THE AUSTRALASIAN

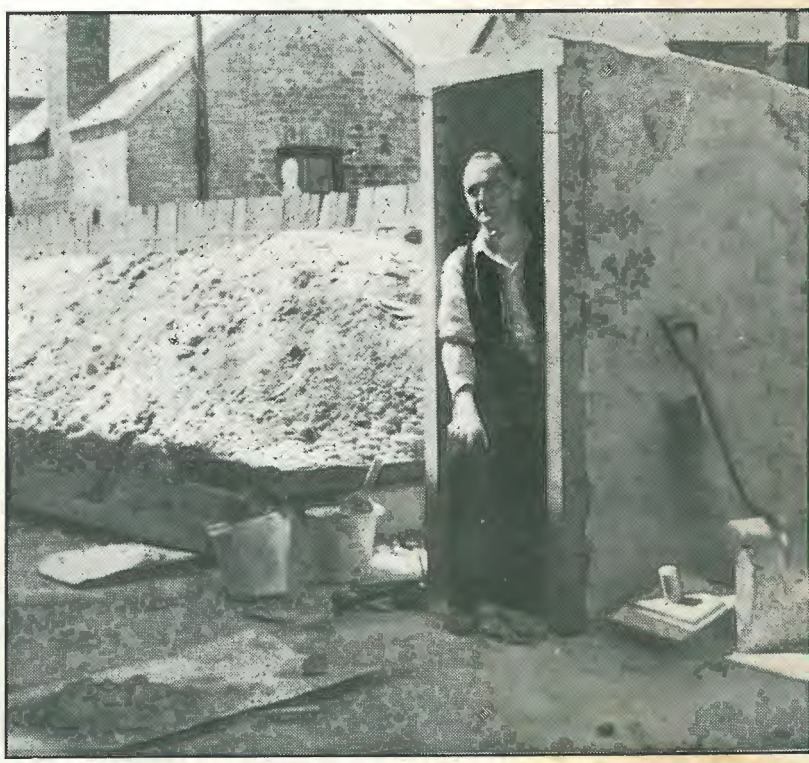
Radio World

PRICE, 1/-

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

VOL. 6 ..... NO. 11 APRIL 15 1942

- FULLY TUNED SIGNAL TRACER
- TEST BENCH ARRANGEMENT
- HIGH FIDELITY AMPLIFIER
- ALL LATEST S.W. SCHEDULES



AIR RAID SHELTER FOR R.C.S. EMPLOYEES

(See Page 3)

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★ Editorial Offices —

117 Reservoir Street, Sydney

Phones: M 4078 - M 4079

★ Office Hours —

Week-days: 9 a.m. - 5 p.m.

Not open Saturday morning

★ Subscription Rates —

6 issues 5/3

12 issues 10/6

24 issues £1

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OUR FRONT COVER

Our photograph shows Mr. Ron Bell, managing director of R.C.S. Radio Pty. Ltd., at the mouth of a large concrete air-raid shelter which has been built at the R.C.S. factory.

Mr. Bell has the interests of his employees at heart, and is also keen to make certain that there will be no interruptian in the supply of R.C.S. components, which are used sa extensively for both civil and defence requirements.

Vol. 6 APRIL, 1942 No. 11

CONTENTS

EDITORIAL

Pioneers often have a tough time of it before their work receives proper recognition.

John Bristoe, author of our series of articles on signal tracers, might be considered a pioneer, and accordingly his articles have not been accepted by all our readers.

Quite a few have their doubts about the value and efficiency of the signal tracer, and the subject is a fertile one for arguments.

Frankly, we have not had much experience with them in our own laboratory, but there are two factors which influence us to put our backing behind Mr. Bristoe.

Firstly, we know that Mr. Bristoe is a practical man, in charge of a radio department, handling hundreds of sets, and, secondly, we note that those who doubt the value of the signal tracer are mostly those who have not actually tried them in practice. They base their opinions on theoretical considerations, which are not, to our way of thinking, sufficient in themselves in a case like this.

To those in doubt we can only suggest that a little practical work with one or another of the signal tracer outfits will soon convince them that they are well worthwhile for those who have a volume of servicing work to handle.

In the Fully Tuned Signal Tracer featured in this Issue

Use

R.C.S

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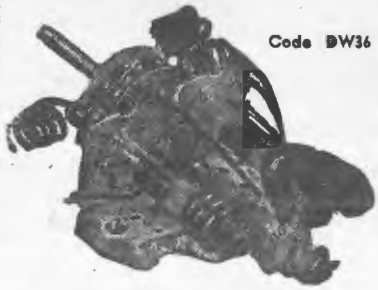
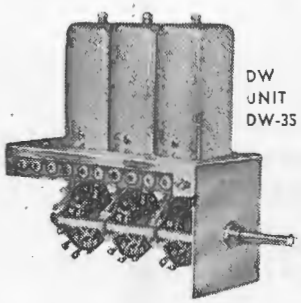
R.C.S. UNIT DW36

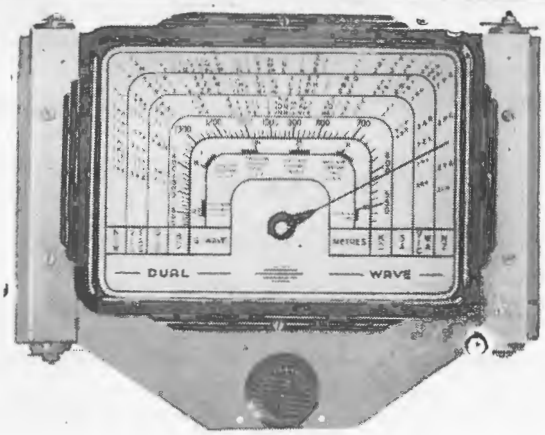
Type DW36, as illustrated, consists of Aerial and Oscillator Coils, Wave Change Switch, the necessary B.C. and S.W. Trimmers and Padder mounted together, wired up ready to assemble into a set utilising 465 k.c., the bands being S.W. 13.7 to 40 metres, and B.C. 1600 to 550 k.c.
Code DW36 .. £1/7/6





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



R.C.S. DIALS

Types DA1 and DA2 are single glass dual-wave, the type DA2 having been designed especially for use with the Five-Band Communications Coil Kit and "H" type condenser. Type DA1 is a standard dual-wave dial for use with R.C.S. coils and "F" type condenser. The DA-5 dial is for use on the 1600 to 550 k.c. and 13.7 to 40 metre bands, with "H" type condenser. All this series is edge-lit and wedge-driven. Aperture for the escutcheon is approximately 7" x 4-7/8."

DA1—Standard D/W Dial, "F" condenser 22/6
DA2—Communications Dial 22/6
DA-5—13.7 to 40 metres D/W condenser 22/6
DA-6 Mantel Set Dial, D/W "H" gang 18/9
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DA8 Same as DA7 but ready assembled .. 13/6

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TB6	Input "B" Class, bakelite case	18/6
TB35	"A" Class High Fidelity, steel case	67/7
TB36	"B" Class Input High Fidelity, steel case ..	67/6
TB37	"AB" Class, bakelite	28/6

TB6—"B" Class

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THE LATEST SIGNAL TRACER

From John Bristoe, signal tracer specialist, comes his latest design, featuring full tuning, an in-built vacuum-tube voltmeter and many other new features.

IN September, November and December issues of this journal I described three different types of signal tracers. These were resistance-coupled throughout, except the one in the September issue, which had a superhet tuner to be used to apply a signal to the receiver under test.

I have now completed a "tuned" signal tracer which uses less valves than the one in the September issue, but which is more effective and has greater scope.

A simple but very effective vacuum tube voltmeter has also been embodied in this tuned signal tracer which uses the same 0-1 milliammeter that is used on the 1000-ohm per voltmeter and ohmmeter.

The operation of this signal tracer is similar to those described previously, but it must be tuned to the signal right up to the second detector of the set being used.

Standard Parts Used

As standard parts have been used in the construction, no difficulty should be experienced in obtaining them, excepting perhaps the 76 valve. This could be replaced by a 56, making the required filament voltages change from 6.3 to 2½ volts with the aid of an auto transformer if there is no 2½-volt winding on the power transformer used.

Use reliable parts to build this outfit. I used I.R.C. resistors throughout and found them efficient and reliable.

If difficulty is experienced in obtaining the 8 meg. resistor, use a 5 meg. and a 3 meg. in series. Be sure that all resistors, condensers and wiring throughout the unit are mounted firmly and not shifting about every time the instrument is moved. Also see that all valve shields are properly earthed. All valves are shielded excepting the 6V6G and 80.

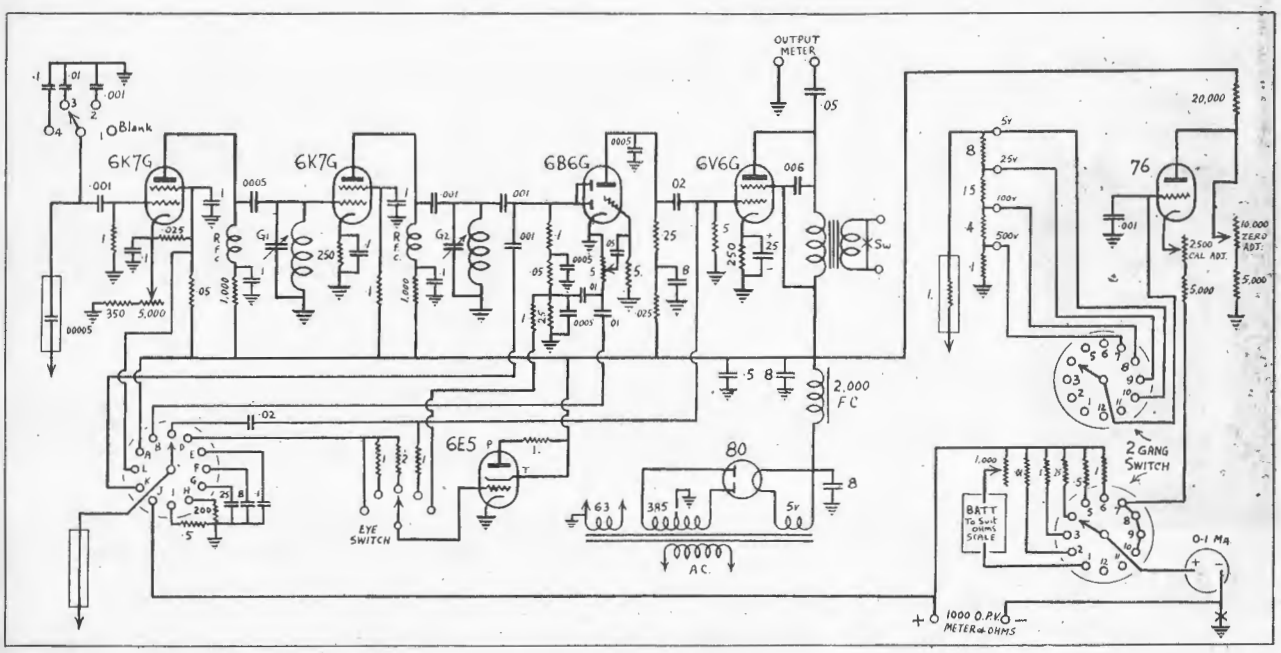
Important.—The earth terminal of the signal tracer must be connected to the chassis of the radio being tested.

Advantages of the Tuned Signal Tracer

(1) The instrument is much more sensitive than previous types. Often it is not necessary to place the probe on the plates or grids of the set under test, only near them. Under a dead

(Continued on next page)

JOHN BRISTOE
Radio manager of Denhams' Pty. Ltd., Maryborough, Q.



Circuit schematic diagram for the latest Signal Tracer, showing the in-built vacuum-tube voltmeter in detail.

SIGNAL TRACER

(Continued from page 5)

set I usually wave the probe about an inch away from the wiring, starting near the detector and working back. If a sound is heard in the signal tracer near the detector the trouble is almost certain to be in the detector or audio stages. If no sound is heard, take the probe towards the intermediate and oscillator stages until a signal is received. Apply the probe to the nearest plate or grid. If a signal is obtained, then work back until the signal cuts out.

(2) Although a very low capacity condenser is used in the probe, the sensitivity is greater and less detuning occurs on the R.F. and I.F. frequencies.

(3) As the signal tracer is tuned, one knows eactly which frequency the signal is on in the R.F. and I.F. sections.

(4) Selectivity. — Untuned models, used in a city area where a number of stations are operating, bring them in together. This model tunes only the required frequency.

How to Use

If servicing a set and the I.F. frequency is not known, apply the probe to the plate of the mixer with the wave-change switch in the untuned position. This is to check the presence of the signal. Now turn wave C switch to band 4. If, on rotating the dial on the signal tracer, the signal comes in very loudly, the frequency is located. However, be sure that the oscillator on the set is working, or the broadcast frequency signal is received.

The tuned section can also be used to check the efficiency of the oscillator signal. Turn the dial to the oscillator frequency of the set, have the eye switched to the diodes, and apply the R.F. probe to the oscillator plate and grid. The oscillator grid voltage can be checked with the eye or V.T.V.M. without affecting the operation very much.

How to Adjust the Signal Tracer

Line up the tuned circuits on the instrument in the same manner as you would a T.R.F. set. Then take readings from various parts of the dial with a reliable oscillator, otherwise it means working in the dark. Actually a dial, calibrated for all bands from about 20 m.c. to 150 k.c., is needed, together with an all-wave coil kit. Due to war conditions it is not likely that coil manufacturers would make these coils, so details are given on how to make the kit up with ordinary I.F. transformers and R.F. coils.

To Construct the Coil Unit

This requires one I.F.T., 465 k.c., and R.F. coils for whatever bands are to be included in the instrument. The most important are all usual I.F. bands. The two coils from the I.F.T. will cover all these, i.e., from 150 k.c. to 470 or thereabouts.

All you require are the actual windings from the I.F.T., so remove the can and trimmers and there is usually a former with two pie-wound coils, probably covered with wax.

To remove the wax, hang the former in a warm oven long enough for the wax to melt and leave the two coils exposed. Now, between the windings, cut the former with a hacksaw. This gives two separate coils.

Coil Alterations

Remove about 10 turns from each coil or it will not be possible to tune up to 470 k.c. When using an ordinary standard two-gang condenser, I found that 175 k.c. could not quite be reached when the blades were fully meshed. So, to avoid including another set of coils, I shunted a .0001 condenser across each of the I.F.T. coils. This condenser is switched in when the wave-change switch is on No. 4 position. If possible, avoid using I.F.T. coils wound with Litz wire, as this is very fragile and care must be taken to see that all strands are soldered or the inductance of the coil is affected. I fitted all the coils into a two-stage five-band coil box, but they can be mounted direct on to the chassis if desired, as close to the gang as possible.

Be sure that both sets of coils are shielded from each other or oscillation will occur. It may also be necessary to shield the R.F. chokes. All coils used in the coil box have small trimmers across them. The types generally used for aerial and R.F. trimmers in modern radios are suitable. Provided the coils are reasonably accurate no great capacity is needed.

If desired, the R.F. coil primaries can also be switched into the circuit instead of the R.F. choke. But, as this involved extra switching and owing to the fact that my coil unit had to be mounted above the gang, I did not worry about them. I think the system

Further Data

If you have not already seen the previous articles on Signal Tracers you can obtain the September, November and December, 1941, issues from our Back Number Department, price 6d. each, post free.

used will be found effective for all requirements.

Vacuum Tube Volt Meter

This vacuum tube volt meter (V.T.V.M.) has ranges of zero to plus or minus five, twenty-five, one hundred, and five hundred volts. With it voltages can be measured in any part of a radio set with practically no current being drawn, as the input resistance is 11 megohms. Furthermore, it is almost impossible to overload the meter.

No special meter is required for the construction of this section. An ordinary 0-1 milliammeter similar to that used in most volt ohmmeters is suitable.

Calibration

The calibration of the V.T.V.M. is as follows:—Using good dry batteries, or some other source of constant reliable d.c., adjust the 2,500-ohm potentiometer until the V.T.V.M. reads the correct voltage (using the first input switch tap), then remove the probe from the voltage and re zero by means of the zero adjustment, 10,000-ohm potentiometer, in the when the voltage is removed. (Zero is in centre of meter scale. In fact, when the V.T.V.M. is in operation it looks and works just like a car ammeter, only it shows voltage — positive and negative — instead of charge and discharge.)

After this point is found, the 2,500-ohm potentiometer will not need to be touched again unless the valve is changed. The 10,000-ohm potentiometer adjustment is readjusted whenever the V.T.V.M. is to be used, the same zero setting applying to all ranges.

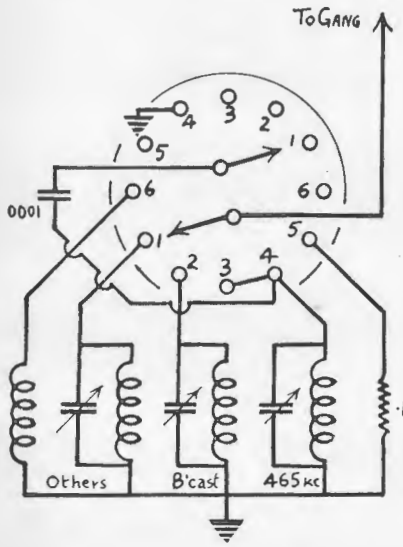
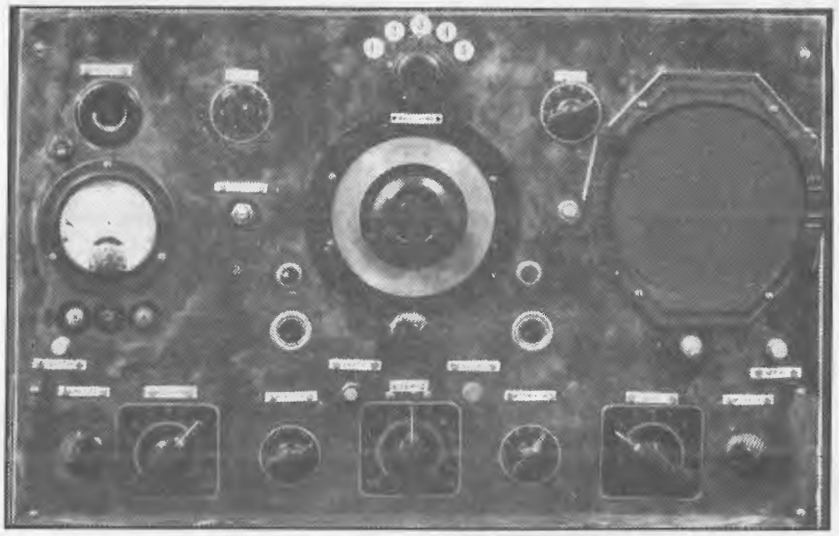


Diagram showing the switching arrangement for the coil unit, as detailed in the article.



A photograph of the front panel of the latest Signal Tracer unit.

middle of the panel. Continue this procedure until a point is found on the calibrating resistor 2,500-ohm potentiometer, where the V.T.V.M. will read the correct voltage and return to zero

To Correct Zero

If it is found that the V.T.V.M. will not zero correctly it may be necessary to alter the size of the plate resistor on the 76 valve. This is shown in the diagram as 20,000.

This V.T.V.M. will be found to be a big improvement on many other types as no switching system is required to reverse the meter. Just apply the probe and it shows the exact voltage, and if it is positive or negative.

I do not intend to attempt to give all the advantages of a V.T.V.M. or describe its many uses as it is too comprehensive a subject at this stage. Perhaps Mr. Hull will arrange some articles on this subject later on.

Gain Tests

However, it can be used for making gain per stage tests right through any receiver. There are many voltages in a radio that cannot be checked with ordinary meters without upsetting the operating efficiency.

If desired, the meter may be removed from its case and, where there is sufficient space, the calibrations of the various scales of the V.T.V.M. may be marked on the meter face. If not, make the complete scale in ten divisions and a good indication can be obtained of the voltage reading.

Switch Wiring

The switch wiring of the voltmeter section is shown fully and needs very little explanation. When the contacts are on points 7, 8, 9 and 10 the V.T.V.M. is in action, and when in the other positions the meter needle will resume its normal position and return to the end of the scale. It will be noticed that two contacts of the switches were not used. These could be used to extend the voltage range if required or another deck could be added and milliamps included.

The tuned signal tracer is not meant to entirely supersede the previous models designed. Those who have built the various types can alter them very easily. The others were good, but this model is better and warrants any trouble taken to make up the coil unit and V.T.V.M.

Eye

It will be noticed that the magic eye grid can be switched to the diodes where it acts as the usual tuning indicator, or audio sections, where it operates as an output indicator. Also it can be switched to the master switch and used with the probe to test A.V.C., etc. Actually it is not really essential to include the eye circuit at all as the V.T.V.M. can do these operations just as effectively. However, I prefer to have a visual as well as audible check of the signal picked up by the tracer and at the same time leave the V.T.V.M. free for other operations simultaneously. Sometimes in intermittent or noisy sets, two probes can be used at the same time and, in some cases, the three probes. It is an advantage to have small alligator clips that will attach to the end of the probe. Then they can be clipped on the various parts of the set being tested and watched for voltage alterations, etc., whilst still having an audible check. This is particularly

(Continued on page 9)

ROLA LOUD SPEAKERS

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SIGNAL TRACER

(Continued from page 7)

effective if used correctly in tracing intermittent faults, also both audble R.F. or I.F. and audio sections can be checked at the same time, with a visual indication on one or the other or both.

Probes

Diagrams are given of three different types of probes:—

(1) A probe with a small fixed condenser inside. Used on R.F. and I.F. section.
(2) With a 1 meg. resistor inside and used on V.T.V.M. and eye sections.
(3) This probe is straight through and is used on audio circuits, etc.

When using the R.F.-I.F. probe have the signal tracer turned to the frequency to be checked, i.e., on R.F. frequency tune to the broadcast frequency, and from the mixer plate to the second detector should be tuned to the I.F. frequency.

Low-capacity Cable Needed

The lower capacity cable used in the probes, the better the general effect. I have tried all types of cables and find that good-quality microphone cable is most satisfactory. However, if you can obtain a length of coaxiel cable all the better.

It will be noticed that contact L on the master switch connects to the screen of the first 6U7G about 100 volts. I include this because a source of H.T. is useful for various purposes. By turning the switch to this position, there is available 100 volts that can be applied with the probe anywhere desired. Also contact A is connected direct to 250 volts. This can be used in the same way.

The 1000-ohm per voltmeter and ohms can be used with the probe or two ordinary test prods can be plugged into the banana sockets on the panel. This leaves the probe free for other work.

The Front Panel

The front panel of the signal tracer was made of sheet steel. However, I have a workshop with lathes and presses at my disposal and, unless you have the same, do not use steel. Masonite is a good substitute and is easy to cut and drill and presents a nice appearance.

Conclusion

In conclusion.—The signal tracer is an instrument which will never become obsolete, because it can be used on any type of radio or sound apparatus. In the future there will come frequency modulation and television, and the signal tracer of to-day will be ready for that time.

Correspondence

I have received a number of letters since the first articles on signal tracers were published — some very appreciative and asking for further details, some of which were too involved to answer by letter. If further articles on the subject of signal tracing will be of interest I shall be pleased to submit same at a later date.

I advise those who have not yet tried servicing with signal tracing to do so as soon as possible. I am convinced that a signal tracer used in a proper and intelligent manner will locate faults more quickly and accurately than any other known method, and, after all, when the fault is found, the cure is usually simple.

Bear in mind, however, a signal tracer does not cure faults — it locates faults quickly and accurately, thus saving your time and time means money.

The Evolution of Radio

SOME EARLY HISTORY OF THE INVENTION OF BROADCASTING

IN these modern days when every tank and Bren gun carrier has its own radio equipment and when every home has its own radio receiver, there is a chance to forget that radio is such a modern feature in civilisation. Or is it?

It is only a few years since broadcasting was introduced, but it is many years since the foundations of radio were laid. For example, it is said that the Chinese discovered magnetic ores somewhere about three thousand years before the birth of Christ.

Surprisingly few modern radio technicians know the full story of the development of radio, and are content to dismiss the subject by saying that radio was "invented by Marconi."

Actually the evolution of radio was considerably involved and it is hard to define which developments should be credited to electricity rather than radio. It was upon the early work of the scientists who gave us electricity that much of radio became possible. The close relationship between the radio terms and the names of early electrical scientists is only too evident. For example, we have the volt, after the Italian scientist named Volta. Ampere was originally the name of a Frenchman, as Ohm was the name of a German. Watt as a Scotsman. All of them had a considerable part in the development of radio, yet their fame is more closely associated with electricity. Considerable credit, however, is usually given to Maxwell and Hertz for their radio work, although their efforts still left a lot of ground to be covered before radio became what it is to-day. Marconi's part in radio development might be considered more as commercial than inventive. It was Marconi who formed the business enterprises which did so much to demonstrate the possibilities of radio communication. A couple of years before the opening of this twentieth century of ours, Marconi's companies had demonstrated that radio signals could be sent over distances of up to a couple of hundred miles. They faced up bravely to plenty of official red tape and public scepticism, and forced the acceptance of radio as a means of communication.

It was in 1901 that the Atlantic Ocean was spanned by a radio signal, and by 1903 the art had progressed to such an extent that a full message was sent from the President of the United States to the King of England.

A big factor in the progress of radio was the proving of its value to shipping when it was directly responsible for the saving of over 200 lives when the S.S. "Republic" sank in the Atlantic.

Modern radio owes a lot to the introduction of the valve, which was more or less directly due to the efforts of Edison when he invented the electric lamp, although the credit is usually placed to Fleming, who demonstrated the diode detector in 1904 and to De Forest, who offered the original triode with its ability to amplify signals, and to oscillate. Both these properties have proved of immense value in bringing radio technique to its present standard.

Radio broadcasting of programmes of music is of much more recent years, this type of broadcasting having been practical for a matter of only about 20 years or so.

SPEAKER ENERGISING

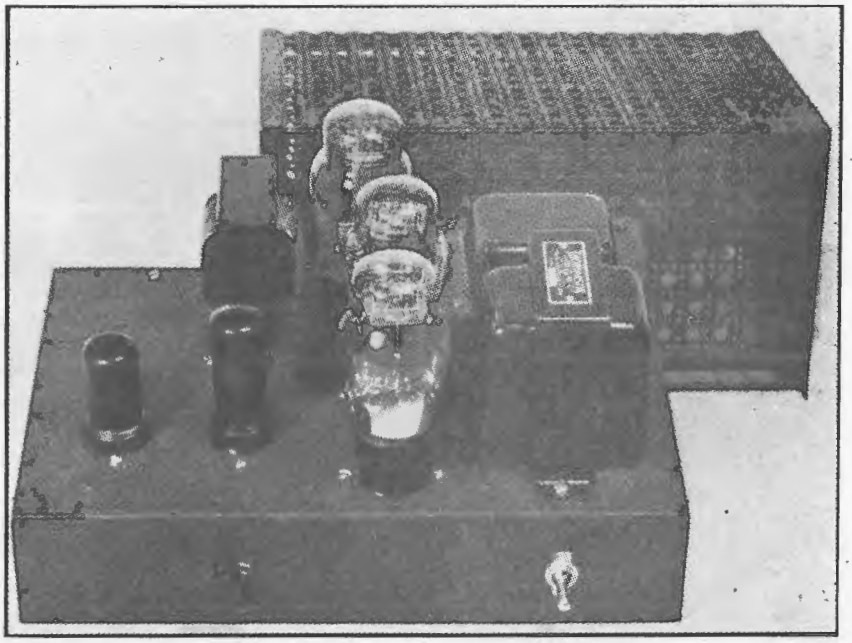
The field coil of an electro-dynamic speaker requires to be energised with a certain wattage of electrical power. Small speakers need only two or three watts, medium-sized speakers need four to eight watts, and the bigger speakers may need from 8 to 12 watts. A speaker which is not sufficiently energised cannot handle power properly nor give good quality reproduction. A speaker which is overloaded with energising power will overheat, resulting in the voice coil housing warping and fouling the pole piece.

The calculation of wattage is merely a matter of the application of the Ohm's Law, it being necessary to know the field coil resistance and the current passing through it or the voltage drop across it.

HIGH FIDELITY AMPLIFIER

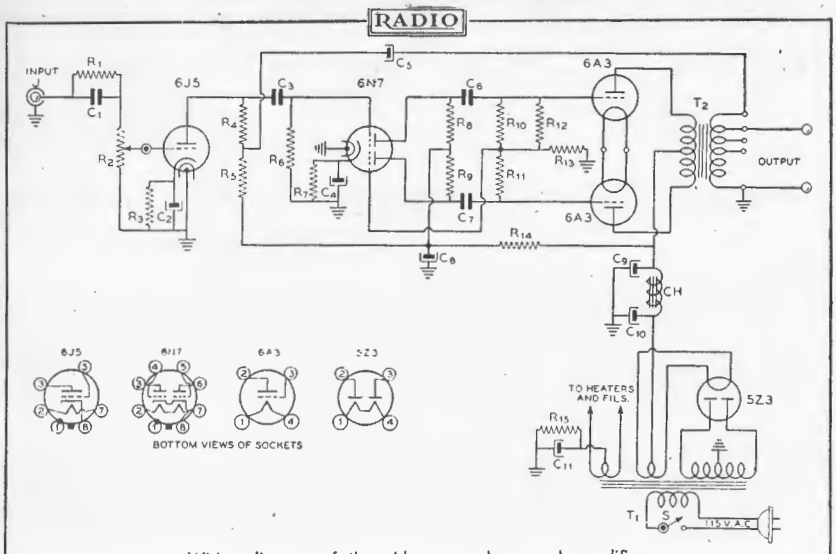
Featuring triodes with inverse feedback.

From the latest issue of the well-known American technical journal, "Radio," comes this design for a high fidelity amplifier which should be of great interest to our readers.



NOW that the amateurs are, for the most part, off the air and the amateur recording fiends are faced with a shortage of new equipment and blanks, such time as can be spared from defence work will be diverted into new channels. One field of activity which seems to be attracting the interest of a goodly number is the building of high-fidelity phonograph players from such equipment as is on hand or can be borrowed or obtained from the rather depleted stocks of the parts supply houses.

Two of the essential components of the phonograph player can be constructed by the amateur or experimenter: the amplifier and the speaker housing. The different types of housings have been described in previous issues, and the construction of a simple amplifier that almost every experimenter can build from parts on hand is described herein. It is assumed that a good-sized loudspeaker (12 inches or greater cone diameter) of modern design will be used and that a good crystal pick-up with low needle point damping will be employed.



Wiring diagram of the wide-range phonograph amplifier.

C_1—.0005-μfd. mica
C_2—10-μfd. 25-volt electrolytic
C_3—.05-μfd. 600-volt tubular
C_4—25-μfd. 25-volt electrolytic
C_5—8-μfd. 450-volt electrolytic
C_6, C_8—8-μfd. 450-volt electrolytic
C_{10}—8-μfd. 600-volt electrolytic
C_{11}—50-μfd. 100-volt electrolytic
R_1—500,000 ohms, ½ watt
R_2—250,000-ohm potiometer
R_3—2500 ohms, ½ watt
R_4—60,000 ohms, ½ watt
R_5—25,000 ohms, ½ watt
R_6—500,000 ohms, ½ watt
R_7—1500 ohms, 1 watt
R_8, R_9—100,000 ohms, 1 watt
R_{10}, R_{11}—250,000 ohms, ½ watt
R_{12}—500,000 ohms, ½ watt
R_{13}—100,000 ohms, ½ watt
R_{14}—10,000 ohms, 10 watts
R_{15}—750 ohms, 10 watts
T_1—750 c.t. 100 ma., 6.3 v. 3.5 a., 5 v. 3 a.
T_2—5000 ohms plate-to-plate, tapped voice coil secondary
CH—15 hy. 125-ma. choke
J—Input jack
S—A. c. line on-off switch

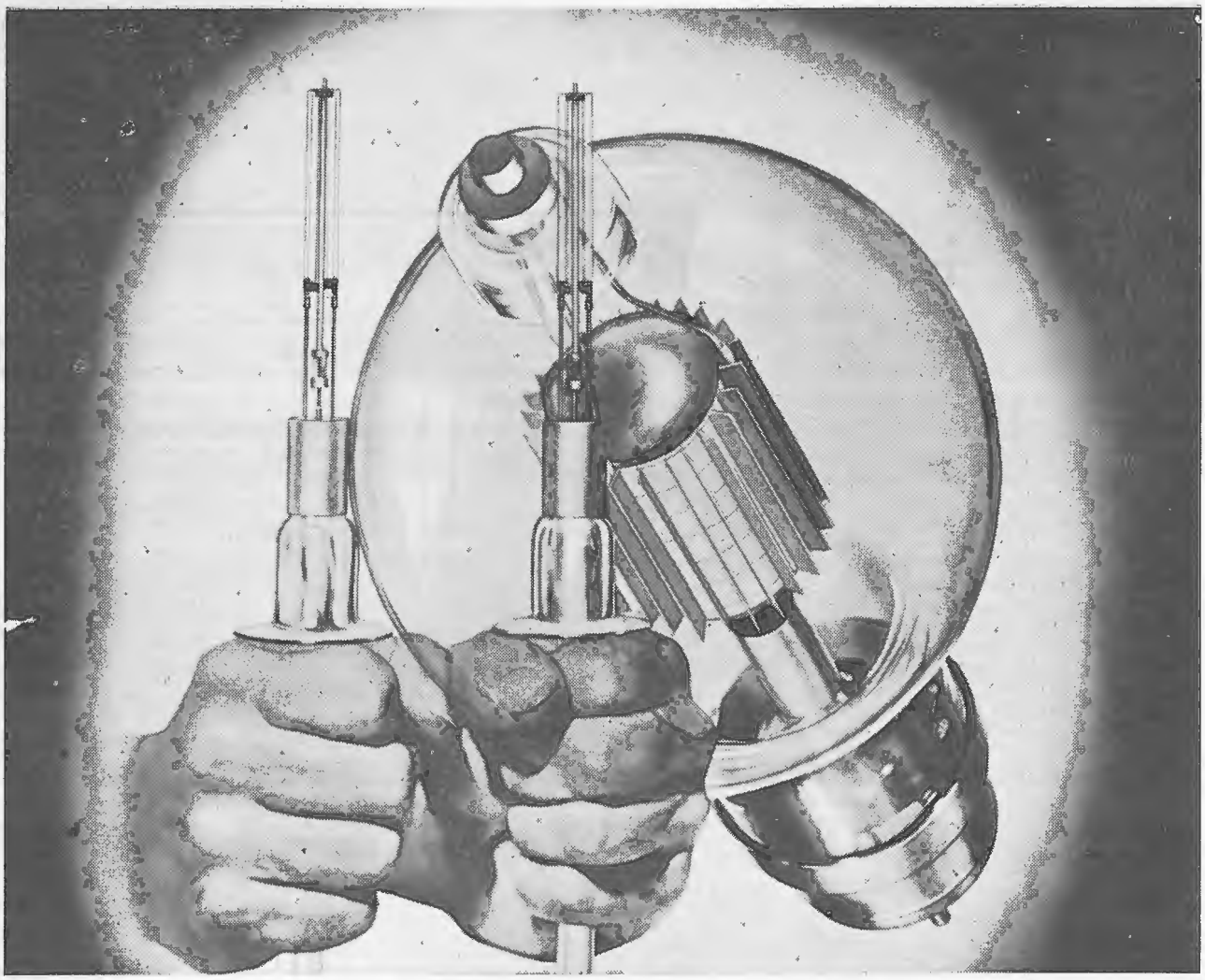
The Output Stage

The design of any audio amplifier hinges, quite naturally, upon the type of output power amplifier stage that is to feed the loudspeaker. All the other sections of the unit — voltage amplifier, phase inverter and power supply — will then be designed around the excitation voltage and plate power requirements of the power stage.

Experiments Carried Out

In the course of casual experimentation to determine a satisfactory output amplifier arrangement, quite a large number of different tube combinations and circuits were lashed up. Naturally, the first tubes tried were beam tetrodes, 6L6's and 6V6's. The high power sensitivity of these tubes, plus their high power output and reasonable plate power requirements, made it appear at first that they would be the ideal combination. Preliminary tests showed that all the above suppositions were true, and in addition showed that distortion arising from the stage could be cut down to

(Continued on page 13)



How Important is a Filament?

It's a well known fact that the vacuum valve is the heart of radio communications, but it is important to remember that the filament is the heart of the vacuum valve! Thus, the efficiency with which these tiny strands of tungsten wire perform may mean the difference between success and failure of the valve itself ...victory and defeat for tanks or battleships ...life and death for millions of people.

You can't always tell by appearance whether a filament is efficient or not. The two assemblies shown above look exactly alike but when put to the test one may not do its job. Into the production of filament for Eimac valves has gone much research and experimentation. Among many special instruments designed and perfected by Eimac to insure perfect filaments, none is more interesting than the electron microscope which virtually gives a moving picture of how a filament works under actual operating conditions.

Behind every Eimac valve is the assurance that its filament will function at top efficiency. Contributing factors to this efficiency are: Tantalum plates and grids and the super-vacuum which removes all contaminating gas particles. All these factors and more are what make it possible for Eimac valves to carry the unconditional guarantee against emission failure caused by gas released internally.

• • •

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HIGH FIDELITY AMPLIFIER

(Continued from page 11)

a negligible amount through the use of degenerative feedback.

But when the checkups were made upon the frequency response of the tetrode amplifier, the results were not quite so encouraging. True, the highs were good, their normal predominance in a tetrode amplifier being flattened out by the feedback. But the low frequencies, considering the medium-priced output transformer and speaker we were using, were not satisfactory. The amplifier was good down to about 60 cycles (it was considerably down at this point without the feedback) but below this point the waveform rapidly approached a sawtooth form and the amplitude dropped. This type of result would have been considered satisfactory for a medium-priced broadcast receiver or record player, but since we were just experimenting it was decided to see what could be done with the same power supply, output transformer, and speaker using triodes in the output stage.

Triodes Give Improvement

A pair of 2A3's were used in the first version of the amplifier, without feedback and with the same phase inverter (a 6SC7 was being used as phase inverter). An improvement in response was immediately apparent; the low fequency response was substantially flat down to 30 cycles and the highs were as good as had been obtained with the tetrodes and feedback. But we immediately ran into difficulty in obtaining sufficient voltage output from the phase inverter to excite the grids of the 2A3's.

Phase Inverter Circuits

A pair of 2A3's require a peak grid-to-grid swing of about 140 volts. This means that each side of the phase inverter must be capable of putting out about 70 volts without distortion at the lowest and highest frequencies to be handled by the amplifier. An inspection of the Resistance-Coupled Amplifier Chart in the R.C.A. Receiving Tube Manual shows that about the only triode which is capable of delivering this output voltage, at 300 applied plate volts, is one section of the 6N7. With a supply voltage of 300, a plate load resistance of 100,000 ohms, and a grid leak on the next tube of 250,000 ohms, each section of the 6N7 has a voltage output of 83 volts. This value gives a satisfactory safety factor over the 70 volts or so actually required.

Self-balancing Circuit

Several phase-inverter circuits were tried, but the conventional "self-balancing" circuit was found to be the most satisfactory for an output voltage of the magnitude required above. But it is important to note that this so-called "self-balancing" circuit will only give the same voltage on each grid of the output stage when the proper resistor values have been used. Once the proper resistor values have been determined the circuit is actually self-balancing regardless of supply voltage variations and small differences in tube characteristics.

Essential Resistor Values

The phase inverter circuit is really comprised of the essential resistors R8 through R13 in the main circuit diagram. It is the value of these various resistors which determines the effectiveness with which the circuit operates. The most satisfactory manner in which to get the circuit operating properly is to check the amplifier with a constant tone of about 400 cycles on the input, and R12 removed from the circuit. An oscilloscope will usually indicate (assuming that R8 and R9 are the same and that R10 and R11 are the same value) about 20 per cent. more voltage from the grid of the top 2A3 (in the diagram) to ground than from grid-to-ground on the other tube. For exact balance in the circuit it is necessary that R10 (or the parallel combination of R10 and R12) be somewhat lower in resistance than R11. The exact value for these two resistors can be determined mathematically, but the normal tolerance in resistors is great enough so that the adjustment is best made experimentally. In fact it is only necessary to place different values of resistance at R12, continually checking the ratio of the two 2A3 grid-to-ground voltages with an oscilloscope, until an exact balance is obtained.

Practical Examples

In two of the amplifiers built following this circuit diagram the values for the three resistors given in the

(Continued on next page)

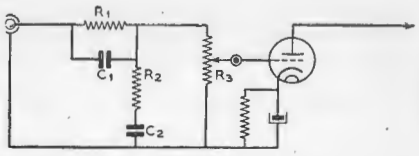
(Continued from page 13)

caption to the wiring diagram were found to give equal voltages (resistors R10, R11, R12). But in the amplifier shown in the photograph the use of the additional resistor was eliminated by using selected "250,000-ohm" resistors for R10 and R11. By using a so-called ¼-meg. resistor at R10 that was somewhat low and another ¼-meg. at R11 that was somewhat high it was possible to obtain an exact balance. But unless one has quite a selection of resistors the additional resistor R12 is the simplest way of obtaining a balance.

Degenerative Feedback

Although degenerative feedback is not generally used with triode push-pull class A amplifiers, it was decided to incorporate some feedback into this amplifier to see what benefits would be obtained. The results have been quite satisfactory. It was possible to use about 10 db of feedback with the circuit. shown in the main diagram. Hum, tube noises and distortion within the feedback loop were reduced by the amount that would be expected with this amount of degeneration.

However, a considerable amount of difficulty was experienced in determining a feedback circuit that could be used with a circuit arrangement of this type. At first it was thought that it would be possible to use a dual cathode tube for the phase inverter. But no dual cathode tube (which would allow the use of the feedback to the cathode of the first section of the phase inverter) was available which would deliver sufficient peak voltage output to excite the grids of the 2A3's. So it became necessary to return the feedback energy ahead of the phase inverter. Feedback was at first attempted in the cathode of the 6J5 first amplifier. This proved unsatisfactory; there was too much phase shift throughout the amplifier and output transformer and instability resulted.



Equaliser circuit for high-frequency compensation and bass boost.
R1—500,000 ohms, ½ watt; R2—100,000 ohms, ½ watt; R3—500,0000-ohm potentiometer; C1—.0005-mfd.; C2—.003—mfd.

Input Voltage Required

The feedback circuit that did prove satisfactory is the one shown in the amplifier circuit diagram. Voltage is returned from a high-impedance tap on the output transformer to the decoupling condenser in the 6J5 plate feed circuit. If a sufficiently high impedance tap is available on the output transformer it will be possible to use 10 db of feedback with this circuit with perfect stability. With this amount of degenerative feedback in the amplifier the amount of input voltage required on the grid of the 6J5 (about ¾ volt peak) is a little more than three times that required without feedback — for full output from the 2A3's. With this amount of feedback in the amplifier it is substantially flat in response, within 2 db, from 20 to 20,000 cycles and the waveform is perfect over this range. The response is down about 3 db at 16 cycles, but the waveform is still very good.

Phasing the Feedback

Naturally, as is the case with all feedback circuits, the voltage that is returned must be of the proper phase for degeneration. But we have the advantage in determining the proper polarity that it is a go or no go proposition. If the polarity is incorrect a violent oscillation will be set up in the amplifier. In this particular circuit arrangement it will then be necessary to ground the other end of the output transformer secondary winding, and then take the feedback voltage from the end of the winding which was previously grounded. If

this procedure would be inconvenient (due to a tapped voice coil output transformer) the two primary leads that go to the plates of the 6A3's or 2A3's should be reversed.

Power Supply

A pair of 2A3's, 6A3's, 6B4G's, or 6A5G's, are rated at a plate voltage of 300 to 325 volts and a plate current of 80 ma. The 2A3 filaments require a 2½-volt supply at about 5 amperes, while the other three types require a 6.3-volt supply at about 2 amperes. From this data it can be seen that that any small b.c.l.-type power transformer capable of about 100 ma. drain with 350 to 375 volts each side of centre on the high voltage winding will be capable of handling the amplifier. If the transformer is a 2½-volt one 2A3's can be used, with a 53 phase inverter and a 56 or triode 57 as the first amplifier. Or a small 6.3-volt filament transformer may be used to supply the first amplifier and the phase inverter while running the 2A3 filaments from the power transformer.

Of the three amplifiers so far constructed, all have operated identically with the exception of the power output and the extreme low frequency response. The one with the largest output transformer went lowest in frequency—as would naturally be expected—and the one with the highest plate supply voltage delivered the greatest power output. The three tested had actual plate supply voltages of 330 volts—power output 7 watts, 365 volts—power output 9 watts, and 400 volts—power output 11 watts. It will be noted that these power output figures are slightly lower than would be expected from reference to the published tube characteristics. This discrepancy is due to the fact that the power output was actually measured at the voice coil winding of the output transformer so that the insertion loss in the transformer was subtracted from the actual power output at the plates of the valves. Published valve data gives the power output at the plates of the valves, not at the secondary of the output transformer.

Pick-up Equalisation Circuits

Since phonograph records are not flat in frequency response, that is, they are not cut either constant amplitude or constant velocity throughout their range, it is necessary to equalise the phonograph pickup if substantially flat frequency response is desired. Records are cut constant amplitude up to a crossover frequency (from 200 to 1000 cycles, depending upon the manufacturer and upon the date when the record was recorded) and substantially constant velocity above that point. Since a crystal pick-up has a voltage output dependent upon the amplitude of displacement, its response will be satisfactory on the low frequencies but it will have to have an equaliser which will build up the high frequency response. A magnetic pick-up, in which the output voltage is dependent upon the velocity of displacement, will have to be equalised so that its low frequency response is built up. The point at which this equalisation should begin to take place is dependent upon the crossover point used in making the recording.

The input condenser and resistor R1-C1 in the main circuit diagram serves to equalise the high frequency response of the conventional crystal pick-up, using 750 cycles as the average crossover frequency. The additional small circuit diagram is for bass boost when using a crystal pick-up, with high frequency compensation, or this input circuit can be used with a magnetic pick-up to obtain the low frequency equalisation required. When using a magnetic pick-up the small condenser C1 may be removed if too much record scratch is apparent.

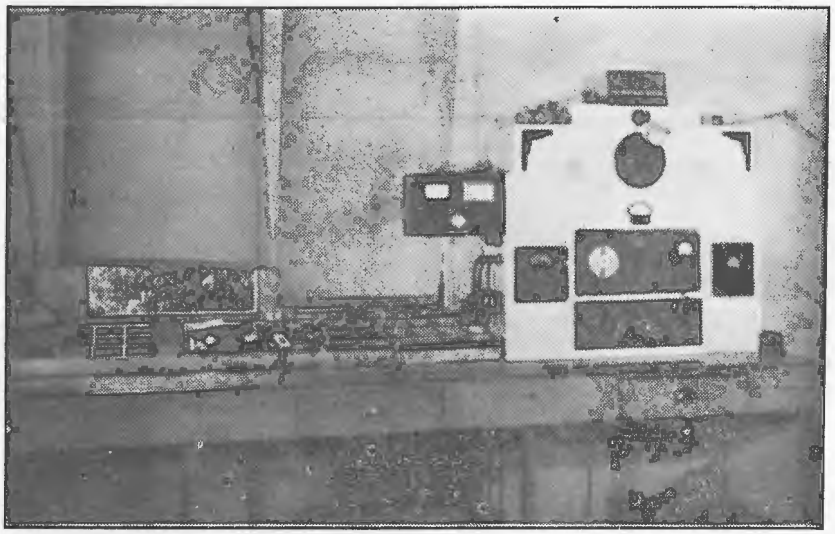
Motor Speed

Even the best of amplifiers will be spoilt if the turntable speed is not exactly 78 revolutions per minute. A regular check should be made, preferably with a stroboscopic speed tester.

These are available from our Back Number Department at 6d. each, post free.

TEST BENCH ARRANGEMENT

This article from Mr. Brown, winner of our recent Battery Circuit Contest, gives a rough idea of a practical layout for a test bench to speed-up service work



A photograph of the test bench arrangement as used by Mr. Brown at Taree.

I AM enclosing photographs taken some little time ago of my service bench.

I have an A.W.A. signal generator with a Stromberg-Carlson as standby and check. The meter above the generator is an output meter, and a 10-inch permagnetic Amplion speaker is behind the grille.

The panel immediately to the left is a Palec universal checker with Palec valve tester on the right-hand side.

Immediately below the generator is the main switch panel. Three loose terminals on the left-hand side are for loose speaker leads, and below same is a male plug, as used in newest A.W.A. products.

By —

R. Brown

82 Victoria Street, Taree

Then, working from left, we have the A.C. switch of rectifier for the output meter and switch for the meter itself; then one 4-pin and one 5-pin socket (5-pin wired for centre-tap), and have some 30 cables which adapt these sockets to almost every commercial set on the market. Immediately above we have the field switch, in steps, to give 750, 1,000, 1,500, 2,000, 2,500 and 7,500 ohms. Then we have an externally-mounted 4-pin sprung socket with a toggle switch alongside for those A.C. models which link field to speaker input and earth the fourth pin.

Below this we have the speaker load switch, 5,000 to 20,000 ohms, all centre tapped. All plugs and terminals are controlled by the field and load switches.

Then we have the generator output switch. First position being in constant dummy (i.e., broadcast or short-wave alignment without change). Second position gives a .5 mfd. condenser for I.F. alignment with toggle above, so that when instability is noticed through A.V.C., etc., on the converter, the grid cap can be removed and bias return is then completed by the toggle just mentioned. Third position brings in an outside antennae.

The board is completed by two terminals which bring out the generator leads after switching.

To left and low down beside the board is the battery terminal board, and the three meters above are, from left, amp. meter in circuit of board below constantly. Small middle meter is a milliameter also in circuit constantly, so that high drain or leaky coupling condensers are apparent as soon as the receiver is switched on.

The third meter is 0-1 milliammeter used for grid current check only. This may sound unnecessary, but it frequently happens that all meters are in use at one time.

We have sundry other items, such as vibrator testers, etc., under way, but am afraid they will not be finished now. Also have meter for line voltage check.

CONTEMPT FOR TOKYO PROPAGANDA

Axis propaganda, and particularly Japanese propaganda broadcasts, have been so inaccurate and psychologically misplaced that they have had no material effect upon the Australian people. This is apart from the work of rumour-mongers whose irresponsibility serves as a virtual fifth column for the enemy. These conclusions have been reached after a close review for several months by the Department of Information listening post. The Australian propaganda outlook is not to be defensive and the Japanese themselves are to be put on the defensive in the field of propagonda. The Minister for Information (Senator Ashley) has announced thot this is to be done by broadcasts in English inside Australia and broadcasts in Japanese to Japan and Japanese-occupied territories giving the truth about the "gongster code" of Japanese diplomacy ond militarism in its attempted world domination. Plans devised some time ago will be put into operation to "give the Lord How-How's of Tokyo something real to think and worry about." In this plan all the facilities of the Department will be employed and, in addition, the co-operation of the Press and broadcasting stations will be enlisted to give Australians a clear understanding of the true Japonese mentality, and to arouse Australians more fully to the offensive spirit. "Meanwhile," states the Minister, "those people who do listen to Japanese broadcasts can afford to treat them with the contempt that lying and exoggerated propaganda deserves, but those who continue to try ond use Japanese broadcasts on which to base disturbing rumours should be dealt with ruthlessly by those to whom they pass on their rumours. The Australian people can always take the truth and our campaign to expose the enemy as he really is will be bosed on truth. There will be no need to exaggerate or caricature it."

USE A GOOD AERIAL

Even the best of sets will be improved by the use of an efficient aerial. Many modern sets will give a certoin amount of satisfaction with o piece of wire strung up oround the picture roil, but for the most reliable reception, with clean reproduction, an outside aerial should be used.

MOLECULES, ATOMS & ELECTRONS

THE story of radio is the story of the electron, which can be regarded as a tiny charge of electricity. Once it was thought that the smallest thing imaginable was the atom, but we now know that it is not indivisible; that, in fact, it consists of a group of even smaller things. These are known as protons and electrons.

It is very difficult for the human mind to grasp the significance of very small dimensions, just as hard as it is for it to grapple with colossal measurements such as billions of miles. However, perhaps a few similes will help.

Atoms and Molecules

Anything at all—solid, liquid, or gas—is comprised of molecules, which in turn are made up of atoms. A grain of sand, for example, is made up of molecules, and if it could be magnified billions upon billions of times, it might look like a huge mountain of tennis balls, each ball being a molecule, consisting of a combination of atoms. Yet an atom is an assembly of even more diminutive things—of protons and electrons.

In the centre there is a nucleus, or core, consisting of protons, which carry positive charges of electricity, and electrons, which are tiny negative charges. The protons predominate, so the nature of the nucleus is positive.

Comparatively widely separated from the nucleus, and revolving round it as the planets do round the sun, are more electrons. These are more or less free agents, and when something happens to cause one or more of them to leave the nucleus, electrical activity becomes evident.

Normally an atom is neutral, and the total number of electrons equals that of the protons. It is only when the balance is upset that the atom as a whole becomes charged positively or negatively. If electrons leave an atom, it becomes positively charged because the protons then outnumber the electrons. If new electrons are gained by the atom, it becomes negatively charged, because the electrons are then in the majority.

How Different Elements Are Made Up

The simplest atom is that of hydrogen, which has one proton in the nucleus and a single electron revolving round it. Next comes helium, the second lightest atom, which has four protons and two electrons for a core, and another two electrons as satellites, as shown in Fig. 1.

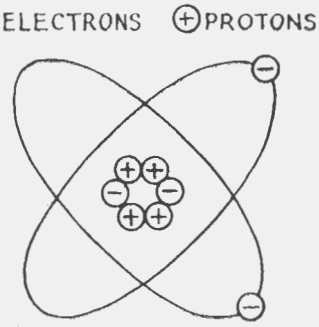


FIG. 1

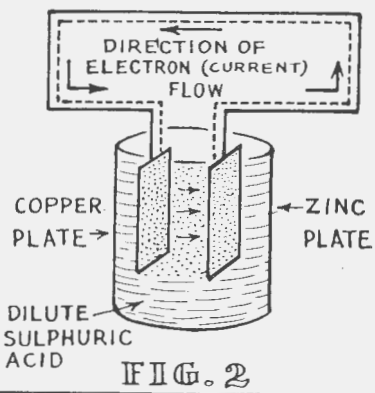


FIG. 2

There are 92 elements in all, and these in combination with one another give thousands of different compounds. For example, two atoms of hydrogen will combine with one of oxygen to give a molecule of water.

For the present, though, we are more interested in the electron, and the way in which different substances behave as carriers of electricity.

Conductors and Insulators

With some materials it is an easy matter to persuade electrons to leave

their parent atoms; such substances are known as conductors. The metals copper, silver, and gold are good examples.

For instance, if the terminals of a battery are joined by a length of copper wire, then, under the influence of the electric field that is set up, the electrons within the conductor will drift from atom to atom towards the positive pole of the battery. This drift constitutes an electric current.

As electrons enter the conductor at one end, others leave in equal numbers at the opposite end, so that the conductor itself neither gains nor loses any electricity. When the circuit is broken, the electrons simply stop moving and remain where they are.

The strength of the current is represented by the number of electrons passing a given point in one second, and this depends on the strength of the electric field causing the electron flow and on the material forming the conductor. For instance, if a rubber strap were used in place of the wire, there would be no current, or if there were it would be infinitesimal. Substances of this nature include porcelain, glass and mica, and all are known as insulators.

To summarise, then, we know that all solids, liquids, and gases are made up of molecules. These in turn can be split up into atoms, which can again be sub-divided into protons and electrons. Normally all atoms are neutral, but when they gain or lose electrons they become negatively or positively charged, as the case may be, and there is electrical activity. Electrons in motion constitute an electric current.

Direction of Current Flow

To a beginner, the direction in which current really flows is sometimes difficult to understand. This is because early research workers, not knowing the real nature of electricity, arbitrarily labelled the direction of current flow as being from positive to negative. Actually, electrons always flow in an external circuit in the opposite way, i.e., from negative to positive, and this is the direction of current flow.

How Electricity Is Generated

There are many ways of generating electricity, but only the simplest of them will be considered now.

If a plate of zinc and another of copper are immersed in a dilute solution of sulphuric acid, what is known as a primary cell is formed. When the two plates are connected by a copper wire, a current will flow through it.

The acid attacks the copper, robbing its atoms of some of their electrons, which then pass to the zinc plate. The copper plate, to make up its electron deficiency, borrows some from the connecting wire, which in turn takes some from the zinc. Thus there is a constant flow of electrons from the copper to zinc within the solution, and from zinc to copper through the connecting wire. This current flow which takes place in a simple electric cell is illustrated in Fig. 2.

The secondary cell, or accumulator as it is more commonly known, works a little differently. Here it is necessary to apply electricity in the first place in order to get it back later. In other words, an accumulator is merely a reservoir for electical energy. It depends for its action on a rather complicated chemical change, which need not be explained here. Sufficient to say that, unlike a primary cell, an accumulator is rechargeable and, also, a heavier current can be safely taken from it than from a dry cell.

The Dry Cell

Battery-operated radios usually derive their power from primary cells, or dry batteries as they are commonly called.

A dry cell is not really dry — if it were it wouldn't work, as the moisture contained in the active paste within the cell is essential to its operation. This is why all dry batteries should be kept in a cool spot in order to obtain the longest service from them.

Fig. 3 shows the internal construction of a dry cell. The outer case is of zinc, which forms the negative pole. Next, comes a lining of the active material, which is generally a paste of sal-ammoniac and plaster-of-Paris or gelatine.

In the centre of the cell is a rod of carbon (the positive pole) and this is separated from the sal-ammoniac by a layer of manganese dioxide, which prevents a chemical action taking place that would impede the efficient working of the cell.

When fresh, the voltage of a cell of this type is a little over 1½ volts. By connecting two such cells so that the positive terminal of one is joined to the negative terminal of the other, the voltage between the two free terminals would be double that of a single cell. With three cells so connected, the total voltage would be three times that of one and so on. This is illustrated in Fig. 4, which also shows the theoretical symbol used in radio diagrams to represent a battery of any kind. The short heavy stroke denotes the negative terminal, and the thin long one the positive.

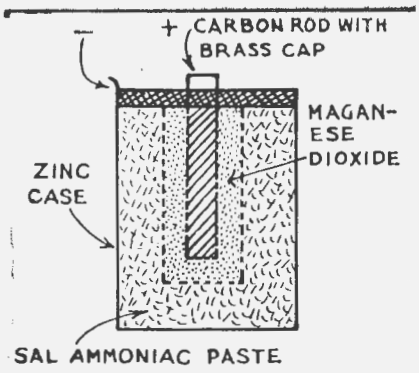


FIG. 3

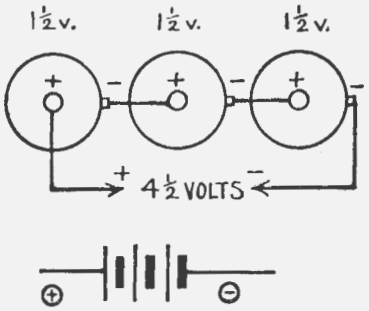


FIG. 4

"B" battery units are made up from dozens of these small cells linked in series. A 45-volt B battery consists of 30 such cells, and a 108-volt unit of 72.

Alternating Current

The current generated by any kind of battery flows in one direction only, and so is called direct current. In some areas in Australia and New Zealand direct current (D.C. for short) is also supplied for domestic use, but generally alternating current is provided.

This type of current will be explained more fully in a later issue, but briefly it is so named because it reverses its direction many times a second.

Next Month: Volts, Amperes, and Ohms.

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

When my identification card arrives it should bear my address as: 23 Honiton Avenue, W. Carlingford. I chose this locality for many reasons, and, despite warnings from my short-wave friends that this was the worst district in or around Sydney for cross modulation, etc., etc., I relied on the good offices of my car radio, and here I am. I figure that when I get settled this little bit of the world will compare favourably with Queensland and New Zealand for my little hobby.

So far, a very modest areial, about 25 feet long by as many feet high, of the inverted "L" type, suffices, but maybe one of these days there will be a busy bee, and the sky and the acreage of the property will be the limit.

So, kind friends, please address loggings and notes to me here.

* * *

The past month has been most interesting for the number of "off-the-band" signals that have appeared. It would be unwise to list them all, as so many are only tests, and doubtless we will discover pretty soon the channel that has been chosen. The fact that so many are anxious to find the best avenues for contact with Australia assures us of some more, and perhaps better, continuity.

* * *

What's In a Name?

German and Italian stations broadcasting "news" are labelled by one American short-wave magazine as "The Liars' Club," and the same paper gives the Japanese the delightful appellation of "The Dagger-in-the-backs."

* * *

Los Angeles

My reference to Los Angeles Press Wireless in March issue was timely, as long before the edition had reached Queensland, the "Malanda S.W. Tiger," friend Perkins, had logged them and, with commendable thoughtfulness, air-mailed them to me.

Another who happens on the new or unusual is that doyen of the wireless, Dr. Gaden, and if he sent a letter by ordinary mail I would expect it to contain an invoice.

I am grateful for his information re **KEQ**, Honolulu.

* * *

Dr. Gaden, in referring to a verification from All India Radio regarding a report on **VUD-3**, 19.62m, mentions their signature tune is played on a violin and 12 sitars. A sitar is an Indian stringed instrument.

HELP WANTED

*

Mr. Perkins, of Malanda, says: "Here's one that has me completely buffaloed. Their call is **UKK** and they operate on approximately 50.5 metres. Heard on March 12 at 7.25 a.m. (6.25 a.m. A.S.T.), testing on high power, playing such records as Tom Jones and Orchestra in 'In the Shadows'; Jeanette MacDonald singing "Sweet Mystery of Life,' and 'If I Should Fall in Love Again' played by an orchestra.

Sgt. Clack, who seems to be moving about as fast as a Spitfire, writes in to say that **Radio Saigon** have gone back to 25.47m, and sends a complete schedule of XGOY. However, apparently since the Chungking station made up this roster, circumstances or times or both have altered them considerably. The principal frequencies, however, are: 5950kc, 50.42m; 11,900kc, 25.21m; 11,925kc, 25.16m; 9635kc, 31.14m; and 9620kc, 31.17m.

* * *

Several reporters have mentioned the absence of the whirling noise on the German and Holland transmitters lately. This would almost confirm the long-held belief that the interference was caused by our friends in the East to prevent wrong ideas reaching Java.

London now gives news in no fewer than twenty-seven languages and, with nearly forty outlets, they doubtless reach the four corners of the globe.

* * *

One of the best signals on the air in the evenings is **XGRS**, Shanghai, 11,675kc, 25.77m, the news read by David Lester at 8.45 p.m. being very easy to copy.

* * *

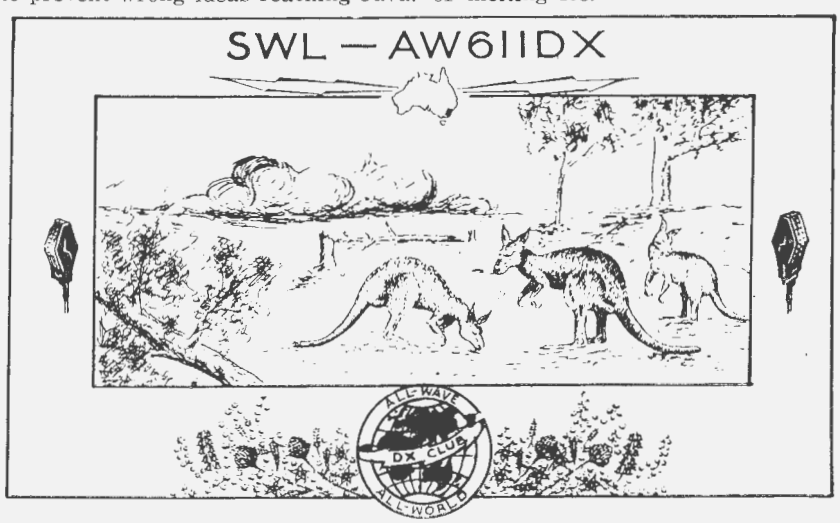
Roy Hallett reminds me that London has a technical session for beginners at 11.30 p.m. on each alternate Tuesday. The next will be on April 7. He has also sent me full programme schedules of the All India Radio stations, but pressure on space makes it impossible to print it in this issue.

THE OHM

If anybody wants to know what an ohm is, the usual answer is to say that it is the unit of resistance; that it is the amount of resistance through which a current of an ampere will be forced by a pressure of one volt. Which, after all, is what most radio men want to know when they ask.

But actually the ohm is a unit of resistance, and if you really want to make yourself up a resistance of one ohm you can do so without an ohmmeter or using Ohm's Law in any way.

An ohm of resistance should be equal to the resistance offered by a column of mercury 106 centimetres long, with a cross-section area of a square millimetre, at the temperature of melting ice.



JACK HORN, of 23 Kier Avenue, Hurlstone Park, is a keen member of our DX Club. He has produced postcards for himself as shown above. This was done by getting a friend to do the drawing and then having a negative made from it by Kodak.

NEW STATIONS

GRK, London, 7185kc, 41.75m: Heard in early evening and at 2 a.m.

GRD, London, 15,440kc, 19.42m: Another B.B.C. trdansmitter; first mentioned by Mr. Hugh Perkins. Excellent signal by 9.30 p.m.

GRM, London, 7250kc, 41.38m: And still they come. This one is evidently for the African service as it is heard from 1.30 a.m. to 2.15 a.m.

VLQ-4, Sydney, 7220kc, 41.55m: Commenced, I think, on March 23, in Transmission 5. Excellent signal at night.

Indian Freedom Station 9380kc, 31.90m: Mr. Cushen, of N.Z., sends particulars of this new one. "Heard from 2 to 2.30 a.m. At 2 a.m. News in Hindustani; at 2.15 a.m. announces 'This is Ada Zindabal . . . on 31.9m, and now you hear the News in English, which is given daily at 8.45 p.m. Indian Standard Time.' Station signs at 2.30 a.m." Mr. Cushen says this station is Jap operated for sure.

KJE-8, Los Angeles, 9390kc, 31.94m: Mr. Perkins advises hearing this Press Wireless station on March 7 at 11.50 a.m. They were transmitting a test musical programme.

KJE-9, Los Angeles, 10,750kc, 27.91m: This one opens at 1 a.m. and is another of Press Wireless Inc., Los Angeles, U.S.A. (Note in both instonces I have mentioned Australian Standard Time.—Ed.).

KTG-3, Los Angeles, 6920kc, 43.35m: Mr. Byard, of Launceston, heard this one closing at 12.04 a.m. on February 28.

DXR, Berlin, 11,760kc, 25.51m: Being heard at 7 a.m. and 5 p.m., according to reports. Seems a favourite frequency, having been used by various countries at intervals.

Location and Call-sign Unknown, 9695kc, 30.84m: Heard from 12.30 a.m. to 12.53m. This is an anti-British station using very bad English and purporting to be in Penang, I think. Said at 12.53, when closing, that they were on 28.50m also, but no sign there.

CR6RA, Loanda Angolo, 9470kc, 31.68m: We have all become familiar with the Portuguese East African station, **CR7BE,** situated in Lourenco Marques. Well, here is a Portuguese **West** African. Heard on Mon., Tues., Wed. and Thurs. from 6.30 a.m. to 7.30 a.m. Signal weak. Dr. Gaden was the first to notify us of this fine catch. (Loanda, or Sao Paulo de Loanda, with a population of 15,000, is a city of Angola, Portuguese West Africa, and capital of the district of the same name.)

——, Rome, 11,945kc, 25.12m: Simply announcing as "This is Rome calling," or, for variation, "You are listening to the Italian Broadcasting Service," a new transmitter has been added to the already formidable array of E.I.A.R. Same programme as **2RO-4,** heard around 5 a.m.

XGEI, Kuoiming, Free China: Mr. Perkins submits this one as operating on approximately 18.65m. Signal at 11 p.m. was R6-7. Conducting a test transmission, records were played, "When I Grow Too Old to Dream," sung by Nelson Eddy; "Underneath the Spreading Chestnut Tree"; "Whistle While You Work" and "On the Sentimental Side," by Roy Smeck and His Serenaders. By 11.23 p.m. (10.23 A.S.T.) station faded out. At one portion of the programme the announcer said **XGEI** was on the air every Monday evening at 11 p.m.

ALL TIMES ARE AUSTRALIAN EASTERN STANDARD TIME

Further pressure on space makes it imperative to only record changes or items of outstanding interest. Enemy stations are only briefly referred to.

AUSTRALIA

VLQ-8, Sydney 17,800kc, 16.85m
Good, to British Isles (Gaden).

VLQ-3, Sydney 15,315kc, 19.59m
Patchy at 3 p.m. (Gaden).

VLG-6, Melbourne 15,230kc, 19.69m
Splendid at 5 p.m. in programme for England (Gaden).

VLG-7, Melbourne 15,160kc, 19.79m
100 per cent. in all its sessions (Gaden).

VLG-3, Melbourne 11,710kc, 25.62m
R max. at 4 p.m.

VLQ-2, Sydney 11,870kc, 25.27m
R max. at 3 p.m., but at 8.45 p.m. may be max. or zero.

VLQ, Sydney 9615kc, 31.21m
R max. at 6.30 p.m.

VLW, Wanneroo 9615kc, 31.21m
Opens at 9 p.m. with B.B.C. News (Perkins).

VLR, Melbourne 9580kc, 31.32m
Programme for England at 5 p.m., excellent (Gaden).

VLQ-9, Sydney 7250kc, 41.38m
R max. at 8.45 p.m.

VLQ-4, Sydney 7220kc, 41.55m
Trans. No. 5. Excellent signal at 9.30 p.m.

OCEANIA

Fiji:

VPD-2, Suva 15,160kc, 19.79m
Schedule: 2 p.m. to 2.30 p.m.
French session. Excellent strength.

AFRICA

Algeria:

TPZ, Algiers 12,120kc, 24.76m
Heard in afternoons around 5.45.

TPZ-2, Algiers 8960kc, 33.48m
Excellent signal at 5.15 p.m. Gives News in French at 6 p.m.; closes 6.20 p.m.

Belgian Conga:

OPM, Leopoldville 10,140kc, 29.59m
Being heard weakly. Asking for reports. Closes at 5.45 a.m. with Belgian National Anthem.

Egypt:

Radio Cairo, Cairo 5980kc, 50.17m
Music till 6 a.m. News in English till 6.15 a.m., when same News is given in French. Closes at 6.30 a.m. R5 at 5.55 a.m. (Perkins).

Ethiopia:

——, Addis Ababa 9625kc, 31.17m
From just after midnight till 1.30 a.m.

French Equatorial Africa:

FZI, Brazzaville 11,965kc, 25.06m
News in English at 5.45 a.m.
Heard concluding News in English at 2 p.m. Sunday (Hallett). Heard at 4 p.m. in Free French programme.—Ed.

Morocco:

CNR, Rabat 8035kc, 37.34m
4 a.m. to 10 a.m. Best at 5.30.

Portuguese East Africa:

Mozambique:

CR7BE, Lourenco Marques 9840kc, 30.48m
R6 at 7.35 a.m. (Byard).

Portuguese West Africa;

CR6RA, Laanda Angolo 9470kc, 31.68m
Monday, Tuesday, Wednesday and Thursday, 5.30 a.m. and 6.30 a.m.
R6 signal but sandwiched between morse and **TAP** at 6.30 a.m. (Perkins).

Senegal:

FGR, Dakar 9410kc, 31.83m
Heard around 5.15 a.m.

Transvaal:

ZRH, Johannesburg 6007kc, 49.95m
Schedule: 1.30 a.m. to 7 a.m. News 5.30. News in Afrikaans at 5.45 a.m. B.B.C. News at 6.45.

AMERICA

Central:

Costa Rica:

TIEMC, San Jose 11,900kc, 25.21m
May just be heard after **XGOY** leaves the air.

TIJMT, San Jose 11,900kc, 25.21m
"Radio America Latina." Address: Apartodo 849, San Jose.
Heard well at 9.30 a.m. (Gaden).

Nicaragua:

YNRS, Managua 8585kc, 34.95m
"Radio Nicaraguense." Heard about 11 p.m.

Panama:

HP5A, Panama City 11,700kc, 25.64m
Good at 4 p.m. (Ferguson).

North:

KGEI, San Francisco
"This is the United States of America broadcasting from the Fairmount Hotel in a round-the-world service." Transmitting on the . . . Various bands are mentioned, to suit the particular hour. Apart from News, some splendid talks are given and some excellent sponsored sessions such as Rudy Vallee and company. Roy Hallett reminds me of "Kraft Musicale" at 11 p.m. on Saturdays and "Time Marches On," Sundays at 4.30 p.m.
15,330kc, 19.57m: News 11 a.m. and 1 p.m. Poor at 10 a.m. but good at ot 2 p.m. (Gaden).
13,690kc, 21.91m: Opens with News at noon, 1 p.m. and 2.20 p.m. R4 at 2 p.m. (Byard).
7250kc, 41.38m: Opens at 4 p.m. with News. Also News at 5, 6, 7, 9.30, 10.30 p.m., 12.30 a.m. and 1.45 a.m. Excellent at 7 p.m.
6860kc, 43.73m: Opens at 6 with News. News also at 7, 9.30, 10.30 p.m., 12.30 a.m. and 1.45 a.m. News in Chinese at 9.45 p.m.

WGEA, Schenectady 15,330kc, 19.57m
Listen to "March of Time," 7 a.m. to 7.30 a.m. Sundays. Closes at 8.30 a.m. with fair signal.

WCBX, New York 15,270kc, 19.64m
Some nice reception in mornings and still going at 2 p.m. Call was **WCBX,** not **WCRC.** Announcements at 8.30 a.m. (Gaden).

WLWO, Cincinnati 15,250kc, 19.67m
Has long News period at 3 p.m. Announcer says on 19.70m (Hallett). (Also News at 4.15.—Ed.)

WBOS, Boston 15,210kc, 19.72m
News at midnight and 1 a.m.

KRCA, San Francisco 9480kc, 31.65m
Operates from 3.15 p.m. News 4, 5, 6, 7 and 9.30 p.m.

WRCA, New York 15,145kc, 19.81m
This was called a few times and **not WNBI.** Nice signal in a.m. Probably closed about 9.30 a.m. (Gaden).

KKQ, Bolinas 11,950kc, 25.11m
Heard at 4 p.m. when News from Fairmount Hotel is given.

WBOS, Boston 11,870kc, 25.27m
Good at 9 a.m. in News. "Command Performance" at 9.15 a.m. on Mondays (Hallett).

WBOS 25.26m
Heard well at 9-9.30 a.m. in English (Goden).

WCRC, New York 11,830kc, 25.36m
Irregular, but heard occasionally about 5 o.m.

WRUL, Boston 11,790kc, 25.45m
Excellent signal every morning. News by Volney Hurd, "Christian Science Monitor," at 7 a.m. Special session for Australia on Tuesdays, Thursdays and Saturdays at 7.15 a.m. Closes at 8.25 a.m.

WRUL, Boston 11,730kc, 25.58m
Good up till 9.45 a.m. in English, but not as good as **WLWO** (Gaden). Opens 8.35 a.m.

WLWO, Cincinnati 11,710kc. 25.62m
Opens nicely at 8.30 a.m., closes 9.45 a.m. (Goden). Opens again on 31.28 at 10 a.m.—Ed.

KJE-9, Los Angeles 10,750kc, 27.90m
Opens about 1 a.m. (Perkins).

WRUW, Boston 9700kc, 30.93m
Opens at 6.50 a.m.

WRCA, New York 9670kc, 31.02m
8 o.m. to 7 p.m. News 4 p.m. and 6.45 p.m.

WLWO, Cincinnati 9590kc, 31.28m
News at 10 a.m. O.K. (Gaden).

WGEO, Schenectady 9530kc, 31.48m
Only fair in mornings.

KJE-8, Los Angeles 9390kc, 31.94m
Heard transmitting test programme with R7 signal at midnight (Perkins).

KEQ, Honolulu 7370kc, 40.70m
Irregularly heard around 10 p.m. talking to U.S.A.

KTG-3, Los Angeles 6920kc, 43.35m
Heard closing on February 28 at 12.04 a.m. Gave location and frequency; said would return to air in one hour on 1750kc (Byard).

Mexico:

XEQQ, Mexico City 9680kc, 30.99m
Fair just after midnight. Best at 3 p.m.

XEWW, Mexico City 9503kc, 31.57m
Good in afternoon and at 11 p.m.

South:

Brazil:

PRE-9, Forteleza 6105kc, 49.14m
Reported being heard around about 6 a.m.

PRA-8, Pernambuco 6010kc, 49.92m
Heard at 5.30 a.m.

Chile:

CB-1180, Santiago 11,975kc, 25.05m
Heard at good strength at 2.30 p.m. in languages, etc. (Gaden). Splendid at 9.30 p.m.

Ecuador:

HCJB, Quito 12,460kc, 24.08m
Heard at terrific strength on March 9 at 9 a.m. in Spanish. On March 23 at 9.25 a.m., heard Russian. At 9.30 a.m., "You have been listening, etc., to a broodcost in the Russian longuoge for Argentine from **HCJB,** Quito, the capital of Ecuador, in South America." Then English session — religious talks and music till 10 a.m. At 10 a.m. takes relay of News from **WBOS** (Gaden). (Note.—Times will now be 8.30 to 9.15 o.m., and I think this is only a Monday session.—Ed.)

Peru:

OAX4J, Lima 9340kc, 32.12m
Nightly at 11 p.m., Sundays at 2 p.m.

THE EAST

China:

XGOX, Chungking 15,200kc, 19.74m
Special session for England from 7.30 p.m. till about 8 p.m. Heard calling **KRCA** at 9 a.m. (Gaden).

FFZ, Shanghai .... 12,068kc, 24.86m Gives News in Russian at 8.30 p.m. Better signal lately.

XIRS, Shanghai .... 11,980kc, 25.02m Consistently good nightly.

XGOY, Chungking .... 11,925kc, 25.16m Australian session from 8.15 p.m. (Ferguson).

XMHA, Shanghai .... 11,855kc, 25.3m Announces on air at 9 a.m., but cannot hear him (Gaden). This Jap-controlled hear him (Gaden). This Jap-controlled station, "Call of the Orient," gives ads. every fifteen minutes (O'Brien). (Very difficult to hear when the German is going full blast on **DJP**.—Ed.)

XGRS, Shanghai .... 11,675kc, 25.7m Gets badly mauled some nights, but is O.K. at 8.15 a.m. in "Daily Dozen." News at 8.45 a.m. (Gaden, Hallett). (Very good signal at 8.30 p.m. on April 4 and News heard well at 8.45.—Ed.)

XGOA, Chungking .... 9720kc, 30.86m English News at midnight.

XGOI, Shanghai .... 9665kc, 31.04m At 10.10 p.m., announcement, "This is **XGOI,** the Voice of Shanghai." English News 10.13 p.m., Dutch 10.35, French 10.45 (Perkins).

JTHK, Hongkong .... 9525kc, 31.49m Heard nightly. Under Jap control (Perkins).

XGOY, Chungking .... 5950kc, 50.42m News at 11.30 p.m. Calls U.S.A. at 1 a.m. (Cushen). Good at 6 a.m.

Portuguese China:

CR8AA, Macao .... 6250kc, 48.00m R5 at 10.15 p.m. (Byard).

Dutch East Indies:

YDC, Bandoeng .... 15,150kc, 19.81m Heard going off the air on March 7 with the words, "This is Radio Bandoeng closing down. God save the Queen! Good-bye everyone until better times come" (Ferguson).

Caroline Islands:

—— .... 11,740kc, 25.55m This Jap-controlled station, according to one of our contemporaries, is located in Palao, Caroline Islands, and uses 10 k.w. of power, hence excellent signal.

— .... 9565kc, 31.37m Also said to be in Caroline Islands.

French Indo-China:

Radio Saigon .... 11,780kc, 25.47m Back on the old love.—Ed. News 8.15 and 9.15 p.m. (Cushen).

India:

VUD-3, Delhi .... 15,290kc, 19.62m Nows gives News at 6 p.m. Heard well at 6.30 p.m. (Gaden). According to reports, is on air at 9 a.m., but doubtful if able to hear in Sydney.—Ed.

VUD-4, Delhi .... 11,830kc, 25.36m In view of terrific interest in the East, News 10.30 p.m.

VUD-2, Delhi .... 9590kc, 31.28m Probably a better signal than **VUD-4.** News 10.30 p.m. and 1 a.m.

Indian Freedom Station .... 9380kc, 31.98m 1 to 1.30 a.m. (Cushen). (See "New Stations.")

VUD-2, Delhi .... 6130kc, 48.94m Opens up at 11.15 p.m. News heard here also at 1.50 a.m.

Japan:

JLU-4, Tokyo .... 17,790kc, 16.86m Can be heard at 9 a.m.

JZK, Tokyo 15,160kc, 19.79m

JZJ, Tokyo .... 11,800kc, 25.42m One of the loudest stations on the air.

JZI, Tokyo .... 9530kc, 31.46m Gives News at 4.30 p.m.

JVW, Tokyo .... 7257kc, 41.34m Announced on March 29, "As from April 1, **JVW** will be discontinued, and programme will be heard on **JZK,** 19.79m."

JLG-4 .... 15,105kc, 19.86m
Announcements and News at 8.55 a.m. Heard again at 12.10 p.m. in News for U.S.A.

—— 31.35m
Undoubtedly the old **KZRM.** News at 4.30 p.m.

Manchuria:

MTCY, Hsinking 11,775kc, 25.48m
Heard at 4.15 p.m.

MTCY, Hsinking 9545kc, 31.43m
News at 7 a.m.

MTCY, Hsinking 6125kc, 48.98m
Heard nightly.

Philippines:

KZRC, Cebu 6100kc, 49.18m
The only Philippine station left under old regime.

KZRH, Manila 9640kc, 31.12m
Now back on air under Japs. News at 9.30 p.m. (Cushen).

Secret Philippine Station 9643kc, 31.11m
"The Voice of Freedom, broadcasting from somewhere in the Philippines," opens with News nightly at 8.30 p.m. in parallel with 48.94m, and the latter is better signal (Gaden). Have heard them very faintly at 7.30 a.m. (O'Brien).

Thai:

HSP-5, Bangkok 11,715kc, 25.61m
English at 9.45 p.m. (Cushen).

GREAT BRITAIN

"This is London calling."

GRQ 18,030kc, 16.64m

GRP 17,890kc, 16.77m

GSV 17,810kc, 16.84m

GSG 17,790kc, 16.86m
At 9 p.m. the above stations are O.K. **GSG** the best (Gaden).

GRD 15,440kc, 19.42m
At 7.05 p.m. found four London transmitters on the 19m band and this one the best (Gaden). Excellent station (Perkins).

GRE, London 15,375kc, 19.51m
Tuesdays and Fridays from 8.30 to 8.45 p.m. and at 11.30 p.m. on Wednesdays and Saturdays. Not as good as 19.42m at 8.30 p.m., but better than **GSG** and that is saying something (Gaden). Announcements at 7.30 p.m.

GSF 15,140kc, 19.82m
Excellent transmitter at 9 p.m. Good in South American programme at 7.45 a.m.

GRV 12,040kc, 24.92m
As good as any on the air at 5 p.m. (Gaden). News in English for Europe at 6 p.m. (Hallett). Heard at 8.45 a.m. in foreign languages (Perkins). (R9 at 10 a.m.—Ed.)

GSD 11,750kc, 25.53m
Probably the most consistent of the B.B.C. transmitters and one of the earliest of the after-lunch stations.

GRX 9690kc, 30.96m
French from 3.20 to 3.40 a.m., German at 3.45 a.m.

GSC 9580kc, 31.32m
Quite nice at 2.30 p.m. (Gaden).

GRJ 7320kc, 40.98m
Splendid at 5.45 a.m. (Gaden).

GRM 7250kc, 41.38m
African service 1.30 a.m. to 2.15 a.m. (Byard).

GRK 7185kc, 41.75m
Another London transmitter. Heard in early evening, also about 2 a.m.

GRS 7065kc, 42.49m
Heard at 5.45 p.m.

GRN 6194kc, 48.43m
R8 at 6.20 a.m. (Byard).

GRW 6145kc, 48.82m
R-8 at 6.30 a.m. (Byard).

EUROPE

Bohemia:

DHE4A, Prague 11,840kc, 25.34m
Heard at 6.30 a.m. Can be identified by old Czechoslovakian nine-note signal. No English.

France:

Radio Vichy, Vichy 11,880kc, 25.25m
Heard opening at 5.45 p.m. Also good at 8.30 a.m. (Hallett).

Radio Vichy, Vichy 9520kc, 31.51m
Heard with good signal at 5 p.m. (Hallett).

Paris Mondial, Vichy or Paris, 6200kc, 48.39m
Heard at 5 a.m. Good signal.

Germany:

DJR, Berlin 15,340kc, 19.56m
Listen to "Anzac Tattoo" on Saturdays at 10.15 p.m.

——, Berlin 15,310kc, 19.60m
"German People's Transmitter." Midnight to 12.30 a.m. Announce will be on 32m band at 4 a.m. to 5.35 a.m.

DJB, Berlin 15,220kc, 19.74m
News at 3.30 p.m. (Hallett).

——, Berlin 12,775kc, 23.48m
R5 at 12.30 a.m. Gave announcement in English as "This is Berlin calling," and then gave News in Hindustani (Byard).

——, Berlin 9880kc, 30.36m
Sudeten German station. 3 to 3.45 a.m.

DJW, Berlin 9650kc, 31.09m
"Ghost Voice" can be heard nightly in German between 11 and midnight.

DXZ, Berlin 9570kc, 31.35m
News and talk at 4.30 a.m.

DXM, Berlin 7270kc, 41.27m
News at 2.30 a.m., 4.30 a.m. and 5.30 a.m.

DXX, Berlin 6140kc, 48.86m
News in English at 6.30 a.m. Very nice signal (Gaden).

DWX, Berlin 6130kc, 48.95m
This new German gives English News at 4.30 a.m.

Holland:

PCJ-2, Huizen 15,220kc, 19.71m
This Germon-controlled station announces at 9.45 p.m., "Here is Halland colling." News follows and again at 10.45 p.m.—Ed. Appears to be free of whirring noise (Hallett).

PCV, Amsterdam 18,070kc, 16.6m
In parallel with **PCJ-2.**

Italy.

Rome:

2RO-6 .... 15,300kc, 19.61m
Programme for North America closes at 3.50 a.m. Good in News at 8.20 a.m. and terrific signal in News at 5.20 p.m. (Hallett).

2RO-4 .... 11,810kc, 25.40m
News session at 3 p.m. comes in well (Hallett).

2RO-? 10,320kc, 29.07m
Also good signal at 3.40 a.m.

2RO-18 .... 9765kc, 30.74m
Good signal at 3.35 a.m.

2RO-18, Rome 9760kc, 30.74m
Very good at 2.30 p.m. (Gaden).

2RO-3 .... 9630kc, 31.15m
News in English for Australia at 5.20 p.m. Excellent signal (Hallett).

Portugal:

CSW-6, Lisbon 11,040kc, 27.17m
Talk in Portuguese from 3.30 to 3.45 a.m. Station closes, but heard again at 5 a.m.

CS2WD, Lisbon 6200kc, 48.38m
Heard as early as 9.30 p.m. All announcements in Portuguese, and closes with Portuguese National Anthem at 11 p.m. (Byard). (This is not a new station, as Mr. Byard suggests, but is an old-timer who has been silent for ages.—Ed.)

Russia:

Transmission from either Moscow or Kuibyshev.

—— 15,230kc, 19.69m
News at 7.30 a.m. and 9.10 a.m. R6 at 9 a.m. (Byard). Programme for U.S.A. 7.15 to 7.40 a.m. News at 10.20 p.m. Good.—Ed.

——, Kuibyshev 15,180kc, 19.76m
Good from 11 p.m. till midnight.

——, Sverdlovsk 12,060kc, 24.88m
English from 11 p.m. to midnight.

——, Kuibyshev 10,075kc, 29.78m
News at 11.30 p.m.

——, Moscow 9585kc, 31.30m
English at 10 p.m.

RV-96, Moscow 9520kc, 31.51m
Talk in Russian at 3 a.m.

——, Kuibyshev 8050kc, 37.27m
English at 6 a.m.

RW-96, Moscow 6061kc, 49.5m
English at 10 p.m. but much better signal on 31.30m.

Siberia:

——, Khabarovsk 9566kc, 31.36m
R6 at 8.45 p.m. (Byard).

Spain:

Radio Malaga, Malaga 7210kc, 41.61m
R5 at 7 a.m. (Byard). (I have a note of a Spanish station — call-sign unknown —

on 7195kc, 41.70m, heard between 5 and 9 a.m.—Ed.)

EAJ22, Oviedo .... 7140kc, 42.02m R5 at 7 a.m. (Byard).

Radio Mediterrania, Valencia, 70.35kc, 42.66m Opens at 6 a.m. with march. Slogan, "Voz Espana." (See "New Stations.")

Switzerland:

HER-3, Schwarzenburg .... 6165kc, 48.66m Still heard of a morning with a musical programme, but no English.

Vatican City:

HVJ .... 15,120kc, 19.84m Time of opening seems to vary, but generally around 4.30 p.m. and in Italian.

HVJ .... 11,740kc, 25.55m Prisoners-of-war announced at 5 p.m.

HVJ .... 9660kc, 31.06m Information re English prisoners-of-war at 3.20 a.m.

HVJ .... 6005kc, 49.96m Talk at 5.15 a.m.

Scandanavia:

Sweden:

SBP, Stockholm .. .. 11,710kc, 25.63m Listen on Sundays at 9.45 p.m.

SBU, Motala .... 9530kc, 31.46m Think I heard this station around 4 and 5 p.m. (Hallett).

MISCELLANEOUS

Canada:

CBFY, Montreal .... 11,705kc, 25.63m Heard at good strength about 10.30 p.m.

CFRX, Toronto .... 6070kc, 49.42m Opens around 9.30 p.m.

CJCX, Sydney (Nova Scotia) 6010kc, 49.92m Was R3, opening at 8.35 p.m. (Byard). Excellent here at 8.45 p.m. Buckley's Cough advertisement at 9 p.m., followed by News (Cushen).

West Indies:

COCY, Havana .... 11,740kc, 25.55m Good at 3 p.m., fair at 7 a.m.—Ed.

COK, Havana .... 11,620kc, 25.82m Good, morning, afternoon and night. English spoken frequently.

COCQ, Havana .... 8850kc, 33.9m R4 at 11.55 p.m. (Byard). Can be heard well from 10 p.m. and also good at 7 a.m.—Ed.

COHI, Havana .... 6455kc, 46.48m R4 at 10.15 p.m. (Byard).

COCQ, Havana .... 6375kc, 47.06m Fair from 9.40 p.m.

Turkey:

TAP, Ankara .... 9465kc, 31.70m Still heard with R8 signal at 6 a.m. (Perkins).

Location Unknown:

——— .... 9695kc, 30.84m An anti-British station heard from 12.30 a.m. to 12.53 a.m. (See "New Stations.")

European Revolutionary Station 9640kc, 31.12m Invariably announce they are on 31.20m. Heard every morning from 4 a.m.

SPEEDY QUERY SERVICE

Conducted under the personal supervision of A. G. HULL

T.H.H. (Albert Park, Vic.) has a set which whistles on the stations at the low frequency end of the dial.

A.—This is nearly always caused by feedback from the audio end to the aerial or oscillator circuits. Keep the padder condensers well away from the audio end of the set and make sure that the aerial lead-in does not run close to the output valve. Put a small condenser, even if only .001 mfds., across the speaker to by-pass any r.f. which gets through to the audio end.

*

J.C.K. (Marrickville) has a one-valve set which is not giving results up to expectations.

A.—These little sets need to be working at maximum efficiency in order to give satisfaction. You haven't got a hope unless you can get the reaction working smoothly. Try the effect of varying the length of aerial, or fitting a small mica condenser, say, .0001 mfds., in the aerial lead-in to lower the loading. It is quite normal to find that reaction is easier at the higher frequencies, but the difference should not be as much as you seem to be troubled with.

*

C.M.C. (Parramatta) has a set which appears to need laboratory service.

A.—Sorry, but we cannot possibly undertake any laboratory service at the present time. Being unable to obtain suitable staff, we are forced to suspend this service. We can only suggest that you get a local serviceman to help you. The circuit is quite straight-forward and should present no difficulty to any repair man who is experienced with modern sets. Take along the original circuit so that he can look it over if in doubt.

*

G.F.W. (Lindfield) asks about inverse-feedback for amplifiers with triodes.

A.—We have not done any practical experimenting in this direction, but, by a strange coincidence, we came across an article on the subject in the latest issue of the American "Radio." We were so impressed with this article that we reprinted it in this issue. No doubt you will read this article and find it of interest. Apart from the harmonic distortion, the use of feedback should ensure a flat frequency response.

B.H. (Chatswood) enquires about the ability of a single tuning circuit under modern conditions.

A.—In your location you should be able to get each and every local station, without undue overlap. If you use a large aerial and try to get the volume level down to a whisper you may run into a little background, but by using the right length of aerial and keeping a fair bit of reaction on, you should be able to obtain good enough results. A leaky-grid detector may prove more sensitive, but for best selectivity use an anode-bend detector with a screen-grid tube. Unfortunately this type of detector may tend to make the reaction control fierce, and to avoid this you may find a choke-coupled audio circuit is preferable to the normal type of resistance-capacity coupling. For the output valve you will use the most sensitive of pentodes or beam power valves.

*

L.B. (Manly) is in doubt about a gramophone motor.

A.—We can only suggest that you make a practical test by borrowing another motor and then making a substitution. We don't know of any sure way of testing a motor for wogginess, the slowing up on heavy passages not being easy to see, even with a stroboscopic type of speed tester.

*

H.G. (Maroubra) enquires about crystal pick-ups with sapphire needles.

A.—These pick-ups are listed in the United States, but so far as we know, they are not available on the local market. The claimed advantages are not so much that the needle lasts indefinitely, but that the needle pressure is much lower than with ordinary types of pick-ups, and the transient response and overall frequency response are both excellent.

*

T.L. (Carlton) has converted an old set in order to get improved quality of reproduction by taking out the i.f. stage and using the one i.f. transformer to couple the converter valve in to the second detector.

A.—The scheme is a good one and usually makes a great improvement in the reproduction from the local stations, although cutting down the sensitivity a lot. In your particular case, however, you seem to have run up against a bit of a snag in the matter of the converter valve. Those old-style autodynes were very critical about their loading and most of them would work only when feeding into a special type of intermediate transformer. Apparently that is where your trouble lies, as the converter seems to be operoting in the normal way when feeding into the original transformer. There is also the thought that you may have had 175 k.c. intermediates in the original job, and the new i.f. is of the 465 type, as is usual in modern sets. It would not be expected to give proper results with a 175 k.c. type of oscillator coil. If you decide to push ahead with the scheme we feel sure the best plan will be to change over to a 2A7 type converter valve, with a new coil kit to suit the new i.f. transformer which you have on hand.

*

T.K. (Bondi) asks whether it is possible to use two 6V6G type output valves in parallel on each side of a push-pull amplifier, to use four output valves in all, to get double the power output.

A.—Yes, this scheme is quite O.K. You will need a speaker transformer of half the normal loading and capable of carrying double the normal current. Power transformer will need to be able to supply the extra current. Field energisina will have to be watched on account of the extra current, too. Results should be O.K. at double power output, but you will have to be doubly careful about keeping the outfit free from parasitic oscillations. Grid stoppers, and plate stoppers to isolate each pair of valves would be desirable.

*

W.S. (Five Dock) is interested in "ham" radio.

A.—So far as we know there has been no official announcement about the status of the radio "ham" transmitter after the war, but we would not be at all surprised if every encouragement is given, and ham radio becomes recognised as a worthwhile hobby and pastime, as well as a field for scientific experimenting. There will be thousands of trained morse operators and others with a grounding in radio theory, and it is expected that a great many of these will turn to ham radio when peace returns. So far as we know there is nothing to stop you going ahead and getting your operator's ticket straight away, although, of course, you won't be allowed to operate a station while the war is on.

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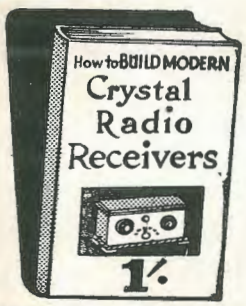

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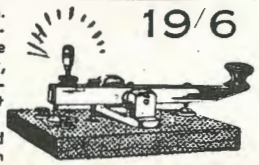

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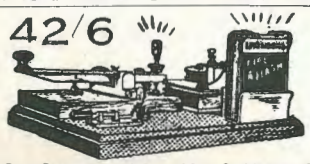

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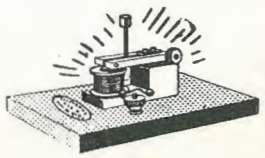

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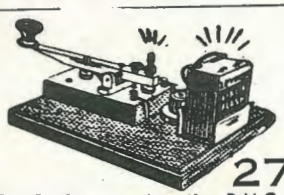

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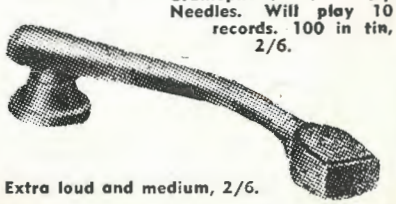

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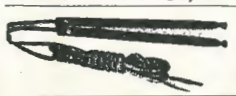

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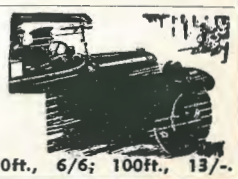

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