THE AUSTRALASIAN

Radio World

Registered at the G.P.O. Sydney, for transmission by post as a periodical

VOL. 7 . . . . . NO. 9 FEBRUARY 15 1943

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CONTENTS

CONSTRUCTIONAL—

A De Luxe Signal Tracer 5

Power for the Battery Amplifier 9

S.W. Converter for Battery Sets 15

TECHNICAL—

Ideas in Circuits 11

Evolution of the Tuning Condenser 13

Substitute Valves — Part 2 16

Radio Step by Step — Part 11 17

Resistor and Condenser Boxes 18

Selections of Crystals for Crystal Sets 19

SHORT-WAVE SECTION —

Co-Prosperity in Formosa and Korea 20

Short-Wave Review 21

New Stations 23

Loggings of the Month 24

THE SERVICE PAGES—

Answers 26

EDITORIAL

The news sessions being broadcast from Japan leave no doubt about the efficiency of the spy service being operated right here in Australia. It is fairly evident that the Japanese have an organisation which sends them full information on matters which should be kept secret. From the working of the Japanese spy system in Australia it appears almost certain that radio transmitters are being operated from Australia. One official view is that the transmitters must be installed in trucks, which move from place to place, making it a difficult job to track them down.

No matter just how or where this Japanese transmitter is operated it appears to us to offer an exceptional opportunity for our readers to do something really startling; to unearth this transmitter. Most of our readers have sets which are capable of covering every wavelength from 5 to 550 metres, and somewhere in this band there must be some unusual type of noise or radiation, if not a straight out morse or phone signal.

Perhaps the greatest difficulty is to appreciate that this spy transmitter is almost certain to be operated by an Australian or British person. This seems hard to believe, but it is equally unlikely that any Japs are walking about freely in Australia, so that we will have to look to the unexpected in this spy hunt.

The suggestion that our readers should keep a sharp look-out for any suspicious transmission is quite unofficial, but we haven't any doubt that if any reader has anything to report he will have no difficulty in getting action from any police or military officer.

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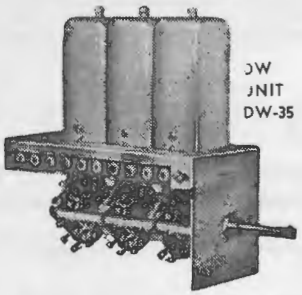
R.C.S QUALITY Components

R.C.S. D.W. UNIT DW35



Type DW35, as illustrated, consists of Aerial, R.F. and Oscillator Coils, Wave Change Switch, the necessary B/C and S/W Trimmers and Padder mounted on a rigid steel base, wired up ready to assemble in a set utilising 465 k.c. and R.F. stage. The bands are S/W 13.7 to 40 metres, and B/C 1600 to 550 k.c.
Code DW35. Price £3/7/6

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These coils are available in both Air Core and Permeability tuned types. The latter are adjusted to ensure maximum efficiency in our laboratories.

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E342	Aerial	6/6
E343	R.F.	6/6
E344	Osc.	6/6

PERM. TUNED "H" GANG

E345	Aerial	8/6
E346	R.F.	8/6
E347	Osc.	8/6

T.R.F. TYPE-AIR CORE

T88	Aerial	6/6
T89	R.F.	6/6
T87	R.F. with reaction	6/6
T81	Reinartz	6/6

• Trolitul is the modern insulating material that is included wherever possible in the manufacture of R.C.S. Coils and Components. Having a high "Q" rating and used in conjunction with the precision workmanship that goes into every R.C.S. part, it ensures that R.C.S. equipment is the best your money can buy. Stocks are naturally limited at the present time, but occasionally your usual retailer may be able to supply.

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465 K.C. I.F.'s
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IF167 2nd .. 7/6
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IF162
465 K.C. I.F.'s

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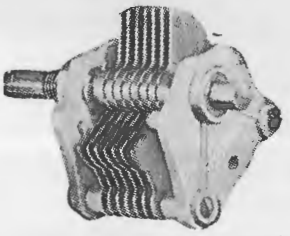
R.C.S. TROLITUL D.W. UNIT



Type DW-36, as illustrated, consists of Aerial and Oscillator Coils, Wave Change Switch, the necessary B.C. and S.W. Trimmers and Padder mounted together, wired up ready to assemble into a set utilising 465 k.c., the bands being S.W. 13.7 to 40 metres, and B.C. 1600 to 550 k.c.
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TB6	Input "B" Class, bakelite case	18/6
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A DE-LUXE SIGNAL TRACER

THE live wire serviceman recognises that good tools and equipment are business builders.

With such an instrument as the Signal Tracer he can quickly and surely get at the root of the troubles and do a thorough job in a shorter time, thus building the confidence of his customers and holding their trade.

When thoroughly familiar with the instrument it will be a permanent business partner, as it will never let the owner down.

With reasonable care it defies the passage of time and will remain dependable and serviceable for years.

Signal Tracing has now established itself as the most modern and dependable method of locating faults, and more and more radio men are recognising its worth.

Photograph of the original Signal Tracer, which was described in the April issue.

Some Facts

The writer recently made a trip through a section of Southern Queensland, and was very pleased to see the manner in which this method of servicing is being adopted. Actually I saw 17 instruments at various places. Of these only two builders were dissatisfied.

An examination showed that their bother was caused by substituting parts instead of building from the original design. However, a little explanation put them on to the right method, and their instruments are now giving the utmost satisfaction.

The advantage of this new signal tracer are improved selectivity, greater sensitivity, and a special section for checking the oscillator of any radio receiver.

Improvements

The principal alterations are: A tuned plate tuning system throughout and a simpler detector section, also an extra tuned R.F. stage.

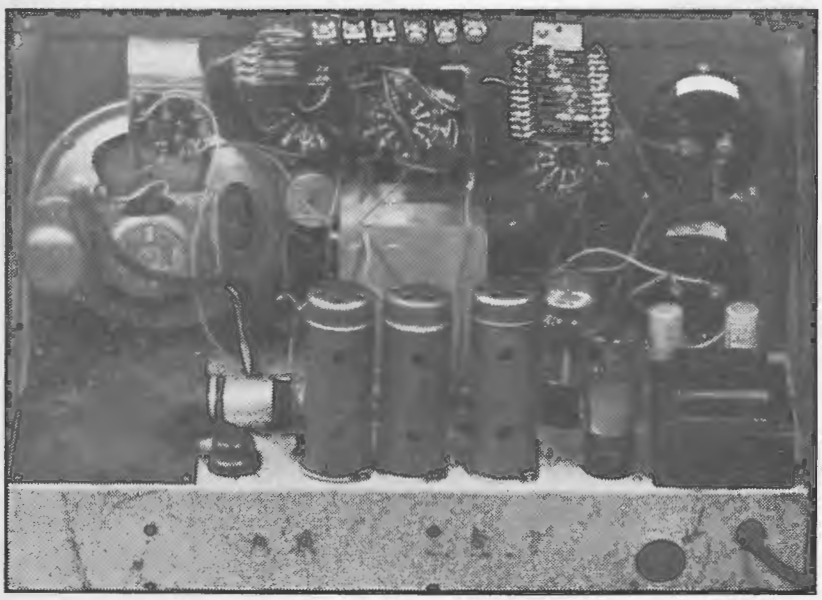
Tuning is extremely simple and rather broad, being comparable to the tuning of a T.R.F. receiver.

The chassis itself is made of heavy steel and all tuned circuits are thoroughly shielded, including the valves and R. F. chokes. This prevents feedback.

The use of three tuned circuits employing high gain, modern valves and good quality coils, together with careful wiring, by-passing, etc., results in greater sensitivity, which is very necessary in a Signal Tracer as many of the signals are weak and elusive, particularly in the R.F. and oscillator stages.

As mentioned in previous articles

By
JOHN BRISTOE
Radio Manager
Denham's Radio Service
Maryborough, Queensland



Rear view of the Signal Tracer, giving a good idea of the lay-out.

on Signal Tracers, the oscillation set up in the oscillator section of a radio causes a negative pulsating D.C. voltage to appear on the oscillator grid. This should first be checked either with the magic eye, or vacuum tube voltmeter to see that it is correct.

If the oscillator section is not working correctly no voltage will appear, or may be a positive voltage. Should either of these conditions exist, the

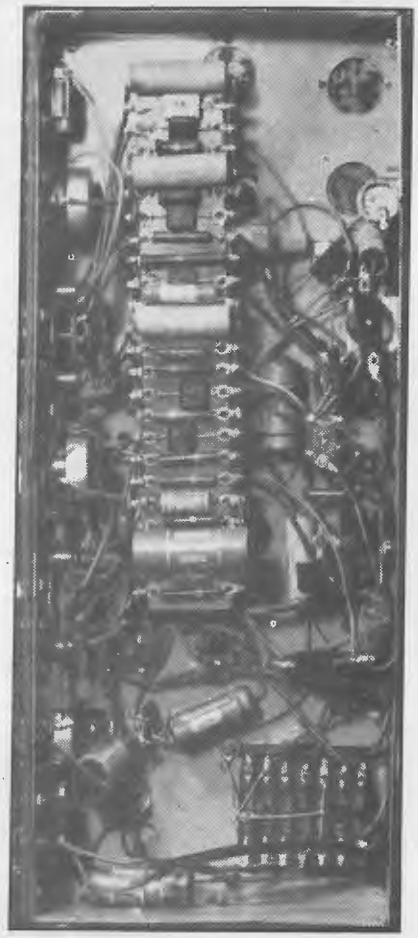
(Continued on next page)

SIGNAL TRACER
(Continued)

section will not operate satisfactorily. The grid should always be negative when the oscillator is functioning.

Having proved that the oscillator is functioning you may now check the oscillator frequency.

This is easily done by applying the oscillator probe to the oscillator grid or plate, and then moving the tuning condenser in the Signal Tracer until



A photo of the wiring of the original Tracer, as described in the April, 1942, issue

an indication is give on the eye. If you have properly calibrated this section previously this frequency of the oscillator can be seen.

When wiring up the oscillator and R.F. stages of this instrument it is important that all leads be heavy enough and vibration will not move them, Otherwise the calibrations will not remain accurate.

Wiring in these sections should be as short and direct as possible, in order to avoid oscillation. Also, it should be kept well above the chassis as far as possible, otherwise too much capacity caused by these being too

close to the chassis will deteriorate the results.

The variable condenser for the oscillator section can be any good reliable make, with a maximum capacity of from .00035 to .0005. Make sure the plates are not touching on this, as you will notice on this instrument all coils are connected to the plates and naturally a short to earth through the condensers will cause considerable trouble.

The oscillator section can be calibrated by connecting a good signal generator direct to the probe and either marking the dial with the various readings, or making a chart for each band. This should also be done with the R.F. tuning section.

The coils used in the oscillator section are similar to those used in the main instrument (see April issue), except that no I.F. sections are required, as we only need to tune to oscillator frequency.

The oscillator and R.F. probes are, as previously described, and must contain a small capacity condenser in order to prevent detuning, and to keep out D.C. current.

A lot of alternate valve types are permissible, Except for the cathode bias resistor on the output valve, no circuit changes are necessary. I have shown the output with a number of different possible substitutes, as output valves appear to be very scarce.

The necessary bias resistors are as follows: —

6F6, 6F6G	42	400 ohms
6K6GT, 6K6G ..	41	500 ohms
6V6G		250 ohms
38		1000 ohms
89		650 ohms
EL2		450 ohms
EL3, EL3NG ..		150 ohms

The theoretical circuit of the latest Signal Tracer is complete in every detail.

When building follow it carefully, and unless previous experience has been gained with these instruments, do not attempt alterations as unnecessary trouble will result.

More could be written on the subject of Signal Tracing.

For example, I could trace the signal right through the set in detail, but it is assumed that the builder knows how a set works, particularly in the R,F., I.F., and oscillator sections. Unless this is the case, the instrument will not prove of value to him.

Many so-called servicemen can search for and probably locate a burnt-out condenser, or resistor, with much trying and testing, but a Signal Tracer must be used by a man who has a fair knowledge of radio for any results to be derived from it,

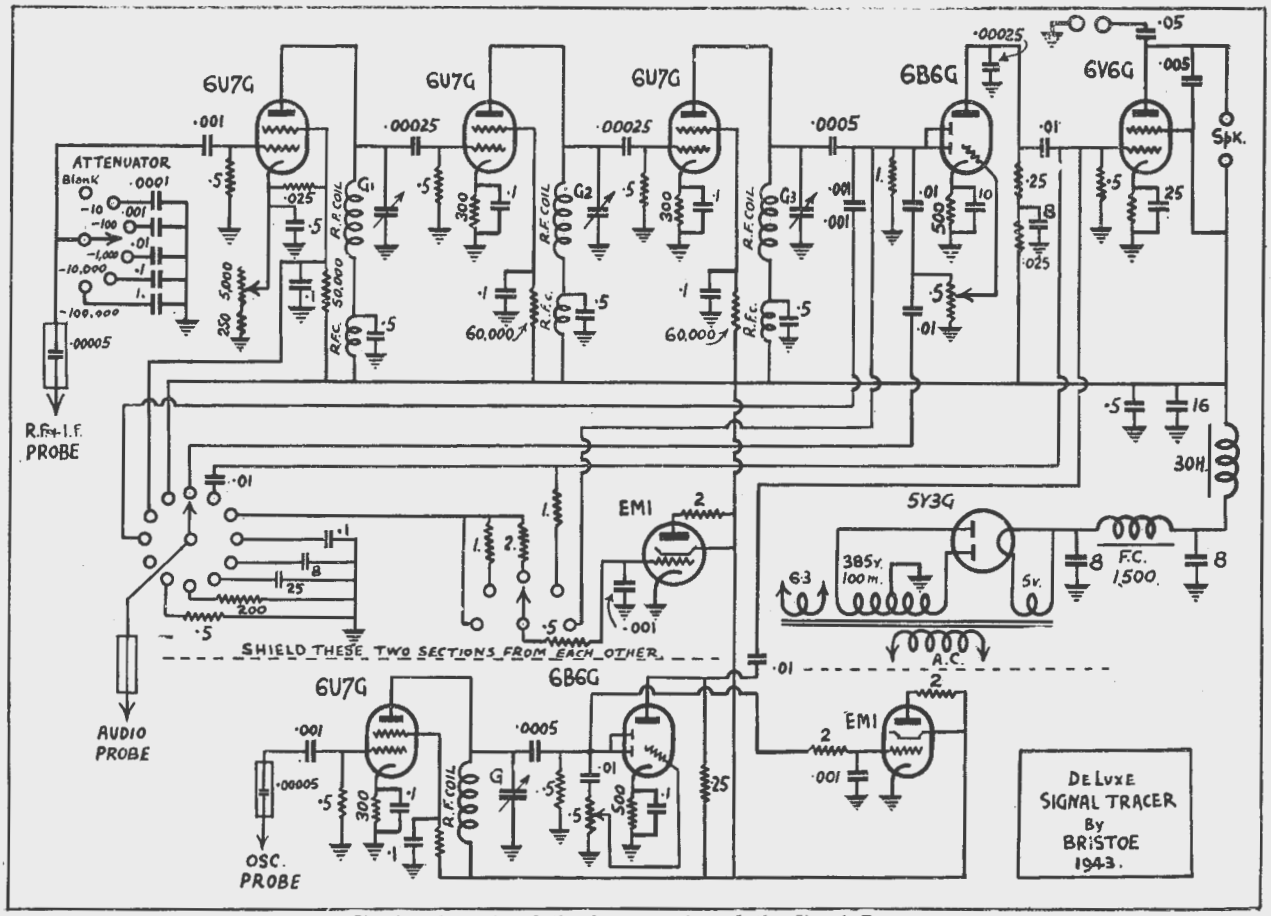
The improvements mentioned above can be incorporated in instruments built from the previous design, thus adding to the greater efficiency of the instrument.

If any serviceman is delaying the building of his instrument because he is afraid of the cost, or the time involved to build it, he would be advised to forget his fears, as the Signal Tracer will pay for itself in a very short while.

The many appreciative letters received from hundreds of satisfied users demonstrate more and more how widely and satisfactorily this new method of radio servicing is being adopted and is proving its worth.

As a number of requests have been received for photographs of the underneath wiring of the Signal Tracer described in the April issue, we show

(Continued on page 23)



Circuit schematic of the latest version of the Signal Tracer.


Conserve your Valves-
LESS VALVES USED FOR DOMESTIC RADIO - MORE FOR DEFENCE
★
SELECT . . . your programmes and conserve your valves but . . . WHEN . . . a new valve is needed in your radio set insist on RADIOTRON
Radiotron
AUSTRALIAN-MADE RADIO VALVES

POWER FOR THE BATTERY AMPLIFIER

THE pack described in this article is for those enthusiasts who, living in the outbacks, want to run medium power amplifiers for public address, small dances, etc. It is also the solution to the problem of power supply for a small mobile amplifier as the pack is very efficient and the drain only two or three amperes at 6 volts.

Simplicity

The circuit shown is quite simple. All unnecessary parts have been omitted and the filtering reduced to a single choke, and a pair of electrolytics.

This is quite sufficient for amplifier work, but nowhere near good enough for radio operation. The latter demands R.F. chokes and by-pass condensers, a filter in the filament supply and very complete shielding.

To-day parts are far from plentiful, but at least one Melbourne shop can supply a complete kit of parts. For the vibrator-pack shown above, we obtained all our parts except the choke (which we had on hand) quite readily.

As substitutes for parts, we mention the use of the primary of a speaker transformer for a choke, the connection of two .01 600-volts condensers in series to give a .005 mfd., 1200 volt condenser and the use of wood for the chassis.

Sheet metal for chassis construction is scarce and so we experimented using wood, wood coated with graphite and wood coated with "aluminium" paint. The latter two were excellent, providing you didn't try using the chassis as an earth return wire.

Graphite-coated cardboard is being used for valve shields in America now.

How It Works

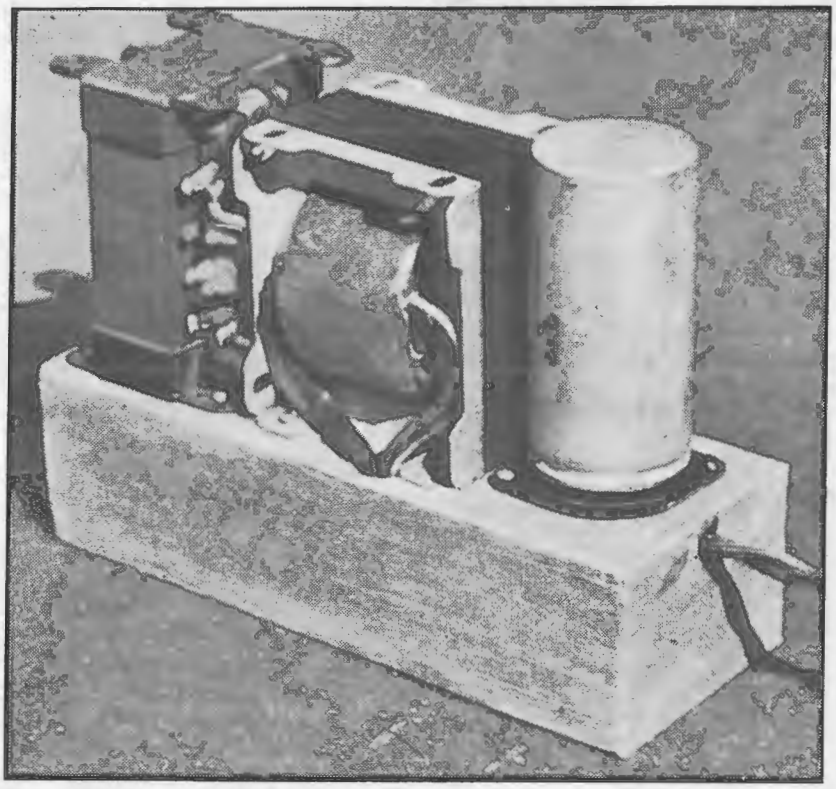
We don't propose to go deeply into Vibrator theory now, except to remind you of the importance of a buffer condenser to eliminate excessive voltage surges.

The vibrator employed is of the synchronous type, i.e., it not only converts the input current to a form of A.C., but also rectifies the A.C. after it has been stepped up by the transformer.

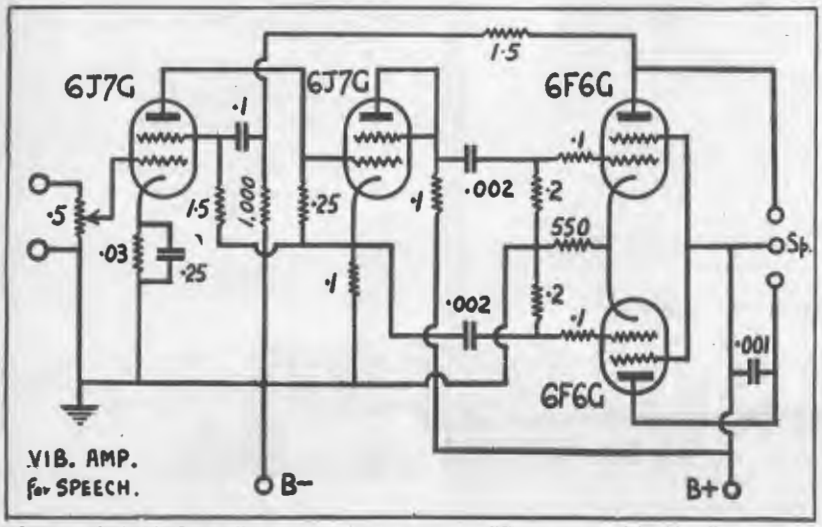
(Continued on next page)

PARTS LIST FOR PACK

- 1—6v./250v. Vibrator Transformer (R.C.S.)
- 1—6v. Synchronous Vibrator and Socket (46 Mallory, 18978 Ferrocart or 5411 Radiart).
- 1—.005, 1200 volt working, or two .01 mfd., 600-volt condensers.
- 1—10,000 ohm ½ or 1 watt resistor (I.R.C.).
- 1—60 ma. power choke or "5000 ohm" Rola speaker transformer.
- 2—8 mfd. 525 volt electrolytic condensers (T.C.C.).
- 2—100 ohm ½ or 1 watt or wire-wound resistors (I.R.C., R.C.S.).
- 1—Chassis (wood or metal.
- 1—½ to 2 mfd. condenser (T.C.C.)



Photograph of the vibrator power unit, made up from parts still readily available.



Suggested circuit for a direct-coupled push-pull amplifier for use with this vibrator unit.

BATTERY AMPLIFIER

(Continued)

The main buffer condenser is a .005 mfd. high-voltage type and was just large enough in capacity for optimum results.

To allow for vibrator wear, we suggest an extra buffer (½ to 2 mfd.) connected across the primary winding.

The wiring is so simple that a joint-by-joint description will not be given.

Take care with the insulation and mind the polarity of the electrolytics.

If the 6-volt supply battery is reversed, the polarity of the electrolytics becomes incorrect.

Output

The actual output voltage depends upon the current taken from the pack. Using a half-charged accumulator and longish leads, we obtained:—

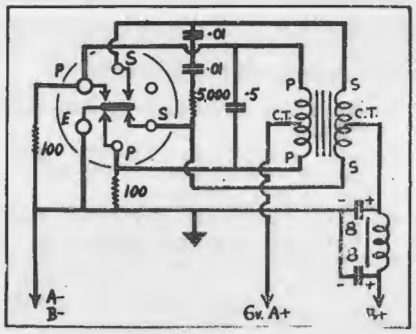
20 ma. at 330 volts.
30 ma. at 305 volts.
40 ma. at 280 volts.
50 ma. at 265 volts.
60 ma. at 250 volts.

On no-load, the voltage was approximately 400.

The pack is ideal for a simple amplifier such as the "Vibra," described in "Radio World" for May, 1940, or for either of the two amplifiers described below.

The first is an adaption of the "Vibra" to parts obtainable at present and requires no comment, except as to its output (3½ watts).

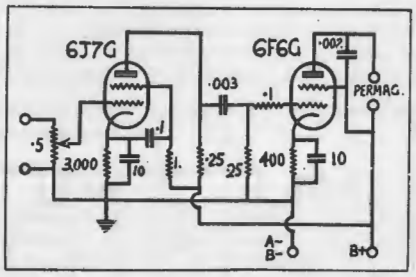
The second is a simple push-pull job with the outputs well biassed to limit the current drain. It has an effective output for speech of about 8 watts (less for music) and features bass suppression and inverse feedback.



Schematic of the vibrator unit.

Limitations

Although the power pack described in this article is excellent for amplifiers, it is definitely **not** suitable as it stands for radio work. To adapt it for radio, more filtering is necessary, both in the input and output circuits



Suggested two-valve amplifier to suit the vibrator unit.

and the entire unit must be carefully shielded.

For further information we refer the reader to the excellent article on Vibrator servicing in the May, 1941, issue.

Later on, if parts are still available, we propose to describe a low voltage unit suitable for use with 1.4 volt valves. This latter unit puts out about 10 milliamps at 100 volts.

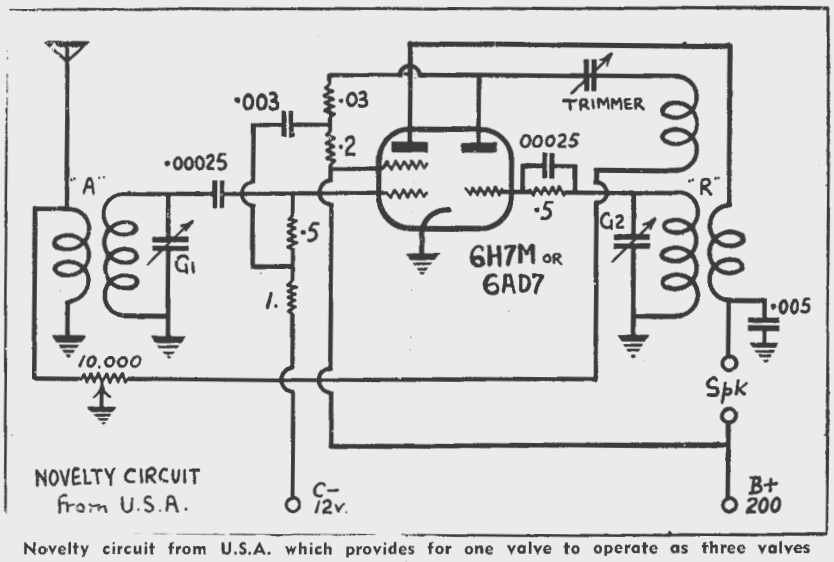
IDEAS IN CIRCUITS *By John W. Straede*

SOMETIMES in a high-gain amplifier for use with a low-level microphone, there will be an obstinate hum due to emission from the heater or filament.

This is sometimes overcome by operating the first two valves in the amplifier with D.C. for the heaters, but it is rather an expensive process.

A simpler system of preventing emission from the heater is to connect the heater to a point of positive potential so that the cathode is negative with respect to it.

One side of the heater wiring is connected to a tap on a voltage divider



Novelty circuit from U.S.A. which provides for one valve to operate as three valves

In this series are described:

Hum Reduction in Amplifier
C.T. Choke as Push-pull Device
Simple Mixer Circuit, and a
Novelty type of T.R.F. Midget

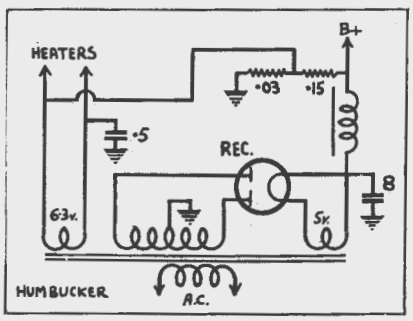
Hum Reduction

connected across the high-tension supply and the other side is by-passed by a large capacity condenser, say .5 microfarad.

The voltage divider may consist of a 30,000 ohm and a .15 megohm resistor in series. Each resistor should be at least 1 watt in power rating, and the maximum voltage across the .18 meg. divider so formed should not exceed 350 or 400 volts. (Resistors are usually rated somewhat optimistically as regards power!)

If there is already a voltage divider, then the filament wiring (or rather, one side of it) is connected to a tap supplying approximately 50 volts.

In America, where valves are cheap and plentiful (before the war, anyway) designers sometimes connect one side of the heater wiring directly to the positive side of the H.T. supply, but this is rather risky. For most 6 volt valves the potential difference between heater and cathode should be as low as possible.



Circuit to neutralise hum by feeding portion of high tension hum to the heater circuit.

Push-pull Device

A centre-tapped choke of total inductance, 80 henry or more, makes a suitable device for driving valves in push-pull without using an extra valve as phase inverter.

The anode of the driver valve is connected to the output valve via a coupling condenser (say .1 microfarad, 600 volt rating) and one half of the choke takes the place of the grid resistor.

The other half of the choke has induced in it a voltage equal to that supplied to the first half, thus acting as a 1:1 ratio transformer.

As in the case of shunt-fed A.F. transformer, the driver valve must be of low or medium impedance and there are slight losses of "lows" due to the coupling condenser and limited inductance and of "highs" due to capacity in the choke windings.

The response can be levelled off considerably by connecting a fixed resistor between the anodes of the driver valve and the output valve that is connected to it.

Another device to level out the response is to shunt the top half only of the choke by a resistor, say .5 megohm.

If the coupling condenser is smaller (say .02 microfarad) and the driver is of low impedance, then there may be a resonant frequency in the 100 to the 250 hertz region. This is quite O.K. for triode output tubes, but quite undesirable for pentodes or tetrodes which normally have a bass boost due to the rise in speaker impedance.

For 6V6 or 6F6 output tubes, a 76 or 6C5 driver, together with a .1 uF condensers and an 80 H centre-tapped choke make a nice combination for public address work.

Experimenters may try using a 1:1 ratio A.F. transformer in place of the choke. Correct polarity must be observed.

Simple Mixer Circuit

Those enthusiasts who are bitten by the amplifier "bug" soon find complications when both microphone and pick-up are to be fed into the same amplifier.

Three popular methods of "mixing" are: Change-over switch, Isolation of Volume Controls by series resistors, and Electronic Mixing.

Each of these has its disadvantage. The change-over switch is abrupt and liable to thumps; the use of isolating resistors decreases the gain and does

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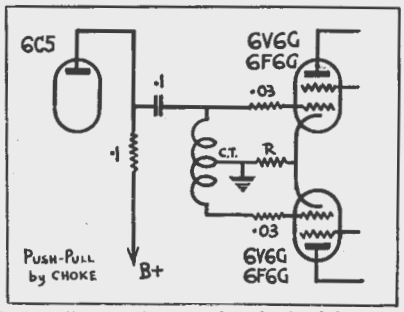


Push-pull operation can be obtained by using a centre-tapped choke, as shown in this sketch.

IDEAS IN CIRCUITS

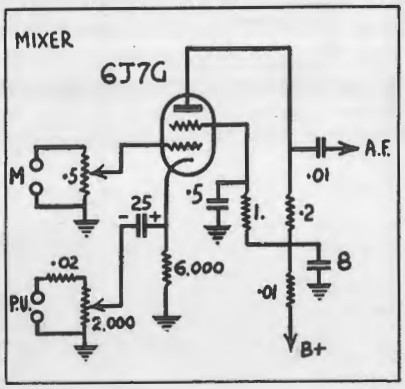
(Continued)

not provide complete independence of control, while electronic mixing demands another valve — a terrible demand these days.

In the diagram shown, there is another type.

Actually it is **series** mixing, in which one side of each input is earthed.

Like the three systems mentioned above, it has a disadvantage in that the pick-up can be magnetic of fairly low impedance only, but it maintains the full gain for the microphone, does not require an extra valve and provides complete independence of contro.l.



In any amplifier a mixing circuit can be obtained by feeding the pick-up into the cathode circuit.

The microphone signal is supplied to the grid in the usual manner, but the pick-up output is fed to the cathode.

Operating conditions of the valve should be adjusted so that the cathode resistor is as high as possible.

A resistor is inserted in series with the pick-up to reduce its signal and to give a suitable load. If the resistor is omitted, the response becomes a trifle muffled (unless high-boost is used somewhere in the amplifier) and needle scratch is reduced or eliminated.

Novelty Circuit Using Multi-Valve

Having a small stock of "multiple" valves on hand, the writer decided to see what could be done with them.

Each tube was a 6H7M, a metallised combination of an output pentode something like an 89 or 42 and a medium-gain triode. One interesting combination was a 2 valve and rectifier push-pull amplifier (to be described later).

Another was a midget super that was of extremely small proportions but "had everything."

The smallest set to be built around one of these tubes was a T.R.F. reflex.

The output pentode section was reflexed to act as a radio-frequency amplifier, while the triode acted as a regenerative grid-leak detector.

Only one other tube (a 6X5 rectifier) was employed.

As each section of the two-in-one tube shared the same cathode, it was decided to use back-bias and to have the cathode earthed.

Volume control was by a combined aerial-shunt and reaction effect. At full volume the detector section was just on the point of oscillating for the high-frequency end of the dial, whilst at low volume there is no appreciable reaction, and part of the aerial signal is bypassed to earth.

In any set of this type, careful layout and shielding are most important, as is good filtering of the H.T. supply, the last to prevent "modulation hum" due to the non-linearity of the R.F. Amplifier.

Experimenters could try out the 1D8GT reflexed in somewhat the same manner, or possibly the 6J8G or 6F7.

EVOLUTION OF THE TUNING CONDENSER

VARIABLE, as distinct from tapped, condensers were first employed in radio as a fine tuning adjustment in somewhat the same way as a "bandspread" or "note-splitter" condenser is used to-day.

Any variable condenser consists of two sets of plates: a moving set and a fixed set. There may be only one plate in each set, or there may be many. Again, the way they move relative to one another may be any of several types. Plates may be flat or cylindrical.

Early variable condensers often consisted of two pairs of semi-cylindrical plates, the pairs being mounted co-axially, the moving pair on the inside. Electrically, one outside and one inside, or moving plate, were connected together to form one electrode, whilst the other pair were connected together. Sometimes the inner plates consisted of tinfoil stuck on a pickle-bottle with shellac varnish.

Shapes of Plates

Condensers using cylindrical and semi-cylindrical plates have been re-introduced within the last five years, so it is never safe to regard anything as being out-of-date!

The next popular type of tuning condenser consisted of semi-circular flat plates generally 2 to 3 inches in radius and spaced well to avoid touching. The moving plates were attached to a central rod and usually formed the "hot" side of the condenser. Making such a condenser by hand was rather a heart-breaking task. No matter how flat the metal to start with it was never flat once it had been cut into plates and scraping of plates was a bugbear.

Machine-stamped plates ensured the success of this type of condenser as a tuning device, although other tuning devices such as the "variometer" held the field for a while. (Condenser-less tuning has had a revival in permeability-tuning.)

When more stations appeared on the broadcast band, it was soon noticed that they were crowded at one end of the dial. Instead of "straight-line-capacity," or semi-circular plates, "straight-line-wavelength," and later, "straight-line-frequency", or S.L.F. plates made their appearances. Then came the struggle for "only one tuning control" and ganged condensers and another shape, the logarithmic, made its bow. This was to simplify the ganging of condensers when the coils were unequal.

Matched Coils

To-day, coils have greatly improved, so a condenser manufacturer may use almost any shape, a combination of logarithmic and S.L.F. or S.L.W. type is best as regards the spacing of stations on the dial but the worst as regards compactness.

Book-type condensers in which one plate is moved towards another in somewhat the same manner as a book is closed, have been used at times, probably for economy. This type has survived to-day in the tiny trimmer condenser, usually found on each section of a gang condenser.

Insulation of variable condensers has advanced. Waxed-wood, ebonite and fibre have all had their day, but now ceramic, or plastic insulation is employed in the best types.

Midget condensers for a wide capacity range (and hence wide tuning range) have been made, by closer spacing of the plates and the employment of a solid di-electric such as mica, or fibre. Unfortunately, their characteristics are not constant and solid-dielectric condensers are not used, even in midget sets. However, anything is possible in radio, so they may be revived some day in an improved form.

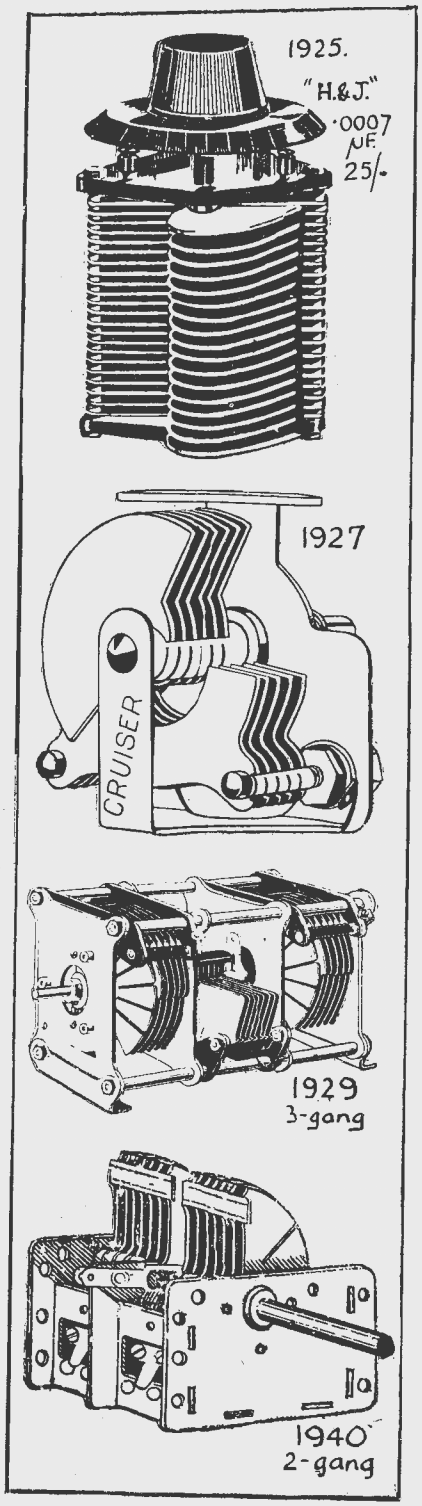
Aussie Gangs

Gang condensers have been made in Australia for over a dozen years now, by the Stromberg people. Types C to H have appeared on the market for home-builders, F, G, and H being current types.

The F gang is a general purpose type, used mainly for broadcast work and has a capacity range (without trimmers) of approximately 12 to 405 micro-micro-farads.

The G gang is a compact condenser of smaller capacity range and is not generally used for short-wave work on account of it not covering so many bands. Its capacity range is 14 to 370 m.mfd.

The H gang is the latest type, not so compact as the G type but having a very wide capacity range (9.5 to 415 m.mfd.) and exceedingly low losses due to its ceramic insulation pillars.



ANTS

The purchasing agent of a large radio plant was amazed recently to receive a requisition from the "lab" for a million white ants together with instructions for breeding them. Investigation disclosed that feeding experiments were in progress to develop an insulation that would not be eaten by the ants.

—American Magazine.

U.S. SOLDIERS' PORTABLE

American soldiers have been equipped by the Special Service Branch of the U.S. Army with a portable "radio-phonograph-library kit." Each of these kits contains a medium- and short-wave receiver, a gramophone turntable with electric and acoustic pick-ups, 50 gramophone records, 25 half-hour transcriptions of sponsored broadcast programmes and a collection of books. A set of spare batteries and valves in included in the kit which, contained in a wooden case, weighs 250 lbs. The gramophone is spring-driven and runs for 15 minutes with one winding.

★

HELLO, TO-DAY

What's the best day you ever knew?

A morning in Spring when you were just six years old? The day you graduated? The first time you knew she loved you? When you bought your first car?

No — it is to-day!

It's to-day for Young Australia, because schools are better, homes are more comfortable, and healthful, and the future holds more opportunities than ever before.

It's to-day for grown men and women, because they're working and fighting for something worth while. They're learning that Australian industry which gave us things like electric ranges, refrigerators and radio, can become a great weapon to defend our country in this vital hour.

Only one day is better—to-morrow!

Because tomorrow we shall establish the principles for which we are fighting to-day. Because to-morrow we shall have new materials, new developments, new sciences. Because to-morrow we shall return with new vigour and new vision to the task of making to-morrow better than to-day.

—From "G.E." Hotpointer.

RADIO QUIZ

QUESTIONS

(1) How do you convert millimetres to inches?
(2) What is an Oscillotron?
(3) Pentode — what is it?
(4) Explain the difference between a valve and a tube.
(5) What does Q.P,P. stand for?
(6) Describe Reluctance.
(7) What is the speed of sound?
(8) Convert 319 metres to kilocycles.
(9) What valve would you use to replace a type 95?

(Answers on page 26)

S.W. CONVERTER FOR BATTERY SETS

FITTED to any broadcast battery set, this unit converts it to a dual-waver. The parts are not expensive.

Some time ago we gave the circuit and details of a modern version of the type of short-wave converter which enjoyed such popularity until the time when dual-wave receivers became more or less universal.

Apparently there are still thousands of ordinary broadcast receivers in operation, judging by the popularity of this circuit, and the many requests we receive for short-wave converters and short-wave adaptors.

Fortunately it is a simple matter to build a battery-operated converter and it is easier than an a.c. model when it comes to attaching it to the receiver, for leads can be run direct to the batteries.

Use

The short-wave converter here described can be fitted to any sensitive broadcast receiver and makes it capable of receiving short-wave stations direct.

The performance when used with a set having plenty of gain is equal to, or in some cases superior to, a dual-wave receiver. The reason is, of course, that an extra valve is added.

Some of the smaller dual-wave receivers, especially those employing only four valves, are not especially sensitive on the short-wave bands. We tested our original converter with a set of this type, and we found that the short-wave results with the converter attached to the set were infinitely better than those obtained on the short-wave band using the dual-wave switch.

It seems, in fact, that this converter can serve a very useful purpose in this matter of boosting up the performance of a small dual-waver.

What It Is

A short-wave converter consists of a frequency changer valve, which, when operating ahead of a T.R.F. set, makes it into a superheterodyne with the "intermediate-frequency" amplification being carried out at a frequency at the end of the broadcast band (around 550 kc./s.), the radio-frequency stages becoming the I.F. stages.

When the converter is used with a superheterodyne receiver, it converts it to a "double super", the frequency at which amplification is performed being changed twice before detection. The first I.F. is about 550 kc./s. and the second I.F. (or intermediate frequency) is the normal 455 kc./s.

The Circuit

The circuit design follows the same lines as the a.c. and battery versions described in the April and May issues of 1940, except that we now give some alternatives in case parts are scarce.

The aerial is aperiodically coupled to the converter valve ("aperiodic" means "un-tuned") so that only one variable condenser is required.

This eliminates the difficulty of aligning a two-gang condenser and also reduces the cost.

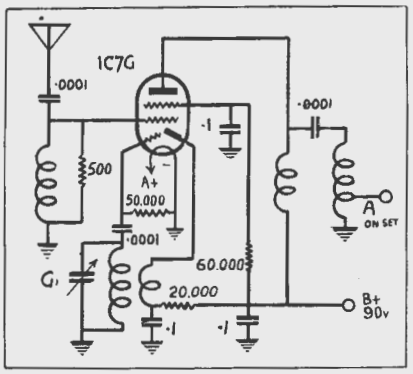
If you want the utmost in sensitivity, then a two-gang condenser and a normal short-wave aerial coil can be employed.

The valve shown is the 1C7G, a two-volt octal-based pentagrid converter. A six-pin equivalent is the 1C6. We selected this valve as most of the coils available work best with it.

Other battery converters are the 1A7G in the 1.4 volt class and the 1A6 and 1D7G in the 2-volt series. No-one seems to have tried the 1D8GT as a triode-pentode converter (a la 6F7) as yet.

The oscillator coil is a normal short-wave coil to suit the valve and is quite easily obtained.

Coupling between the converter tube and the main set is by choke-capacity aand auto-transformer. The choke is a good quality R.F. choke, preferably pie-wound and the coupling condenser a low-loss mica type.



Circuit of the short-wave converter suitable for fitting to any battery set.

The auto-transformer or 'coupling coil," resembles a single section R.F. choke with a tapping. The entire coil with the coupling condenser, tube capacity, etc., should resonate broadly around 550 kc/s.

Substitutes

For the aerial coil, an ordinary short-wave choke (say 100 turns on a 1-inch former) may be substituted and the shunt resistor omitted or replaced by a 30,000 ohm resistor. The size of the aerial series condenser is not critical — it may vary from .0005 mfd. to a pair of insulated wires twisted together. Experimenting here is valuable.

The oscillator coil is easily obtained or may consist of a pair of windings on a cylindrical former about ¾-inch in diameter. The grid winding is 6 turns and the plate winding 8 turns, both of 26 to 28 gauge enamelled wire and separated about 1/20-inch.

Aerial Type

For satisfactory short-wave reception, a good aerial and earth are necessary. Luckily, battery sets are not usually subject to the crackling and man-made static that exists around all a.c. operated receivers.

An aerial of the inverted-L type is generally quite satisfactory.

Attention should be paid to careful insulation and to good connections between sections of the aerial, the "lead-in" and the converter.

Refinements

Useful additions are a band-spread condenser (a low-capacity midget condenser shunted across the main tuning condenser) a sensitivity control and a doublepole, double-throw switch for switching from short-wave to broadcast band.

One set of contacts would be used for the filament of the valve and the other set for the aerial.

PARTS LIST

- 1—chassis of wood, masonite or metal, approx. 6 x 6 x 2.
- 1—good quality variable condenser. (R.C.S.).
- 1—Slow-motion dial (R.C.S.).
- 1—Coil kit and R.F. choke (R.C.S.)
- 1—20,000 ohm resistor (I.R.C.)
- 1—50,000 ohm resistor (I.R.C.)
- 1—60,000 ohm resistor (I.R.C.)
- 1—500 ohm resistor (I.R.C., R.C.S.)
- 3—.0001 mfd. mica condensers T.C.C.).
- 3—.1 mfd. condensers T.C.C.).
- 1—6C7G valve (Radiotron).
- 1—Octal socket (Tasma, Amphenol, Cinch).
- 2—Insulated terminals.

SUBSTITUTE VALVES---Part 2

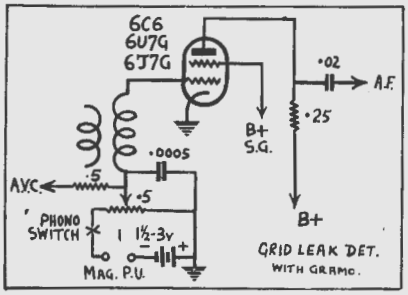
THE DUO-DIODE DETECTOR

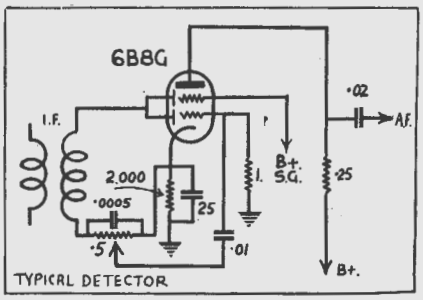
LAST month we showed how a pair of pentode tubes could be used to replace a converter tube. This month we deal with another type that becomes scarce at times — the duo-diode pentode.

Usually this type is employed as second detector and if the volume control is of the T.R.F. or antenna-bias type (variable cathode resistor for I.F, and/or shunt across aerial coil), the simplest plan is to rewire the detector as anode-bend type with a 6J7G (or similar) valve.

If extreme gain is required due to the absence of an I.F. stage as in some mantel sets, then grid leak detection is advisable. In this case, it may be necessary to screen the tube. The same anode and screen resistors that were used for the 6B8G (or 6B7) can be used for the new detector.

If the volume control is in the diode

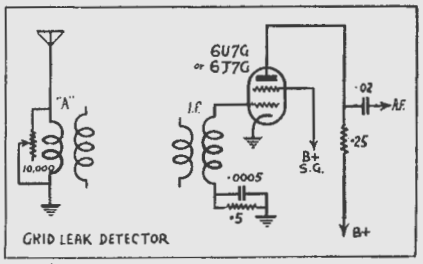




circuit as the diode load, then the problem is not so easy, especially if a pick-up is to be used. (If no pick-up, rewire volume control as shunt across secondary of aerial coil, or across I.F. secondary and proceed as above.)

With Pick-Up

Providing the I.F. gain is not too large and the aerial short so as to prevent overloading, the scheme shown in diagram 4 may be used.

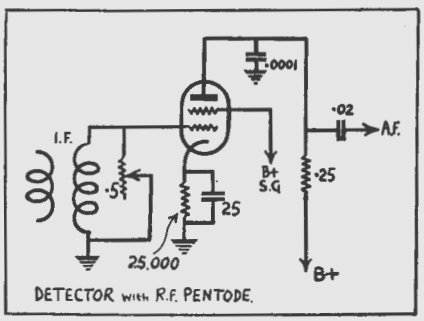


The volume control acts as the grid leak of the 6J7G (this is really the diode load of the diode made up of the 6J7G control grid and cathode) for radio reception and as a potentiometer for phono.

Grid bias for the latter is obtained either from a 1½-volt dry cell, from a back-bias arrangement, or from a by-passed cathode resistor.

Distortion at Low Volume

On "radio," there is a fair amount of distortion at very low volumes as the grid leak is too small, but at this time there is least distortion from the output tube. The aerial should be adjusted in length so that the greatest volume ever required is obtained with the volume control set at "full-on". A.V.C. can be obtained from one end of the volume control, but is not effective at low volume.



Another and better scheme for replacing the 6B8G is to omit the I.F. stage and connect the I.F. valve as a diode, using a 6J7G or 6U7G in the 6B8G socket as a straight audio amplifier. Unfortunately, this is impossible in the case of reflex circuits and in small mantel sets where the I.F. stage is already omitted.

THE VALVE AS AN AMPLIFIER

This instalment of a special series of articles for beginners outlines the way in which a valve operates as an amplifier.

IN the last instalment, how the potential applied to the grid controls the electron flow within the valve from filament to plate (i.e., the plate current), was explained. This action is illustrated in fig. 1, in which the plate current in milliamperes is plotted against grid bias in volts. This curve is known as a static plate-current grid-voltage characteristic curve.

How Bias Controls Plate Current

When the grid is neutral (zero grid volts), the plate current is 13 mills ("X" on fig. 1), but when a bias of -5 volts is applied, the plate current drops to 6 mills. ("A" on curve). A further increase in bias to -8 volts results in a further drop to 1 mill. ("C"), while with a bias of -12 volts on the grid, the plate current drops to zero ("Y"). This is because the repelling force exerted on the electrons leaving the filament has become so strong that none of them can pass through the negatively-charged grid to the plate beyond.

With the grid positive to filament, it begins to assist the electron flow instead of retarding it, and thus the plate current is increased. However, it cannot be increased indefinitely by making the grid more and more positive, because the grid starts collecting electrons on its own account, and current flows around the grid circuit.

With the grid becoming more and more positive, the number of electrons diverted by it steadily increases until none at all can get through to the plate, and the plate current drops to zero. This is a condition that is not wanted in radio; the function of the grid is to control the filament to plate electron stream, not divert it entirely. Actually, as a general rule the grid is kept negative to the filament.

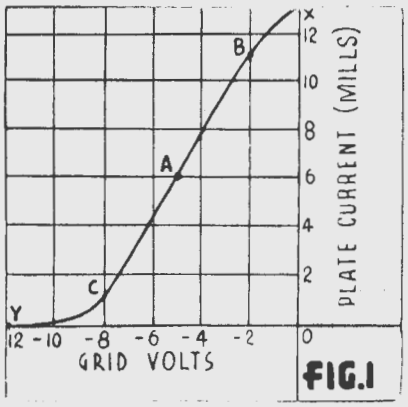


FIG.1

How the Triode Amplifies

Next, how the triode amplifies will be considered. Imagine an alternating voltage, equivalent to a signal, is

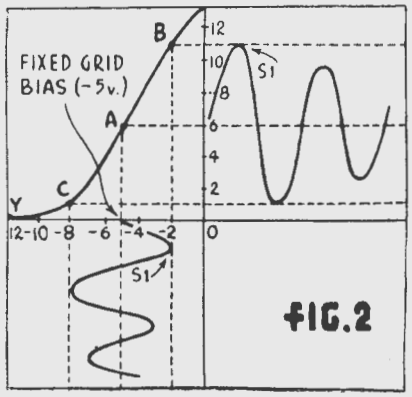


FIG.2

applied to the control grid, which has been given a bias of -5 volts (see fig. 2.), The first peak of the curve ("S1") has a peak value of 3 volts, and so reduces the bias to -2 volts, taking the operating point of the valve from "A" to "B". The succeeding half-cycle swings the operating point in the opposite direction, to "C." In other words, the application of the signal has caused the bias to vary from its normal figure of -5 volts to first -2 volts and then -8 volts.

This variation in grid bias is reflected in the plate current in the following way. The first positive alternation of the signal, which reduces the bias from -5 to -2 volts, results in an increase in plate current from 6 to 11mills. (see fig. 2.). The next alternation, which is negative, increases the bias to -8 volts, resulting in a decreased plate current from 11 to 1 mill. In this way, the plate current varies in sympathy with the applied signal, and so we obtain in the plate circuit an exact replica of the signal variations as supplied to the grid.

The net result, then, of applying a small alternating voltage to the grid is that it produces similar fluctuations in the plate current drawn by the valve.

Corresponding Voltage Variations

When some form of load (resistance or impedance) is connected in the plate circuit, this variation in plate current flowing through it will produce a corresponding variation in the voltage drop across it. This alternating voltage is a magnified version of the original signal, and thus the valve is an amplifier.

How Overloading Causes Distortion

In this way amplification without distortion takes place. This is only true, however, if the signal voltage is not so large that the operating point passes off the substantially straight portion of the curve.

For example, from figure 1 we find that the permissible grid swing is between "B" and "C". If the signal is so great that the operating point passes off this line to the curved portions, distortion results, because then the plate current does not increase or decrease with the grid voltage variations to the same amount as it did over the straight portion.

In fig. 1 we see that a signal with a total variation of 6 volts is the greatest permissible, as the resultant swing of 3 volts each side of the centre brings the operating point to "B" an "C". Thus the negative portion of the maximum permissible signal increases the bias by 3 volts, reducing the plate current by 5 mills., and vice versa with the positive portion. If, however, we apply a 14-volt signal, with a resultant 7-volt swing to the left, it would reduce the plate current by 5 mills. for the first 3 volts, but only by 1 mill. for the next 4 volts. Obviously this would result in a distorted form of signal.

The opposite half cycle would result in an even more violent distortion, as it will be seen that 7 volts to the right of the point marked "A" brings the working point past the zero line, and the grid would become positive. This briefly explains the restriction in undistorted output which is available from a single valve when used as an audio amplifier.

Actually, in one application of the valve—that of detection—this partial suppression of one half of the signal is desirable. Why this is so will be explained in a later instalment.

Next Month: How The Detector Works.

RESISTOR AND CONDENSER BOXES

By John Bristoe

HERE is a handy pair of boxes that will be found invaluable for servicing and experimental work and will save the owner much time.

The first contains a number of tubular condensers varying in capacities from .005 to 500 mfd. These have all the earthed ends in the paper types and negative of the electrolytics connected together and all connect to the negative terminal on the box. The other end of each condenser goes to a lug on the switch and the moving arm of the switch is connected to the positive terminal of the box.

The capacities of the various condensers can be marked with ink or paint on the front of the box.

All you need now is a small pair of insulated clips or test prods, each on a short length of wire connected to the terminals, and instead of having to solder the condenser into a set at any time.

When experimenting, or looking for the cause of oscillation, hum, and other faults, you merely hold the prods on, or attach the clips, whichever you use, and move the switch to the desired capacity.

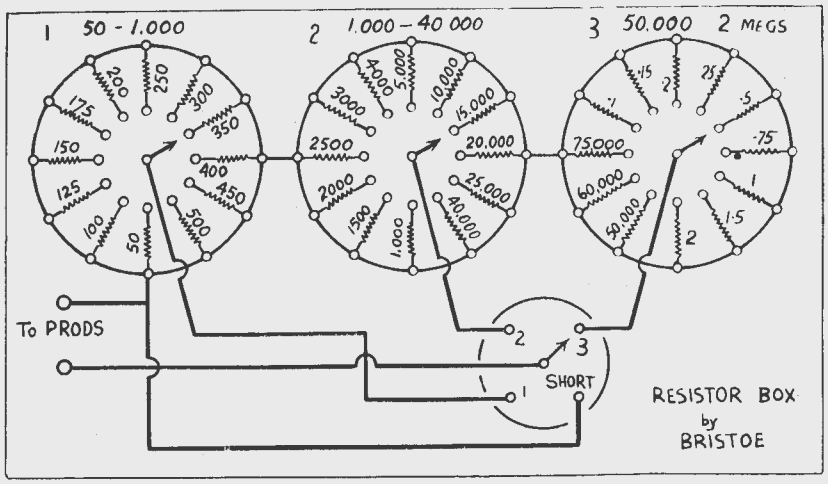
It is well to choose condensers with the highest voltage rating available.

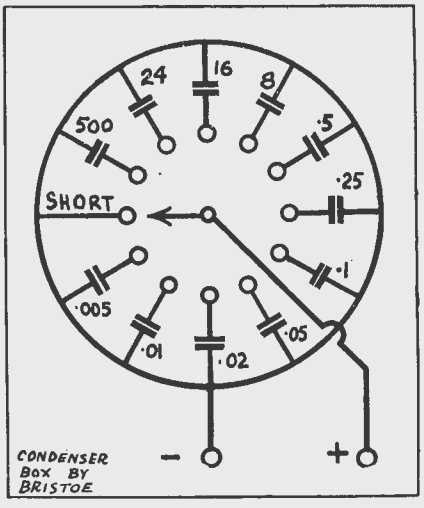
The resistance box is very similar in principle to the above. I used a range of resistors from 50 ohms to 10 megohms and included all the most popular sizes generally used in ordinary radios.

As the range of resistors required is much greater in number than the condensers, four switches were used. Three of them were connected similarly to the condenser switch, excepting, of course, that there is no polarity on the resistors, and the fourth switch is the master switch, which is used to connect whichever one of these switch deck is required to the terminals.

Included in both the resistor and condenser box is a short circuit position which is often an advantage to have.

For instance, it is very useful sometimes to be able to short condensers or resistors without the necessity of soldering or tying a piece of wire across them.





Interesting Letter From Radio Engineer

A letter just to hand from a radio engineer at Bordertown, South Australia, contains several interest remarks. He says:—

"I am not a regular reader of your paper, but, having purchased a spare December copy from the local newsagent to-day, I noticed that one of your querists (G.K. of Kerang) was anxious to know whether type 59 valves were still obtainable. I happen to have two on my shelves which I am not likely to require and thought that it might be of value to let you know. I know how difficult it is these days to obtain parts, and actually one of these valves was in use in an amplifier which I recently rebuilt, and I had a bad time trying to get more modern tubes for it. I cannot imagine anyone wanting 59's for any modern job, although there are occasions when they are useful. In my case I imported a Webster talkie amplifier some years ago, when I knew less than I do now and a Yankee Company convinced me that their 46 class B amplifier was a better proposition with their sound heads (which I ordered) than our existing 50's output amplifier (a copy of the Silver Marshall 692). We soon found out all about photocells, pre-amplifiers, etc., when we had the gear on hand, and found that a preamp. into the old Class A amplifier made a much better job than the 46's Class B.

Meantime we had, during experiments, replaced the 46 driver tube with a 59, because the indirect heater considerably reduced the hum with the Webster. The job was not used for long even then, and only on one night per week, so the tubes are quite good yet for a long life. I say tubes, because I had one as a spare and they were occasionally interchanged. Your correspondent is welcome to them at 15/- the pair. We have just rebuilt the Webster for another show we have opened. using 2A3's P.P. output, into the same output transformer as the 46's fed.

The load may not be quite correct, but it is a good transformer with plenty of load tappings. The 2A3's are fed by a 6J7G inverter, 6J7G ahead from gramaphone input and another 6J7G from the P.E. Cells ahead of that. Flat out, the output is noiseless from the pick-up, whilst from the preceding stage noise is negligible and with barely perceptible hum even using A.C. exciter lamps. We are very pleased with the conversion and it is powerful enough to only require one-third to one half volume for all sound purposes, in a hall seating 450. With the 2A3's tone, is needless to say, **excellent.**

There were several difficulties to overcome in carrying out the rebuild, mainly with securing resistance which would carry the currents necessary without overheating. The oltput voltage for the 46's was 400 volts, rather high for 2A3's. We solved this matter quickly by putting a 60 watt 230 valt lamp in series with the plate supply to these tubes. Any overload will promptly show in variation af the red glow in the lamp, but so far we have not experienced any variation in regular service. The 400 volts was, of caurse, very handy for the phase inverter and for the preceding resistance coupled stages which could be designed for maximum gain.

I have written at some length, and hope that this has not wearied you, but you know how it is when one starts to talk an amplifiers. I had another showman visit me recently because his 2A3 amplifier puts up a poor show and he was amazed at what we were getting out of ours. His design, by the way, was dated 1932. He has now started to rebuild, but is having a job getting parts. However, what I started to say about him was that he gets on the trunk telephone to talk about amplifiers and is worse than this letter. It is costing him a fortune. My greatest worry at the moment is to get a 230 volt A.C. gramaphone motor for my new show. Advertisements in all State newspapers have failed, and if I thought I might get results by advertising with you I would do so; but if there are none about it is not worth trying.

Yours faithfully,
A. W. MURRAY."

Any readers who can assist Mr. Murray to obtain a gramophone motor are invited to get in touch with him direct.

SELECTION of CRYSTALS for CRYSTAL SETS

By

PHILIP A. G. HOWELL

From rather close association of late with that genus of radio bugs known as "crystal jugglers," I find that with most of them the big idea is that any sort of a crystal, from a piece of coal to carborundum, tied by its ends to a coil and pair of phones constitutes as good a set of this style as can be made. This attitude has probably become prevalent through the crystal set being recommended for beginners to start on, with whom it seems we must ever associate a tangle of twisted dirty joins and absence of solder. Whatever the cause it is certainly a pity after the wonderful work done with these sets in the days before the audion tube. Recently I have seen several statements by leading radio magazines reprinting a few stale circuits that have already been printed time and again, that there is nothing new in crystal radio. There may not be, but there are volumes that have been discovered in the past that they have apparently forgotten, or their present writers didn't ever learn about.

Among the more important facts that to-day are omitted are the instructions that should be given concerning the choice, use and handling, etc.. of the crystals themselves.

There are many different types of crystals, including galena or the argentiferous ore of lead, Pb.S., for those lads who are studying for matriculation and kindred examinations; chalcopyrite or copper pyrites, CuFeS2; zinc blende, the chief ore of zinc, ZnS; silicon carbide or carborundum, SiC by formula; and iron pyrites, FeS2; these being but a few of the more common ones. Some, like galena, are natural crystals, while others, like carborundum, which is a mixture of sand, coke, sawdust and a little salt strongly heated in an electric furnace, are synthetic.

Choice of Crystals: These differing types have different applications according to their sensitivity, surfaces, etc. For instance, the highly sensitive galena or pyrites crystals require a light cats-whisker contact, and since this is easily disturbed such crystals would not be recommended for a knockabout portable set; they are for the better type where long distance reception is desired and the constructor is willing to take time to make delicate adjustments. For the average city listener a semi-fixed perihou detector is as good as anything if extreme sensitivity is not desired. Carborundum, however, is not nearly so sensitive, and in general with other silicon crystals usually requires a heavy spring loaded contact. These are the fixed crystals of radio, and are suitable for sets located close to broadcasting stations,

Mounting Crystals: The type with many sensitive spots is usually satisfactory in an ordinary crystal cup, for there will generally be a sensitive spot contacting the cup or screws somewhere, but it may be entirely different with a carborundum crystal, which may have to be screwed into all sorts of different positions to obtain the best results. To get the maximum sensitivity from a crystal I prefer to mount it with two catswhiskers. With this arrangement there is no doubt about geting two sensitive spots.

Handling Crysals: They should never be touched with the bare hands, but handled with tweezers or forceps; otherwise they will become coated with a fine layer of grease, which will destroy their sensitivity.

To Revive Dead Crystals: To my mind the best and quickest way is either to crack the crystal open and expose fresh surfaces, or, if it is too small, hold it in the tweezers and scrape the faces well with a clean, hard blade. This is most effective. However, there are apparently less

(Continued on next page)

CO-PROSPERITY IN FORMOSA AND KOREA

Some Advice to Short-Wave Listeners

by

H. J. TIMPERLEY

RADIO propaganda from Tokio offers Australia and New Zealand a part in Japan's Co-prosperity plans in the Pacific. She also offers nations of South Eastern Asia a new era of co-existence and co-prosperity.

Formosa and Korea have both suffered for 45 years from Japan's co-prosperity plans. the prosperity part certainly comes true — for the Japanese.

The Japanese have always been inclined rather to boast of their achievements in Taiwan, as they call Formosa. In their propaganda they have presented to the world the picture of a progressive and prosperous colony. A place where the native population is living happily under a kind and benevolent administration.

Chinese form about nine-tenths of the population of Formosa. The Japanese took the island in 1895. To-day production and industry and all of the essential services are in the hands of the men of Nippon. They maintain that control by severe measures, and by suppressing that freedom which they say they are so anxious to bring to the peoples of East Asia.

It is true that railways, roads, factories and schools have been built, but these benefits have served only to enrich the Japanese rulers. The people of Formosa are the farmers, the labourers, and the tax-payers. The Japanese have been the administrators and the financiers. Japanese workmen receive twice or three times as much pay as Formosans for doing the same work. Large Japanese firms and banks monopolise business opportunities.

Control of the people is by police methods involving cruelty and torture of the kind that is seen in Korea, Manchuria and China. The people of Formosa have had their lands stolen from them, they are imprisoned without trial. They have been conscripted to build roads and to clear their own land. When they resisted they were beaten and starved, and in some cases put to death.

The 6,000,000 Formosans were among the first victims of Japan's co-prosperity plan. In 1937 there were more policemen in Formosa than teachers. One for every 580 persons. In Japan the number of teachers is almost six times as large as the number of policemen. Those who do not treat the police with the right degree of respect are sometimes made to kneel all day on stony ground outside a police station. The police also make what are called voluntary collections for the war "from time to time," and it is said that about each year 5,000,000 yen is collected. But only the police know the exact sum and where it goes.

A Japanese Governor-General rules the island with the help of the army and police. The 5,000,000 Chinese are not allowed to have even a newspaper of their own. The Formosans must speak Japanese, wear Japanese clothing, and behave like Japanese; but they are denied the same opportunities that the Japanese residents enjoy. Formosa gives its co-operation to Japan for the same reason that a prisoner co-operates with the prison administration, Only Japanese newspapers may be published.

Slavery in Korea

In Korea, which has enjoyed more than 30 years of the same sort of prosperity, the people have been treated like slaves. When Korea was annexed by Japan, Korean officials were replaced by Japanese in every department of national life. If Koreans did the same work they were paid half, or less, for it.

Land grabbers violated the deepest religious instincts of the Koreans by desecrating their ancestral graves.

As in Formosa, the natural resources of the country were rapidly developed — for the Japanese. For years Japan has bought Korean gold at prices fixed by herself, and has sold it at a much higher price in the world market.

In Korea, all expression of national feeling, whether in religion or politics, has been rigidly suppressed.

The Japanese said in 1910 that they went into Korea to establish peace in the Orient. Chief purpose of Korea is to serve the Japanese war machine, and as a jumping-off place for other conquests on the mainland of Asia.

This is what co-prosperity means to conquered peoples.

CRYSTALS

(Continued from previous page)

crude methods than this, such as soaking the crystal for 20 minutes in a saturated solution of alum and drying.

Making Your Own Crystals: I wonder how many of you know that two teaspoonsful of lead broken or cut into small pieces mixed with one teaspoonful of sulphur and heated in a test-tube till it glows with incandescent light and changes to lead sulphide, will make a batch of fine crystal for catswhisker work. A pyrex test-tube, bunsen burner, sulphur and the powdered or granulated form of metals such as aluminium, manganese, zinc, copper, iron, antimony, lead, etc., will provide hours of instructional work making various types of crystals.

The Action of Crystals: Even to-day there seems to be some doubt as to how crystals are able to pass alternating currents one way only thus rectifying them to pulsating direct current. However, it seems to me that the electrostatic attractions of the atoms in certain compounds such as crystals will allow the electrons to move one way only and not to return as an alternating voltage would require them to do in order to reproduce itself on the other side of the circuit. In terms of the electron theory I should say, for galena PbS, that once the two electrons in a molecule of this compound donated to the sulphur by the lead atom have been returned by electrostatic repulsion, they cannot return again to the sulphur atom, and the alternating current has to supply two more electrons to restore the balance; the next surge moves these on, and the process keeps repeating itself: thus the current is able to flow in one direction only.

—"Radiogram," N.Z.

MAGNESIUM

It has recently been revealed that, by using magnesium alloys instead of aluminium, it is possible to save a weight of 360 lbs. in the construction of a bomber plane.

It is only recently that magnesium has leapt in to the limelight as a raw material, although for years it has been used to provide the brilliant flash required for night photography.

As a powder, magnesium ignites as easily as petrol and burns fiercely. But when alloyed with aluminium, the resultant metal cannot be set on fire with a blow-torch.

Magnesium is obtained from seawater. Oyster shells are burnt to form lime, which is mixed with sea water to form magnesium hydrate. Treated with hydrochloric acid, this forms magnesium chloride. An electric current is used to divorce the chlorine, and leaves a metal which is the magnesium in question.

It is expected that magnesium alloys will be used extensively when peace returns; in fact, many progressive engineers have as their watchwords: "Keep your eye on magnesium alloys."

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

RE VERIFICATIONS

Several listeners have complained to me they are not receiving replies to reports sent to the United States. Well, may be here is the explanation contained in "Universalite" for November, just received.

"We recently read that the office of Censorship would no longer permit verification reports to foreign stations or S.W.L. cards to or from foreign countries, so we wrote the Office of Censorship to get the complete details and have received the following letter:

"There is no objection to the continued publication of magazines relating to the activities of the various shortwave broadcasting groups, which you discuss in your letter of October 5.

"We appreciate the morale value of a hobby of this nature, but we also must take into consideration a matter of much greater importance at this time, the matter of national security. On this basis, we have found that the export of verification cards cannot be permitted.

"We read your interesting letter to the Federal Communications Commission. As you know, the problems you discuss concern not only the Postal Division of the Office of Censorship, but also the Radio Broadcasting Division and the Federal Communications Commission. If there should be any change in our rulings, you will be notified.

"Thank you for bringing this matter to our attention. We commend the patriotic motive which prompted your letter and regret that a wartime necessity requires us to maintain our export objection. If other problems concerning postal censorship should arise in the future, please feel free to refer these to us."

Sincrely yours,
(Sgd.) N. V. CARLSON,
Lt.-Col. AUS.,
Executive Officer.

ECHO POINT

This does not concern that very delightful spot on the Blue Mountains, but refers to GRD, London, 15,450 k.c., 19.42 metres. When transmitting in the Pacific Service I notice there is a terrific echo which spoils an otherwise excellent signal. I remember once before, a year or so ago, we had an echo from one of the BBC transmitters, but I do not recollect any explanation for same. The time that I mostly notice it at its worst is round about 8.30 p.m.

SCIENCE NOTEBOOK

Heard the second series of this splendid feature from the BBC at 8.15 p.m. on Monday, January 18, through GSF, 19.82 metres, when a most interesting talk was given by Sir Edward Appleton on "Sun Spots." Listeners will be pleased to hear that he predicts we will have a much greater freedom from sunspot interference for the next few years than has been the case over the last six years. By 1948, however, things commence to get bad again.

The next item in the same broadcast was a talk on "The Circulation of the Blood." This was put over in a novel manner. The reader of the article, when referring to the discovery of this "most important development in **physiological** research," was corrected by "Dr. William Harvey" who insisted it was a Saturday in 1616 when he made this discovery and **not** a Friday as announced. The "Dr." showed profound interest in the four blood groups and their relation to the Nordic and Alpine races. He also asked was it a fact that blood was dried, stored, and used sometimes later. Altogether it proved to be a most informative talk and has encouraged me to make a note that the third of the series of "Science Notebook" will be given "next Monday at 09.15 hours G.M.T."

CHILE CHANGES FRONT

The papers tells us Chile has joined the Allies. Almost coincident with this Chile is to drop the prefix CB and adopt the letters CE, which was assigned to this country many years ago. Why they have used CB, I do not know.

CRYSTAL TROUBLE

I have not heard CBFY for some time, but I was reading in "Globe Circler" that our Montreal friend is having crystal trouble again (see August, 1942) jumping from 11,705 k.c., 25.63 metres to 11,745 k.c., 25.54 metres.

The same magazine says COCM, Havana, 9,833 k.c., 30.51 metres, has been jumping around between 9,765 k.c., 30.72 metres and 9,833 k.c.

A NEW CUBAN

CMZI, Havana, 7750kc., 38.59m. according to "Universalite", and "Globe Circler," this new Cuban is on the air

(Continued on next page)

relaying CMZ from 11 p.m. to 4 a.m.; 7 a.m. to 11 a.m. and 2 p.m. to 4 p.m. Now then, Dr Gaden, Hugh Perkins and Arthur Cushen, who will be first with reports? This may help: Slogan is "Emisora Official de Gobierno la Republica de Cuba, Capitan Rafael Gonzalez, Palacio Presidential, Havana, relays CMZ (630)"

Reports are requested. I think Senor Gonzalez C., is the aide to President Batista. Listeners will remember Hon. President Batista used station for his political ambitions and successfully. Several members of the AWDXAW Club are the proud possessors of motor car number plates sent to them by the "Sports Palace."

BERNE BROADCASTS

I am in receipt of a letter from the Consul-General for Switzerland advising a change in frequency for the Tuesday and Saturday broadcasts to Australia as from Tuesday, January 19. This will be 15.305 m.c. 19.60m., instead of 11.86 m.c. 25.28 m. There will be no change in reception time in Australia, i.e., it remains 7.45 to 9.15 p.m.

In November issue I mentioned this was one of the frequencies allotted to the Swiss transmitter for evening sessions to America. No call sign is given for this 19.60 metres outlet, but my records show it is one of the old HB stations which later on were changed to HER. I think it will be HER-6.

JACUTTA

Listening to PMC, Batavia a few nights ago on 16.54 metres, heard "You are listening to Jacutta, formerly Batavia, on a wave-length of 16.6 metres." I am giving the phonetic spelling. A letter from Roy Hallett yesterday tells me he puts it down as Chacutta, while Austin Condon, of Laura, South Australia, thinks, with me, it is Jacutta. But, of course, it is only a guess how it is spelt and we will doubtless hear, one of these days, what is correct.

LONDON'S 48 FREQUENCIES

Elsewhere I have shown two more of the outlets for the BBC and here are another couple that may be heard at any time: GRB, 6010k.c., 49.92m.; and G.R,C., 2915kc., 102.9m.

WORLD RADIO UNIVERSITY

World Wide Broadcasting Foundation, Boston, now broadcast in 21 foreign languages: Albanian, Alsatian, Arabic, Austrian, Czechoslovak, Danish, Dutch, Finnish, French, German, Greek, Hungarian, Itilian, Norwegian, Persian, Polish, Swedish, Turkish, Yugoslav (Serbo-Crotian), and Latin

says: "In the midst of war, WRUL closely operates with the U.S. Government in beaming programmes in many tongues to listeners within the enemy lines, and those in the enslaved nations patiently waiting for Victory Day."

U.S. SW-BC STATIONS

According to "Globe Circler", November issue, the war communications board has approved a plan whereby the United States Government will take over and operate all short-wave broadcast stations in the U.S. These transmitters are to be under the direct control of the Office of War Information and the Co-ordinator of Inter-American Affairs, and are to be operated on a 24 hour basis. According to Robt. Sherwood, Director of OWI's overseas operations, the new plan contemplates use of 36 transmitters in all, 14 of which are now in operation. The OWI's request for funds included 7,068,000 dollars for the installation of 12 new stations. It is rumoured that all programmes will originate from the General Motors Building, New York.

RADIO ANANIAS

I have been hearing Berlin on a new wave length to me, viz., 48.54m. At 6.30 a.m. the signal is terrific, and some beautiful music is played. It is apparently a special transmission for some country as this programme is not heard on any of the several other Berlin transmitters at this hour.

NEWS FROM THE CENTRAL STATE

An airmail letter from Mr. Condon of Laura, South Australia, mentions a new station, WHL-5, New York, 9917 kc., 30.25m,, which he has heard at 9 a.m. (our time) with a fair signal.

Mr. Condon also refers to MTCY, Hsinking, 15,320 k.c., 19.58m. at 7.10 p.m. in English, 19th December. "The Voice of Manchuria" was first reported in August, 1941, and at that time gave news in English at 7.30 a.m, (A.E.S.T.).

Another station mentioned by our South Australian listener, is 2RO—, Rome, 10,330 k.c,, 29.04m. He says signal at 9 a.m. is good when presenting session for British Isles.

Mr. Condon was hearing for a time VLN-3, Sydney, 19.305 k.c., 15.54m. in programme from 2 p.m. to 2.40 p.m. for North America.

HELP WANTED

Arthur Cushen writes:

I have a real mystery one for you, heard here in the morning on 9.82 m.c., 30.54 approximately. I heard them with music at 6.10 a.m. and at 6.15 a man reads a short news item, which is followed by a lady who says: "This is a test programme for the —— in West Africa." This same news item is repeated and the lady gives the call again till 6.20 when music is played and they sign shortly afterwards. Modulation is very bad, and although they have plenty of volume its very hard to catch the words. During the whole programme a male breaks in with "How's that?" "Any good," etc. Usually sign at 6.24, saying they will call again at some other times which are given in New York time. It may be the CBS relay on the same frequency which I heard relaying WCRC and signing at 3 p.m. I also heard one at this time on 10.15m.c., 29.50m.

Another one is: on 9.86m.c., 30.43m has news in English at 6.15 a.m. and then has news in Portuguese and French. I think this one is an African —strength is very low. (Only one I know at that hour on that frequency is EAQ, Madrid and signal is excellent, but Mr. Cushen knows that one, too, so it's still a mystery.—Ed.)

Mr. Condon, of Laura, S.A., sends one:—

While listening the other morning at 6.50, I got a station on approximately 49.21m. A dance session was in progress and the signal strength was good then. At 7 a chap came on in English and said, "This is the National Broadcasting Station ERIP." This is all that was said, no location ws mentioned at all. After this a chap was talking in French. At 7.5 jazz music was played and continued till 7.20, when the chap came on in English again and said the same as previously. At 7.25 operatic music was heard and about 7.40 it faded out. I have heard this station on other occasions, but have not taken any notice. This station was first heard here about 3 months ago. I have a feeling that this station is situated in Iran. Have you any clues about this one?"

(No, sorry Austin, I have tried several mornings, but without result.—Ed.).

NEW STATIONS

GVO, London, 18,080k.c., 16.59 m.: This is the call sign of the New BBC transmitter mentioned in January issue under "Diary." Opens at 3 a.m. directed to Central America, West Indies and South America.

GRA, London, 17,715 k.c., 16.94m.: Another outlet from the BBC and just audible from 7.45 p.m. till 10 p.m. From 9 to 9.30 German is heard, but the rest of the time is generally given to music.
At my location the signal is spoilt by very heavy morse.

KWY, 'Frisco, 7.560kc., 39.68m.: Replaced KWV, 10,840k.c., 37.68 m. on Friday, January 8, at 7.45 p.m. Carries same programme as KWID.

HER-6, Berne, 15,305kc., 19.60m.: While this is not actually a new transmitter, I do not remember it being recorded as heard in Australia. It replaces HER-5, 11,865kc., 25.28m., as from January 19.

VLI-3, Sydney, 15,315kc., 19.59m.: A new outlet for Department of Information heard on January 18, at 9.40 p.m., when Paul Maguire was giving talk on Japan. Schedule: 9.15 p.m. to 10.45 p.m.
At 9.45 announcement: "This is Australia calling the China Coast through VLI-3 Sydney on 19.59 metres and VLG-4, Melbourne, on 25.35 metres." After announcing, news will be read, in 15 minutes goes into Mandarin. Signal was excellent. At 9.50 p.m. goes into Malay; also uses Dutch.

VLG-4, Melbourne, 11,835kc., 25.35m.: See remarks above.

VLI-6, Sydney, 9590k.c., 31.28m.: Still a further transmitter for D.O.I. used from 4.10 to 4.40 p.m. for western states of North America. Time was when we knew this transmitter as VLQ-10.

VLI-2, Sydney, 11,,870k.c., 25.27m.: For the British Isles from 5.55 to 6.25 p.m.

VLI-7, Sydney, 11,880kc., 25.25m.: For Eastern States of North America from 11 to 11.45 p.m.

——,Ponta Delgada, 7001k.c., 42.75m.: This is a new outlet for "Emissora Nacional", reported by Mr. Condon as heard with a good signal from 7 to 8 a.m. Clock strikes 6 on opening and, of course, 7 when closing. Programme right through is in Portuguese. This is the one heard last year on 41.07m.

WHL-5, New York, 9897kc., 30.31m.: Still another first reported by Mr. Condon. Heard at 8 a.m. with fair signal. Carries same programme as WLWO (25.62m.).

Radio Shonan, 11,840k.c., 25.34m.: Announcer says: "Radio Shonan, formerly known as Singapore. Broadcasting on 25 metres from 9 to 10 p.m. Tokyo time." They are actually on 25.34m. from 11 to midnight. At 12.30 a.m. they become the Independence League.

WDL, New York, 9750kc., 30.77m.: Another of the Voice of America outlets. Uses several languages from 7.15 to 10.15 a.m. Only a fair signal.

WCL, New York, 9390kc., 31.95m.: Opens at 9 a.m. Very poor signal here. Special programmes for U.S. troops in Europe and North Africa.

WHL-6, New York, 13,480kc., 22.25m.: Mr. Condon sends this one. Says "Good at 7 a.m."

WOO4, New York, 8760kc., 34.25m.: Still another first mentioned by Mr. Condon. Heard in South Australia some nights around 7.45 p.m. with French programme. Roy Hallett tells me he has heard this one in the afternoons.

XGOY, Chunking, 6130kc., 48.92m.: Mentioned in January issue. Is now heard from 9.25 p.m. with good signal. News at 11.30 p.m.

——,Bangkok, 6060kc., 49.50m.: First reported by Roy Hallett. Relays the broadcast station HS7PJ (825k.c.).

SIGNAL TRACER

(Continued from page 7)

photographs of the underneath wiring and rear view.

These show an extra meter, but this particular job is otherwise the same as the original. The meter is a moving iron type and was incorporated to be used for A.C. volts and an output meter, for a special order.

Some of the other instruments especially built have had a modulated oscillator and valve tester all built into one unit.

ALL TIMES ARE AUSTRALIAN DAYLIGHT SAVING TIME

Pressure on space only permits of unusual Loggings or alterations in schedules or frequencies.
by 24th of month. Urgent reports 'Phone Epping 2511.

Australia:

VLI-3, Sydney 15,315kc., 19.59m
A new outlet for the Department of Information. 9.15 p.m. to 10.45 p.m. See "New Stations".—Ed,
Heard well in Adelaide (Gillett).

VLG-6, Melbourne 15,230kc., 19.69m
From 1.15 to 1.45 a.m. for Asia in English.

VLI-7, Sydney 11,880kc., 25.25m
For Eastern States of North America from 11 to 11.45 p.m.

VLI-2, Sydney 11,870kc, 25.27m
For British Isles. 5.55 to 6.25 p.m.

VLG-4, Melbaurne 11,835kc,, 25.36m
Used in parallel with VLI-3, See also "New Stations". Also heard ot good strength in Adelaide (Gillett.).

VLG-8, Melbourne 9680kc., 30.99m
4.10 to 4.40 p.m. for Western States of North America,

VLI-6, Sydney 9590kc,, 31.28m
4.10 to 4.40 p.m. for Western States of North America.

VLG, Melbourne 9580kc., 31.32m
For Western States of North America from 2 a.m. to 2.45 a.m.

VLG-2, Melbourne 9540kc., 31.45m
Slight change in time, Now broadcasts to Eastern States of North America from 11 to 11.45 p.m. To Asia in French and Thai from midnight to 1 a.m.

VLI-4, Sydney 7220kc., 41.55m
Excellent when giving special programme for Forces in S.W. Pacific from 8.30 to 9 p.m,

Oceania:

New Caledonia:

FK8AA, Noumea 6155kc., 48.74m
From 6,15 p.m. to 8 p.m. with news at 7 p.m. Presenting at present one of the best signals ever heard from this Free French Settlement.

AFRICA

Abyssinia:

——, Addis Ababa 9620kc, 31.19m
From 2.40 a.m. to 3.15 a.m, News at 3 a.m. Good signal (Hallett, Condon).

Kenya Colony:

VQ7LO, Nairobi 10,730kc, 27.96m
3 a.m. to 6 a.m. News at 3.15 a.m. and 5 a.m. Mr. Gillett of Adelaide says they open at 12.30 a.m. using English and foreign languages.

America:

WHL-6, New York ..... 13,480kc., 22.25m.
Heard at 7 a.m. with sessian in English (Condon). Heard at 11.30 p.m. Good volume. (Gillett).

WJQ, New York 10,010kc., 29.97m
Almost a wash-out at my location now, of a night.

WHL-5, New York 9897kc., 30.31m
Heard around 8 a.m. (Condon). Nearly as good as WLWO (Gaden). R6 at 9 a.m. (Gillett).

WRX, —— ..... 9920kc., 30.34m.
Heard araund 6 p.m., but not too good (Gaden).

WDL, New York, ... 9750kc., 30.77m.
From 7.15 a.m. to 10.15 a.m. Gives news in several languages.

KEI, Bolinas ..... 9490kc., 31.61m.
Has now reploced KET, 31.65m. at 10 p.m. (Perkins).

WCL, New York, ... 9390kc., 31.95m
Opens at 9 a.m. with news. Gives special musical programme for United States Forces in Europe and North Africa—Ed. Heard well in South Australia (Gillett).

KWY, San Francisco 7560kc., 39.68m
In parallel with KWID from 7.45 p.m. See "New Stations". "In my opinion the best secondary statian ever used by 31.35. R8 at 8 o.m. (Gillett) (Goard) (Perkins).

WBS, —— 7350kc., 40.81m
Heard around 6 p.m. with fair signal (Gaden).

WGEA, Schnectady 6190kc, 48.47m
Very poor at 6 p.m. (Gaden).

WLWO, Cincinnati 6080kc., 49.34m
A favourite of mine. Heard a couple of times closing at 9 p.m. and once at 6 p.m. when it mentioned WBS 7.35m.c. and WRX 9.92 m.c. (Gaden).

WRUS, Boston 6040kc., 49.67m
Heard at 6 p.m., but noise very high (Gaden). (Schedule is 5 p.m. to 9 p.m.—Ed.).

South America:

CE1180, Santiago 11,975kc., 25.04m
Roy Hallett has received verification of his report. These people expressed surprise that their beam—up and down Chile—should be heard here. Best hour is around 10.30 p.m.

THE EAST

China:

FFZ, Shanghai 12.070kc., 24.86m
In addition to night session (7.30 p.m. to 1.05 a.m.) is being heard around 2.15 p.m. at good strength (Gillett).

XGRS, Shanghai 11,680kc, 25.68m
Fine in English at 9.45 a.m. (Gaden).

XGOY, Chungking 6130kc., 48.92m
Heard around 9.35 p.m. (Goden) (Perkins). Gives news at 11.30 p.m.—Ed. Goad at 1 a.m. (Hallett).

Dutch East Indies:

PMC, Jacutta (farmerly known as Batavia) 18,135kc., 16.54m
8.30 a.m. to 10 a.m.; 1 p.m. to 2.30 p.m. and 8 p.m. to 2 a.m. Always a good signal, but I don't like their talks.

India:

VUD-3, Delhi 15,290kc, 19.62m
Still 100 per cent at 2.30 p.m., not a sound of it on 31.3m. (Gaden). (Delhi announces they are also on 31.3.—Ed.).

VUD-3, Delhi 9675kc., 31.01m
English at 11.30 p.m. and announces as United Nations calling (Hallet, Condon, Gillett).

VUD-4, Delhi 6130kc., 48.94m
From midnight till 5 o.m., very good at 1 a.m. (Hallett).

Malaya:

Radio Shonan 11,840kc., 25.34m
"Radio Shonan" (formerly Singapore). Note change in frequency. See 'New Stations"—Ed. Good around 11 p.m. (Condon).

Manchuria:

MTCY, Hsinking 15,320kc., 19.58m
"Voice of Manchuria" in English at 6.40 p.m. with fair signal (Condon).
(Has been heard at 7 p.m. testing with Rome, but during the winter of 1941 gave good morning session with news at 7.03.—Editor).

Philippines:

KXRH, Manila 11,600kc., 25.86m
7 p.m. to midnight. News at 9.30, 10.30 and R6 with news at 9 a.m. (Gaden). (Heard well at night from 7 till midnight.—Ed.) R5 at 9.30 a.m., R4 at 2.30 p.m. R5 at 11.45 p.m. (Gillett).

KZRH, Manila, ... 9640kc., 31.12m
11.30 p.m. R3 at 3.30 p.m and R4 at 7.30 pm. (Gillett).

Thai:

——, Bangkok 6060kc., 49.50m
Relays HS7PJ (825kc) (Hallet). Believe schedule is 10.30 p.m. till 1.30 a.m.—Ed.

Great Britain:

GVO, London 18,080kc., 16.59m
Opens at 3 a.m. for Central America, West Indies and South America.

GRA, London 17,715kc., 16.94m
A new transmitter of the BBC. Poor signal from 7.45 p.m. till 10 p.m. However, Dr. Gaden is hearing it quite well, as also is Mr. Perkins. Fair at 8 p.m. and 1.30 a.m. (Gillett).

GRY, London 9600kc., 31.25m
Very good signal at 6.55 a.m. on Sunday January 24, when giving talk on capture of Tripoli. Listening again at 8.45, found reception only fair.

GSC, London 9580kc., 31.32m
Fair at 8.45 a.m. in North America service.

GRM, London 7125kc., 42.11m
R6 at 6.35 p.m. (Perkins). Usually good around 8 a.m. in European service (Gillett).

GRN, London 6195kc., 48.43m
Fair in North America service (Condon). Schedule I think is: 8.15 a.m. to 3.45 p.m. —Editor.

GRJ, London 7320kc., 40.98m

LOGGINGS
(Continued)

Really good in the European service at 7.30 a.m. (Condon). Schedule: 3 a.m. to 9 a.m. in foreign languages—Ed.

Italy:

2RO-21, Rome ..... 15,047kc, 19.94m Good most nights at 1.30 p.m. in Spanish (Condon).

2RO—, Rome ..... 9550kc., 31.4m Very good with English (woman) at 8.15 a.m. (Gillett). (I have not heard this one yet.—Ed.)

2RO-23, Rome ..... 6300kc., 47.6m Good at 6.45 a.m. with dance music (Condon). Schedule: 4.30 a.m. to 9.30 a.m. and one of my favourites at 6.30 a.m.—Ed.)

Vatican City:

HVJ, Vatican City ..... 17,445kc., 17.20m Heard with R4-6 signal at midnight (Gillett). (This is more or less a new station, but I think is only heard on Wednesdays at midnight for one hour.—Ed.)

Russia:

——,Moscow ..... 15,745kc, 19.05m 10.40 p.m. to 11.20 p.m. calling CBS at 11 p.m. for news broadcasts by William Downs (Gillett).

——, Moscow, ... 15,228kc., 19.7m Giving news at 10.53 a.m. fair signal, but lot of background noise. Dr. Gaden says, Like this station at 9.50 a.m., 12.30 p.m. and 2.30 p.m. all English sessions. Mr. Perkins hears them at 9.05 a.m.

——, Moscow ..... 15,110kc,, 19.85m Dr. Gaden's remarks apply to this also..

——, Moscow ..... 10,445kc., 28.72m One of the best signals on the air at 10.35 p.m. with Kremlin Bells. At 10.40 p.m. woman announces "We broadcast for forty minutes every day at this hour on 15,745kc, 15,240kc, 10,445kc, and 9,545kc." I tried the lot, but 28.72 is my choice. Man read news. At 10.50 woman called the BBC to take a talk from Paul Winterton.—Ed.

——, Moscow ..... 9870kc., 30.4m Heard fairly well at 9.50 p.m. Closes at 10.25 p.m.

Siberia:

RW-15, Khabarovsk ..... 9566kc, 31.36m 7 p.m. to midnight. Excellent signal at 9.30 p.m. (Goard).

Spain:

EAQ, Madrid ..... 9860kc, 30.43m Gives news at 5.15 a.m. Signal is only fair —it is beamed to Europe. Lady announcer—asks for reports (Hallett).

Switzerland:

HER-6, Berne ..... 15,305kc, 19.60m 7.45 p.m. to 9.15 p.m. See "Diary." Frequency is a very bad choice I'm afraid and I would not be surprised to hear of anot hrehacng ....fa,(k iFi.wsG W5m6p ..... of another change very shortly.—Ed.

Miscellaneous:

Azores:

——, Ponta Delgada ..... 7001kc, 42.75m 7 a.m. to 8 a.m. (Perkins). See "New Stations."

Location Unknown:

"Radio Metropole," .... 9475kc, 31.66m Heard at 8.10 a.m. by Mr. Gillett of Adelaide. Mr. Hallett of Enfield, writes he hears them from 4 to 5 a.m.

Syria:

Radio levant, Beirut .... 8030kc, 37.34m 2.30 a.m. to 7 a.m.; News 3.30 a.m.

Cuba:

COCY, Havana .... 11,740kc, 25.55m English from 3.30 p.m. till 4.45 p.m.

COK, Havana ..... 11,623kc, 25.83m Heard very well every morning at 9.15 a.m. (Gillett). Also heard at 4 p.m.—Ed.

COCH, Havana .... 9435kc, 31.80m Heard at 10.45 p.m. on some nights (Condon, Gandy).

COBC, Havana ..... 9365kc, 32.05m Good signal at 9 a.m. (Perkins). R5 at midnight (Gillett).

COCX, Havana .... 9270kc, 32.36m Usually good at 9.30 a.m. (Condon, Gandy).

SPEEDY QUERY SERVICE

Conducted under the personal supervision of A. G. HULL

G.J. (Paddington) complains that many stations fail to announce their call signs, except at long intervals.

A.—Yes, there may be grounds for complaint on this score nowadays. A few years ago nearly every station seemed to announce its call sign before and after every record, which was most tiring. Now they seem to have gone to the other extreme. With marked dials the difficulty is not so pronounced, but for the enthusiast who wants to check up his result, a great deal of patience is necessary.

★

M.M. (Broken Hill, N.S.W.) wants to know what power is required for dance music in a hall.

A.—Rather difficult to say. How big is the hall? How many couples? For a hall 30 feet by 90 feet with two speakers mounted half-way down, a power of 15 watts was found to be barely enough for really good reproduction. It's all a matter of quality versus quantity. Out in the bush, 2 watts seems to be quite O.K. for a small hall. In the city areas, powers of 25 to 30 watts are not too large. It's better to have too much rather than too little, because you can always use of the excess on the bass.

★

S.P.C. (Frankston) suggests an article on how to get best possible quality from pentodes, or beam power valves, now that triode output valves are so hard to obtain.

A.—Main problem would be to find out just which valves are the easiest to obtain. From our own experience we have found it easier to pick up stray triodes than to obtain the latest types of beam power valves. One type of valve which seems fairly plentiful is the 6F6 pentode, a valve capable of giving good all-round performance, and doubtless you will notice that we have used this type for several sets and amplifiers lately. There is nothing much more that can be done to improve the quality beyond fitting inverse feedback, as we have done in nearly every case.

★

T.H.K. (Richmond, Vic.) enquires about kits of parts for a modulated oscillator described some time ago.

A.—No, we are sorry to say that we cannot suggest where you are likely to be able to buy a kit of parts for this job now.

★

A.F.K. (Ballarat) says that his superhet is full of whistles since he has shifted from Melbourne.

A.—This is probably due to the super, being incorrectly aligned. Either the I.F. trimmers have shifted their adjustment due to vibration in transport; or, more likely, the new relative signal strengths of the stations requires a different intermediate frequency. Re-alignment is really a job for a calibrated oscillator and output meter, especially the former. If you do not possess these, then you could try screwing down the I.F. trimmers, say one-eighth of a turn at a time re-aligning whilst listening to a distant station. Sometimes a shorter aerial and accurate aligning of the aerial trimmer (usually on the gang condenser) are of help. If you find the whistles disappear when a certain station is off the air, then point your aerial in the direction of that station so that you receive as little of it as possible. If your aerial is over 30 feet long, you could try putting a small condenser, (say .0001 mfd.) in series with it. A wave-trap is sometimes helpful, though difficult to adjust in this case.

★

J.J,S. (Timboon) has built an amplifier that sometimes suffers from hum and sometimes doesn't.

A.—It sounds very much as though you use a reversible A.C. plug such as 2-pin or bayonet-cap type, but if changing the A.C. polarity is the cause, then you would probably discover it yourself. Try reversing the A.C. plug and see if it makes any difference. Other causes of intermittent hum in an amplifier are: loose earthing wire to braid of a "shielded" grid lead; poor valve socket contacts; intermittent leakage between cathode and filament of a valve; placing a magnetic pick-up near the power transformer; placing an electro-magnetic moving-coil speaker near the first valve; occasional incorrect connecting of pick-up leads.

If there is any crackling, then the intermittent hum is probably due to a poor connection and this should be checked immediately. If you are interested in amplifiers, look out for our "Triode or Tetrade?" article next month.

★

F.J.B. (Koimbo, Vic.) wants to know where to obtain aluminium for a chassis,

A.—You don't. To-day, aluminium has become one of the precious metals. Even flat iron is hard to obtain. For that reason, we are suggesting the use of wood and masonite chassis. Shielding of a type can be obtained by painting with some kinds of metallic paints, or with a graphite-in-shellac varnish. The vibrator pack described in this issue was built upon such a chassis.

★

M.F. (Melbourne), wants to know all about CO-AXIAL CABLE, and how to make it.

A.—Co-axial cable consists of a conducting wire surrounded by an earthed metal case. The two conductors, the central wire and the external shield, are usually separated by glass, ceramic or plastic beads, although other forms of insulation may be used. Ordinary shielded wire is a form of co-axial cable, but the term is usually reversed for large diameter, low-loss cable.

Co-axial coble is used for connecting high-frequency equipment that is widely separated. It is often employed for conveying energy between a transmitter and its aerial, or from an aerial to a receiver. The use of a large diameter sheath and bead insulation means the losses are much less than if ordinary shielded wire were used.

The earthing of the external sheath prevents the picking-up of interference and so car radios employ co-axial cable as a "lead in."

Television is "piped" from the pick-up point to the transmitter by means of co-axial cable.

A satisfactory co-axial cable for short-wave reception can be made by using ordinary cab-tyre flex inside a copper pipe, but both these articles are unobtainable at present, so we're afraid you can't make it.

★

Curious (St. Kilda), asks, "What is the difference between a HARMONIC and an OVERTONE?"

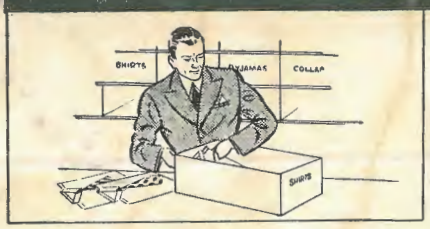
A.— A harmonic is a note the frequency of which is an exact multiple of the frequency of the fundamental. An overtone may be a harmonic, or it may have a frequency which is a simple fraction of one. For example, if the fundamental were middle C with a frequency of 256 hertz (i.e. 256 vibrations per second), then the harmonics would be 512 (i.e., 2X256), 768 (or 3X256), 1024, etc., hertz, These harmonics may or may not be present, depending upon the quality of the note. Overtones which might be present include 384 (or 1½ X 256, ½ of 768), 341-1/3, 640, etc., hertz. Sometimes the overtones include sub-harmonics or fractions of the fundamental frequency. We refer you to that article, "The Reduction of Distortion", in the issue for February, 1942.

RADIO QUIZ — ANSWERS

(1) Multiply by .03937 or divide by 25.4.
(2) Another name for Oscillograph.
(3) A five electrode valve.
(4) There is no difference. Valve is English—tube is American.
(5) Quiescent Push Pull.
(6) The ratio of magnetomotive force to the magnetic flux produced by it.
(7) Sound waves travel 1,142 feet per second.
(8) 940 kilocycles.
(9) 2A5 Type.

—N.Z. "Radiogram."

How John Stepped Ou...

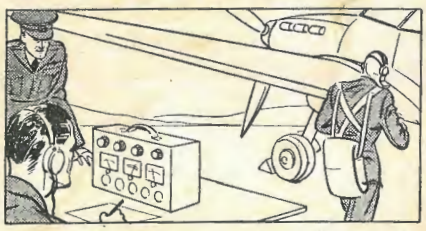


Not so very long ago, there was a young shop assistant named John, who wanted to do his best in the War effort. Being untrained, he did not know what do about it.

Until he heard about A.R.C. Radio Engineering training, and wrote for details of the course. He quickly saw the advantages of learning Radio Engineering, and started the A.R.C. course in his spare time.

John quickly learned enough to take a position at Radio Defence work, which was found for him by the College. This meant more money and good opportunities for advancement.

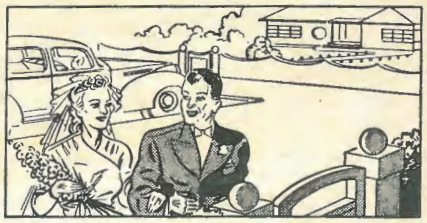
Had he wished at that time, he could have joined a Radio Unit in the Army at communications work, radio maintenance, or some other form of military radio work.



Or in the R.A.A.F. as a Radio Operator in air crew, or on the ground staff. Radio maintenance work, and radio location work, were also open to him.

Still on Defence Work, he carries on with his spare-time Radio training with the Australian Radio College. All the time making himself more and more proficient at Radio work.

Soon, by reason of his training, he is promoted to take control of his section of the work. This means another rise and prospects of even more promotion.



This extra money means wedding bells for John, and a home of his own. He can see the fulfilment of his highest ambitions quickly taking shape.

When his Radio Training is completed he will be ready to take up an executive Radio position. This may come during or after the end of the War. What is most important—HIS FUTURE IS ASSURED.

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