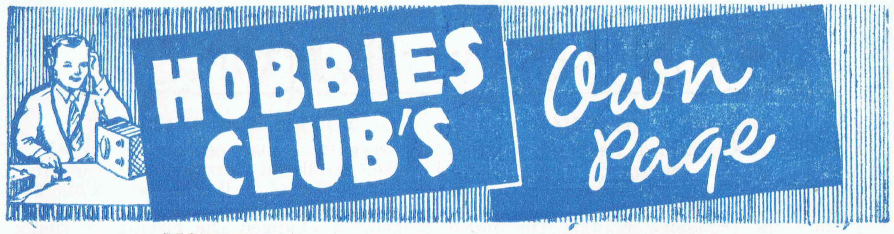
"The sky is the limit," but what a sky to look forward to! A sky writing company reports that it now offers advertisers a choice of colours, line drawings and luminous inscriptions. Eventually, censorship may be required for sky-art.

☆ ☆ ☆

"Fresh eggs" may soon be an inadequate description for this product because of an electronic sterilisation method under development at the University of California. It is said that ten seconds exposure by this method will kill all interior germs and unwanted egg growth and in addition all bacteria growth on the shell, thus giving the egg better keeping qualities.

☆ ☆ ☆

In experiments performed at the Harvard Biological Laboratory, it was found that the retina of the human eye, when freed of the eye lens in cataract operations, is highly sensitive to ultra-violet or "black light." In tests under "black light" some 70-year-old patients read all lines of test charts in a room dark to normal eyes.



MOTUEKA

Motueka calling all Rahobs. The last two meetings have been badly attended. Members who are unable to attend, please send word along to either the President or Secretary that you will be unable to attend. We know that the cause of the bad attendance lately has been due to the busy season. Next year we may knock off meeting from December to April. Mr. Blackmore attended a meeting, bringing along his transmitter. To him we owe one of the most enjoyable evenings we have so far held. It has been suggested that the Club divide up into groups, say, one dealing with Amateur Transmitting and another with building sets. A welcome is extended to Mr. B. M. Tarlton to our roll of members. S.O.S.—Any person interested in Radio, come along and learn about it from your local branch. You may find us every second Monday night at 7.30 in St. Thomas's Hall. This is Motueka signing off.—B. F. Mackay, Secretary.

* * *

AUCKLAND

The annual general meeting of our Club was held on April 5th, with a very large attendance of members present. Mr. Walker opened the meeting, and minutes of previous annual meetings were confirmed. The Secretary-Treasurer tendered the audited balance-sheet for the year ending March 31st, 1946. The statement showed that a very satisfactory position existed, with assets to the value of £29, and a substantial bank balance. Income was at a fairly steady increase, whilst expenditure was naturally higher this year with the purchases for test equipment. The election of officers for the ensuing year resulted as follows:—President, Mr. A. B. Walker; Vice-Presidents, Mr. A. Bain and Mr. F. Adams (unopposed); Sec.-Treasurer, Mr. J. Forrest (unopposed); Assistant-Secretary, Mr. D. Hamblyn; Committee, Messrs. D. Bull, B. Hales and G. Munro; Hon. Auditor, Mr. G. Williams; Banking Trustees, J. Forrest, F. Adams. During the course of the meeting Mr. R. Rhodes paid tribute to the excellent work being done by Mr. Adams in his series of lectures and his unfailing assistance to the members individually. All members associated themselves in extending acclamation to Mr. Adams, who suitably replied. The membership of the Club has progressed very satisfactorily during the year and we now have the grand total of 169 members for three years of operation, with 42 new members during the year. Next issue we shall tell you of the annual dinner.—J. Forrest, Secretary.

* * *

HAMILTON

Radio-minded Rahobs in Hamilton and those interested in radio are cordially invited to attend our meetings. They are held in the Welding Club Rooms (Technical School grounds) on the first and third Wednesdays of each month. How about turning up, Rahobs?

20/3/46—A short talk by Mr. S. R. Sutherland on the R.M.A. colour code and the mystery of tolerances as used in radio circuits started the Club's activities this evening. Next was a discussion by members on the sets they intend building. Faults and improvements were the main items. Supper followed, and the evening was brought to a close.

3/4/46—The colour code of coils and the right and wrong methods of connecting them in a circuit was the first subject of this meeting. The Treasurer, Mr. R. MacKenzie, has just finished his first power set (a seven tube one, with magic eye). His faults were fully explained to him, and, with these rectified, the set broke into operation. Its performance was perfect. Work has started on the five-tube set purchased by the Club. A general test was carried out with the aid of a "Meissner" Analyst and signal generator which brought to notice many faults that are expected to be remedied at the next meeting.

Club members are making their next meeting a work night, so look forward for the next issue of this publication of the Club's activities.—B. F. Pepperell, Hon. Secretary.

* * *

JELLICOE SEA SCOUTS RADIO CLUB

Owing to structural alterations to the Troop's H.Q., and also to camp, etc., the Club has not done very much during the summer months. However, things are now under way again and a new season's work has opened with a meeting

(Continued on page 22.)

HINTS AND KINKS

WAR-TIME SERVICE

The following idea saves time and makes possible changing back to the original tubes without rewiring.

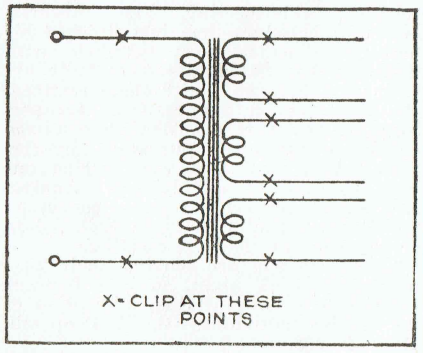
I replace a 5Z3 or 80 with a 5U4G (where the transformer takes the added load) as follows: Cut off pin No. 1 with cutters and saw off the centre pin. Now build up pins 2 and 8 with solder so that they are as big as the filament pins on 4-prong tubes.

The idea may be applied to the 39/44, which may be used in place of the 6D6. Melt solder from pin No. 3 of the former tube, without breaking the wire inside, and extend the lead with a piece of hookup wire. Now build up the heater prongs with solder, and feed the 39/44 screen lead into the screen socket hole, connecting it with the lug underneath. The 39/44 suppressor is connected internally so no connection is necessary.—Radio Craft.

IDENTIFYING REPLACEMENT CONNECTIONS

In replacing transformers, condenser blocks, and similar parts with numerous leads, the problem of reconnecting the wires to the proper points may be greatly simplified and a great deal of time saved if the old leads are clipped off close to the defective component.

After the defective part has been removed, the colour-coded loose wires remaining will indicate where the leads from the replacement unit are to be connected.



If an exact duplicate replacement part is used, one need only replace the old leads with each new lead having the same colour coding, one by one. If a different replacement part is used, the slip accompanying same will enable one to identify the corresponding lead.

TONE IMPROVEMENT

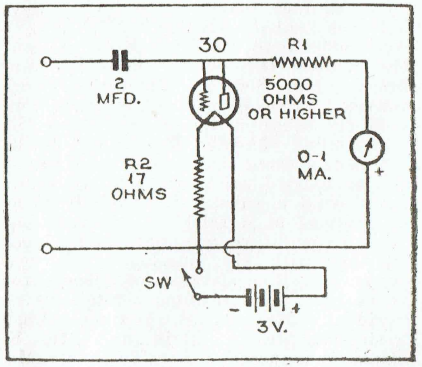
I recently came upon an old set which worked well on low volume, but distorted badly at full volume. This set used a pentode detector which was overloaded. I changed the circuit by tieing together the plate, screen and suppressor, thus making a high-mu triode stage, capable of handling large input signals. The set is now able to handle full volume with no distortion. This kink may be used on 6C6, 78, 6B8, etc., type tubes with a great improvement in quality.—J.L. ("Radio Craft").

[It is possible that the change simply lowers the set's sensitivity, making it harder to overload the tube. Have others tried this method?—Ed.]

A SIMPLE VACUUM-TUBE VOLTMETER

Here is a diode-type vacuum-tube voltmeter that can be used for a wide variety of tests, where a slight circuit load is not objectionable. Being substantially independent of frequency it is adaptable to either a.f. or r.f. circuit.

The value of R1 will depend upon the sensitivity desired. For full-scale deflection with 100 volts input the value of this resistor should be about 75,000 ohms. For greater sensitivity R1 can be decreased so as to cover any desired range. The device has a fairly linear scale and it may be calibrated on an a.c. 50 cycle supply line by connecting it in parallel with an a.c. meter. This calibration will hold for radio frequency as well as audio frequency.

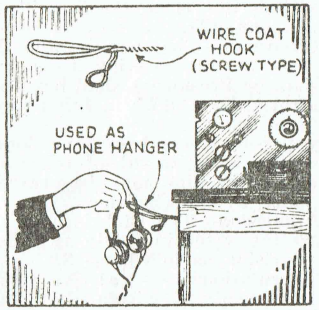


OVERCOMING REFRIGERATOR INTERFERENCE

Quite often radio interference can be traced to static discharges from the motor belt of electric refrigerators. To eliminate this type of interference simply connect a wire from the motor frame to the compressor and continue this lead to a good ground.

USE THE COAT HOOK!

Once more the old wire coat hook goes to work for the radio "Fan." I have used it as a mounting place for the earphones, in order to keep them off the operating desk or table. This ordinary coat hook is screwed into the side of the desk in some position where it will not be brushed against. The illustration shows how this is done.



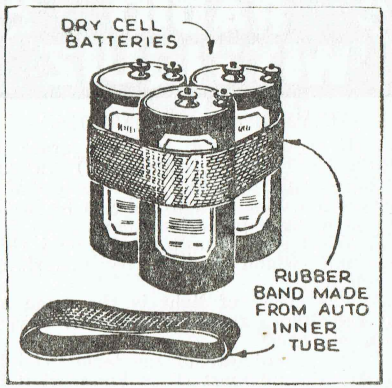
POLISHING AND CLEANING OLD BAKELITE

The following information was received from Mr. Allan Brown, of the Bakelite Corporation, in reference to an item entitled "Renewing the Appearance of Bakelite and Hard Rubber Parts" which appeared in this magazine.

"We have carried on a number of experiments and recommend the following: To keep a panel in good shape sponge it off with alcohol occasionally. The only dirt that sticks is greasy dirt, like fingerprints, and these could be washed off with alcohol better than they can with soap and water.

"If a high lustre is desired on a polished surface, a little Butcher's floor wax may be applied and rubbed; or with dull panels where a rich matte finish is desired, a little light lubricating oil may be wiped on and then carefully rubbed off.—Radio Craft.

BATTERY "WRINKLE"



Those who use dry cells can readily appreciate the value of this idea. It consists of a narrow band cut from an old automobile inner tube and placed around the batteries. With this arrangement the batteries may be tipped over accidentally and still the connections will not tear apart. In fact, it is rather difficult to tip the batteries over when they are securely bound with this heavy rubber band. This is a simple kink, but it should find favour among the battery set owners.—John Nelson.

I am stationed in one of the island bases in the Pacific and am particularly fortunate in having a phonograph to brighten up the dull hours of barracks life. However, the speaker ceased emitting the comforting tones of Crosby one day, and after a careful inspection of the unit, this is what I found.

The tinfoil covering of the crystal was almost completely gone due to corrosion, and the negative foil strip was broken. The inner foil strip was still intact and in good shape. Since there wasn't a replacement on the island, I struck upon this idea, with good results.

First, remove all the lead foil outer covering and wipe the crystal clean, using carbon tetrachloride or alcohol. Be careful not to damage the interelement lead. Now procure about 15 feet of No. 30 bare copper wire, and, starting at the front of the crystal, close-wind the entire crystal tightly. When you get down to the end, twist the two ends of the wire together and solder them to the lug. Carefully replace the crystal in the case, taking care to keep the rubber mounts in place.—"Radio Craft."

RADIO WITTIQUIZ

(H. VERNON WHEATLEY.)

1. If you wanted to incorporate a differential control (condenser) in an aerial circuit and did not possess the necessary component, would you be justified in using a potentiometer?

2. What sort of a control would this be, and would tuning be materially affected?

3. The speed of light is the same as the velocity of the so-called ether-waves. True or false?

4. We often hear of the term "visible spectrum" and most of us know what it means. Even if you don't, the actual expression gives you a rough idea. Can you jot down its range of extension?

5. Can you give a simple explanation and/or example of "unlimited conductivity"?

(Answers on Page 27)

Hobbies Clubs

(Continued from page 19)

of members of the Club at the workshop of Mr. R. T. Parsons, the originator of Broadcasting in Invercargill. A very interesting and profitable time was spent in examining apparatus which now belongs to history and comparing it with the most modern and up-to-date gear. An ambitious scheme of work was mapped out ahead for the Club to undertake, and the thanks of all hands are due to Mr. Parsons for his generous gifts of gear and offer of active help in the future.

* * *

DUNEDIN Y.M.C.A. RADIO HOBBIES CLUB

Here is our new set of rules:—

1. Name—The Club shall be known as the Dunedin Y.M.C.A. Radio Hobbies Club.

2. Aims—The Club will endeavour to introduce Radio to its members, explain Radio fundamentals, answer questions, and will endeavour to teach members the practical construction of small radios as a hobby only. It will also endeavour to promote friendship and a healthy spirit of competition among its members.

3. Membership Fee — (a) Y.M.C.A. Members under 18 years of age, **no charge.** (b) Y.M.C.A. Members over 18 years of age, 3/6. (c) Rahobs, under 18 years of age, 2/6. (d) Rahobs, over 18 years of age, 3/6. (e) Honorary Members over 18 years of age, 5/-. (f) All boys not listed under (a) (b) (c) (d) (e) will pay 5/-. Membership fees are payable Annually, and shall be paid within one calendar month of attending the first meeting.

4. Meetings—The meetings shall be held in the Club Rooms in the Y.M.C.A. Boys' Division every Tuesday night, commencing at 6.30 p.m. and concluding at approximately 9 p.m. Under special circumstances meetings may be postponed by not more than one week.

5. Committee—A committee of at least five members shall be elected at the Annual Meeting as follows:—President, Vice-Presidents, Secretary and Treasurer, and three other members who will act as Leaders.

6. Quorum—A quorum shall consist of four members of the Club before a meeting shall be declared opened.

7. Annual Meeting—This shall be held in the Club Rooms on the first Tuesday in April, annually.

8. Chairman—The person who holds the Chair at any meeting (namely the Chairman or President) shall have power to control order and be in full charge of such meeting.

Any person whose behaviour does not meet with the approval of other members at the meeting may be ordered to leave same by the Chairman.

9. Admission—The Club is open to all who are interested in Radio as a Hobby, with provision as in Clause 3.

10. Regulations. — (a) No member shall be permitted within the Club to operate or repair any radio or allied equipment, whether fully qualified and licensed to do so or not. (b) No member shall have the right to affect the trade of radio or electrical firms in this or any other city by the use of knowledge gained as a member of this Club, unless the approval of the Factory Controller and the Radio Inspector is obtained by the person concerned. (c) The Club will not accept any responsibility for any member who disobeys the above regulations, but will report the matter to the authorities concerned.

* * *

OHAKUNE

This is Ohakune, calling all Rahob Clubs and wishing them all the best over Easter. I should like to draw all Ohakune members' minds to the fact that meetings are held fortnightly. Owing to circumstances over which I have no control, we have not been able to have meetings for the last month, but nevertheless we hope to start again very shortly. Well, no meetings, no news, so I shall close now. Cheerio from Ohakune.—Mr. A. Dick, Secretary.

STAMP COLLECTION

Many thanks to the following Rahobs for their contribution to the Rahob Stamp Collection:—

14724 15076 14480 A198

MULTI-RANGE MILLIAMMETER

By RUFUS P. TURNER (Reprinted from "Radio News.")

This practical 0–1–10–100–1000 d.c. milliammeter can be home constructed from junk-box parts. All hard-to-obtain, odd-sized, low-resistance shunts, so often used, are purposely eliminated.

There is no question that a small-sized, multi-range d.c. milliammeter separate from the regular volt-ohm-milliammeter is very useful in shop, station, and laboratory. The uses of such an instrument are many and varied. Familiar applications include checking current and tuning-in grid and plate circuits of transmitters; drain checking and load measurements in test instruments, power supplies, and industrial electronic gear; and substitution for damaged milliammeters. The common multi-range milliammeter consists simply of a low-range instrument, such as a 0–1 ma. model with some arrangement for switching shunt resistors across the meter to change its range.

That more experimenters and servicemen do not build multi-range milliammeters from spare parts is due chiefly to difficulties arising (or expected) from switch contact resistance and to the hard-to-get odd resistor values required.

In order to get a bird's-eye view of the conventional arrangement, see Fig. 1. This circuit is based upon the common 0–1 d.c. milliammeter. The value of each shunt is equal to $R_s = Rm/f-1$, Rm is the internal resistance of the meter and f is the factor whereby the basic 0–1 scale is to be multiplied. Rm will have a value between 30 and 110 ohms for 0–1 d.c. milliammeters, the exact value depending upon the make and type of meter. Rm for a particular model may be obtained with sufficient accuracy from the manufacturer's catalogue. As an illustrative example: if Rm equals 100, the shunts for the several ranges shown in Fig. 2 will have the following values: R_1 11.11, R_2 1.01, and R_3 0.100 ohms. For a 60-ohm meter movement, these values become: R_1 6.666, R_2 0.606, and R_3 0.060 ohms. And for a 30-ohm value of Rm, the shunt values are: R_1 3.333, R_2 0.303, and R_3 0.030 ohms. Resistors having these values are difficult to obtain unless the builder is willing to invest in precision instrument shunt resistors or make his own from resistance wire, with the aid of a precision Wheatstone bridge. When such resistors are home-made they usually have a poor temperature coefficient unless extraordinary precautions are taken. A further disadvantage of the conventional circuit, as given in Fig. 1, is the fact that the switch contacts are in series with the shunt resistor and meter. While contact resistance is extremely low in ohmage, it becomes of concern when it is in series with resistances as low as those employed as meter shunts. Consider the effect of switch contact resistance in series with the .06– and .1-ohm shunts. The only remedy in the conventional circuit is to employ an expensive, low-resistance instrument-type switch.

The arrangement in Fig. 2A makes it possible to use standard resistors and a common rotary selector switch in a multi-range milliammeter. Here, the unknown current flows through a resistor, R_1, across which it develops a voltage drop. The meter then is connected (as a voltmeter) across R_1, through a suitable multiplier resistor, R_2, to measure this drop. By proper choice of R_1 and R_2 values, the regular current scale of the meter may be used and milliamperes will be read in the regular manner. A convenient value for R_1 is 50 ohms; 10 milliamperes flowing through this resistance will produce a drop of ½ volt. The meter then will give full-scale deflection (as a 0–½ d.c. voltmeter), corresponding to 10 milliamperes, of R_2 is made 500 ohms. In the same way, 1000 milliamperes (1 ampere) will produce a drop of 50 volts, and R_2 must be 50,000 ohms. In order to switch meter ranges, it will be necessary only to switch R_2 values.

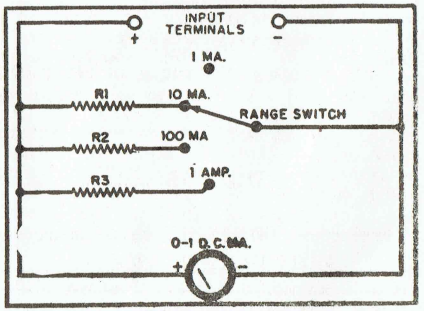


Fig. 1—Conventional type multi-range d.c. milliammeter circuit.

R_1 remains the same for all except the 0–1 range.

The resistors have standard integral values and, accordingly, are easily obtainable, but they must be selected carefully to be as close as possible to specified values. R_1 will have to be large enough to dissipate the power resulting from flow of 1 ampere. This sets the minimum rating at 100 watts. All series multiplier resistors may be 1 watt, however. Exact values may be obtained in the series resistors, if desired, by employing, in each case, a combination of fixed resistor and small wire-wound rheostat in series. The rheostats may be set to give exact value to the total.

In order to use the basic 0–1 ma. range, some arrangement must be made to switch R_1 out of the circuit and the meter directly across the input terminals. This may be accomplished by means of a second pole on the range switch, as shown in Fig. 2B.

Exact values are given in Fig. 2B for 0–1, 0–10, 0–100, and 0–1000 ma. ranges. R_2 may be a 1000-ohm rheostat, R_3 a 2500-ohm resistor and 5000-ohm rheostat in series, and R_4 a 25,000-ohm resistor and 50,000-ohm rheostat in series. Each of these combinations will give the specified resistance value at centre-scale setting of the rheostat. Screwdriver adjustment may be provided for each rheostat; and when once set, the shafts may be locked in place permanently with a drop of sealing wax.

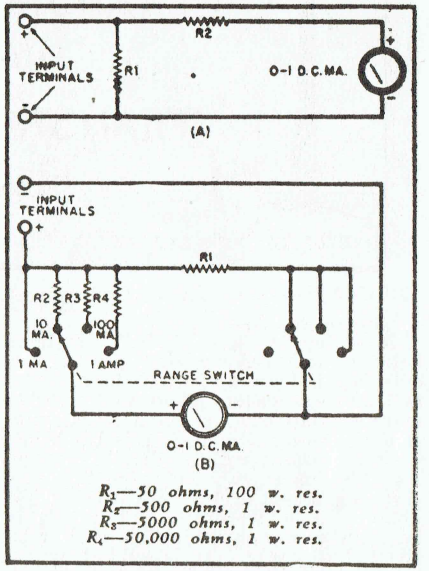


Fig. 2.—Practical circuit of the instrument described by the author. Note lack of odd-sized resistors.

"TEN METRES"

Operation by licensed N.Z. amateurs holding the necessary H.F. permits has once again been authorised between 28 and 29 megacycles. There are probably many Rahobs who are not familiar with conditions encountered on this band, and for their benefit we give details concerning this frequency. This band during certain sun spot cycles lends itself admirably to both moderate and extremely long distance communication with relatively low power. It is subject to extreme skip distance effects, and the advantages of the band are best realised during daylight hours.

A well-designed, stable transmitter, using an input of 25 watts, will practically enable world-wide communication under favourable conditions.

For distances up to 1000 miles a vertical half-wave antenna approximately 16ft. long will be satisfactory. Either a twisted pair feeder or two wire spaced feeder is quite suitable for coupling the receiver or transmitter to the antenna. A horizontal half wave antenna or a directional system is ideal for long-distance work, as such a system has the minimum parasitic pickup for receiving and is more efficient than the vertical.

Multi-element rotary beam antennas are also very effective for long-distance operation, as the system simply is rotated to give maximum signal strength in the receiver from the desired part of the globe, and the system is consequently lined up for transmission in this direction automatically. Due to the fact that conditions on this frequency are unpredictable, a good deal of enjoyment is derived from the sudden appearance of some DX contact when perhaps least expected. On these frequencies stations really appreciate reports from listeners on their transmissions, as due to the peculiarities experienced a station may be putting a good signal into a certain spot, but reception conditions may result in no contact being made with a station in that area.

This is the reason for listeners' reports assuming such importance. When this comes to hand the operator can check with his log and refer to the circuits, aerial systems, weather conditions, etc., existing at the time he was received.

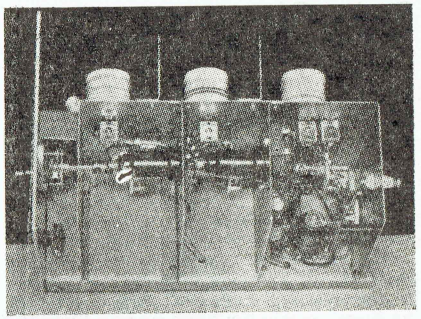
In order to receive these ten metre signals all that is required is a well-designed converter which may be used in conjunction with any type of B.C. or S.W. receiver. This method of obtaining ten metre reception is far ahead of the commercial all-band receiver, in spite of any claims made by the manufacturers!

When building converters or special ten metre receivers it is important that all the R.F. leads be kept as short as possible and fairly low-C form the circuit complement specifications. Most all-wave receivers, due to inherent design difficulties, produce a high noise level with very poor sensitivity for actual signal reception. However, an improvement may be effected by inductively coupling the receiver to the feeders from a resonant antenna; this will always give the optimum signal to noise ratio.

For those Rahobs desiring to experience the thrill of listening to DX on this band we publish details of a suitable converter which gives excellent results, both on ten and twenty metres (with suitable coils). It consists of a regenerative RF stage, detector and HF oscillator. In turn this converter connects to the I.F. amplifier of any superhet receiver. Three metal tubes are used, a 6K7 in the RF stage, 6L7 mixer, and 6K7 H.F. oscillator. The 954 acorn tube can be used in the R.F. stage if desired. It will be noted that each stage is well shielded and that there is ample space between the coils and shields. Heater leads must be run through shielded braid and kept well away from other wiring. The alignment of the circuit is conventional. The oscillator is set to the higher difference frequency and the other stages are then

brought to resonance by adjusting the trimmer condensers. This adjustment should be made with the main tuning condensers set to minimum capacity.

If the signal strength falls off at the lower frequency setting of the condensers, the rotary plates should be bent out slightly so that perfect tracking is had over the entire band. Spacing between cathode coil and grid coil in the R.F. stage must be adjusted to the characteristics of the antenna, the tighter the antenna coupling the closer cathode coil must be coupled to the grid coil in order to enable the R.F. stage to regenerate properly. This spacing must also produce smooth regeneration with approx. 100 volts on the screen, as any lower voltage results in a loss of sensitivity. Coil details are given in the table. All coils are wound on 1½in. isolantite formers.



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10-metre superheterodyne converter assembly.

COIL DATA FOR 10-METRE CONVERTER COIL.

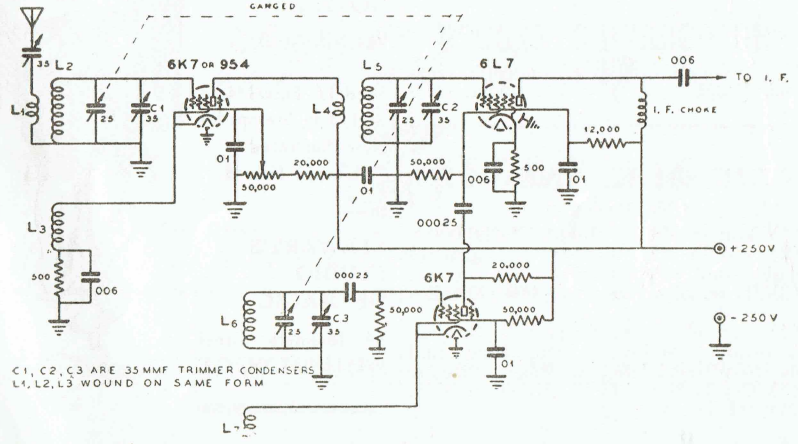
(L1) Antenna Winding:—4 turns No. 22 DCC, close wound.
(L2) Grid Winding:—4 turns No. 22 DCC, spaced 2 diameters.
(L3) Cathode Winding:—2 turns No. 22 DCC, close wound.
Spacing between L1 and L2, ¼ inch.
Spacing between L2 and L3, ¼ inch.

Detector Coil—
(L4) Grid Winding:—4 turns No. 22 DCC, spaced 2 diameters.
(L5) Plate Winding:—2 turns No. 22 DCC, interwound with bottom 2 turns of L4.
6 prong Coil Form used for above coil, but only 4 of the 6 prongs are connected.

H.F. Oscillator.
(L6) Grid Winding:—3 turns No. 22 DCC, spaced two diameters.
(L7) Cathode Winding:—3 turns No. 22 DCC, close wound, spaced 1/16 inch from L6.

PARTS LIST.

Chassis panel and shields.
Four only four-pin sockets.
Three only octal sockets.
Four only 35mmfd. trimmer condensers.
Three only 10mmfd. midget condensers.
Three only couplings.
One only extension shaft.
One only on-off toggle switch.
Two only 500 ohm resistors.
One only 50,000 ohm potentiometer.
Two only 20,000 ohm resistors.
Three only 50,000 ohm resistors.
One only 10,000 ohm resistor.
Three only .006 mfd. mica condensers.
Four only .01 mfd. mica condenser.
Two only .00025 mfd. mica condensers.
One only R.F. choke.
2ozs. only 22 D.C.C. wire.
2ft. shielding braid.
2 doz. nuts and bolts.
1 doz. solder lugs.
Three only grid clips (metal).
One coil pushback wire.
One dial. Two knobs.



Radio Olympus

(Continued from Page 4)

argument about the advisability of a lady called Europa riding a white bull. A lady called Telephassa and a young man named Cadmus seemed to be quarrelling passionately on this subject, whilst in the background we could also hear a terrific roaring. It was not Stentor with his daily news bulletin, but either the Minotaur or the Nemean Lion.

Our conjectures were suddenly halted when the instrument violently exploded. In the ensuing argument as to whether the "age" oscillator blew up the "period" mixer or vice versa, I silently left the room, pocketing a few parts absent-mindedly and carefully clutching my notes.

These notes, I realise, are of untold value, and while I do not clamour for fame and renown, I will be quite happy to settle for a minor title and/or £5000, plus the assurance that my name will be included in future history books.

Money, also, is a secondary consideration, and any further information can be got from me by remitting stamps or postal notes to the value of £50 (fifty pounds), to cover office expenses, packing and postage, etc.

Technical Notes.—Although I am not at liberty to disclose details of the circuit used, I would like to give important views on the reception. Stentor, who was received R. max., was gifted with leather lungs and a pneumatic epiglottis, and, by virtue of his lofty perch on Mt. Olympus, therefore had an advantage over his fellows. The rest of the entertainers, although their vocal cubic displacement was much less, their efforts were greatly assisted by the astounding acoustic properties of the new anthippodrome at Pelion, and this gave them a strength varying between R6 and 7.

PHOTOGRAPHIC RECORD

We have received a photograph from Rahob 13341 taken in the Oamaru Gardens.

RADIO QUIZ ANSWERS

(See Page 22)

(1) You would. Value, 25 to 50,000Ω.
(2) Would give a very fine control and does not affect tuning.
(3) True. Both approx. 186,000 miles per second.
(4) Extends from infra-red, through red, orange, yellow, green, blue and violet to ultra-violet.
(5) Conducting in one direction only. A crystal detector.

PEN FRIENDS WANTED

Rahobs wishing to contact other readers may have their names, addresses and interests published at a cost of 1/- for each announcement, which must not exceed 25 words.

Rahob 14724, R. N. Bromley, 176 Idris Road, Bryndwr, Christchurch, N.Z., wishes to contact Australian and New Zealand Rahobs interested in collecting stamps. All letters answered.

RAILWAY RADIO IN U.S.A.

It is reported that one of the chief railways in the United States, the Kansas City Southern, is installing radio equipment over 560 miles of its main line operating in the western parts of America. In addition to radio, induction telephony will also be employed, utilising carrier current wires along the track. The system is intended to provide end-to-end communication on trains, as well as between stations and trains en route.

PUZZLE CORNER

(By "Starlight")

A strange thing occurred—three car radios in for service in the one week. Each had the same complaint—electrical vibrator hum. Each was cured in a different way.

Number One was cured by replacing a faulty buffer condenser which had an intermittent open circuit. It took us a little time to locate the fault, as upon first test the condenser appeared O.K.

Number Two's fault was located as soon as we tested the tubes. One of them had an internal short.

Number Three had a faulty electrolytic condenser — another intermittent open circuit.

Thus ended a chain of coincidence.

Our next job was on an R.C.A. which was roaring like a bull in a courtyard. Investigation showed a defective 0.5 mfd. condenser between the volume control and the control grid of the 6B7. We replaced this coupling condenser and the trouble vanished.

Technical Thomas (our junior Marconi) struck a bright wheeze when playing around on a Philco. This receiver only worked on the L.F. end of the scale, and this bright genius inadvertently stuck a 1A6 tube in the oscillator socket instead of the specified 1C6. To his profound astonishment the receiver went O.K. and received stations over the entire scale. He thought he had something—he did, in a way—but the cure was replacing the oscillator coil. He was quite disgusted when we did this.

We struck another car radio which could not be faulted in any conventional way. The receiver was completely "dead," and so were we when we took time off from the unequal struggle. We have a spot-light as part of our equipment, and when round two started we brought this into play. After fossicking around in aimless fashion, wondering what to do next, we noted some minute beads of moisture inside the oscillator coil former. If there's dampness on the interior, we reasoned, maybe there is dampness on the windings. So we rigged up a soldering iron after the style of Heath Robinson, and let a bit of dissipated energy do its worst—or best. When we realised the possible danger of the whole coil going up in smoke we removed the iron, switched the set on, and away she went.

Which only goes to prove that Technical Thomas doesn't own all the brains around this place.

SLIPS AT THE MIKE

1ZB, January 27th, .7.56 a.m.—Announcer: "That was Bob Dyer, all you little kids—er—children."

2YA, 8.13 a.m., 18/3/'46: "One kiss from the New Moon, played by . . . "

2ZB, April 13th, approx. 12.15 p.m.—Announcing War Assets auction Sale: "including Flying Boats—I'm sorry—Flying Boots."

RAHOB LIBRARY

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