THE AUSTRALASIAN

Radio World

1/6

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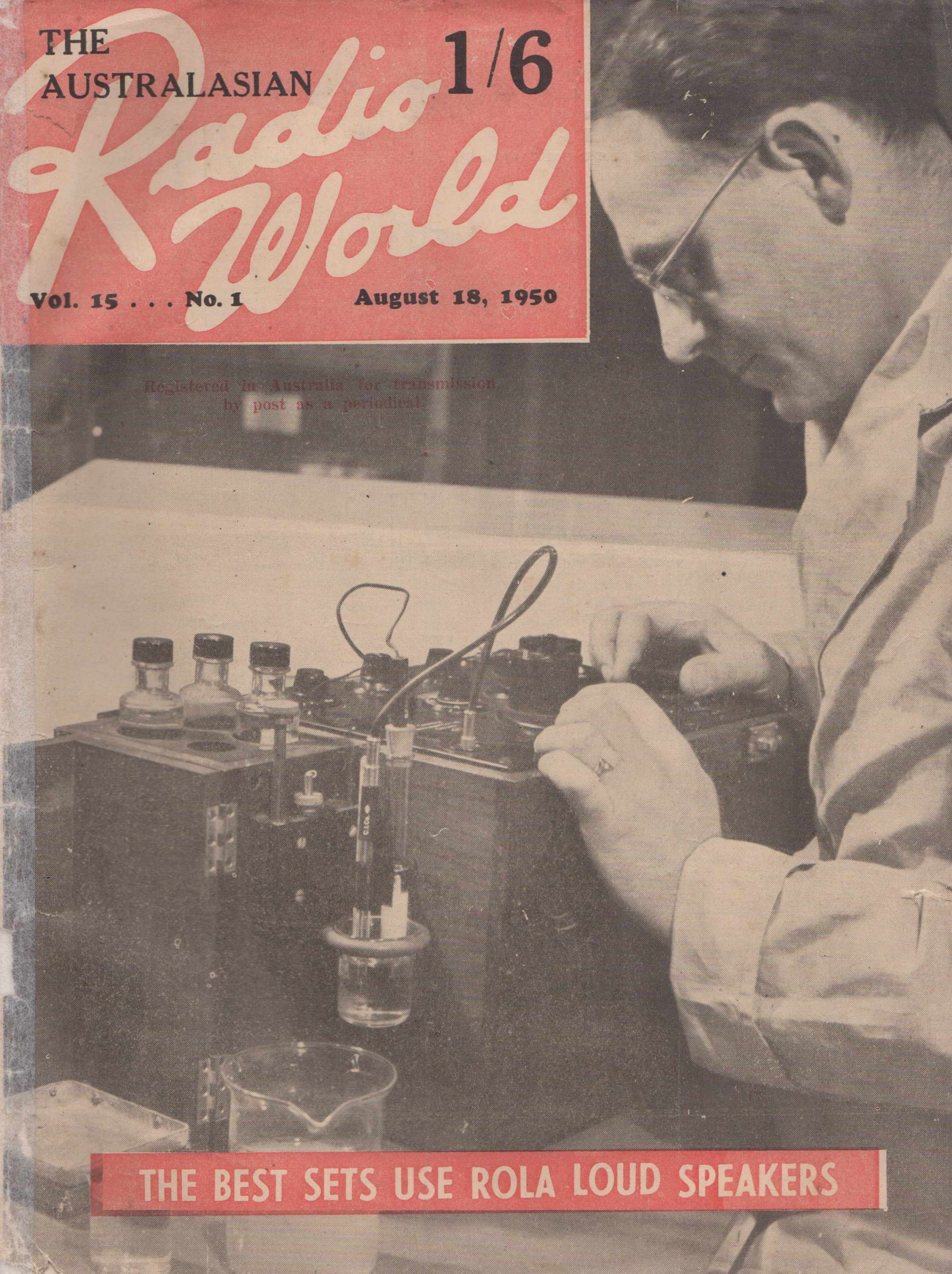

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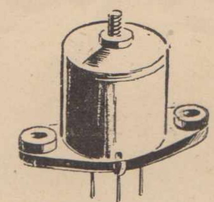
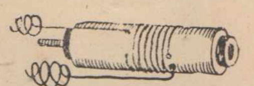
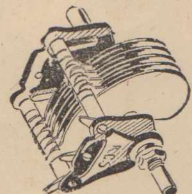


Dual-wave units.

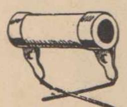


Short-wave Coil.

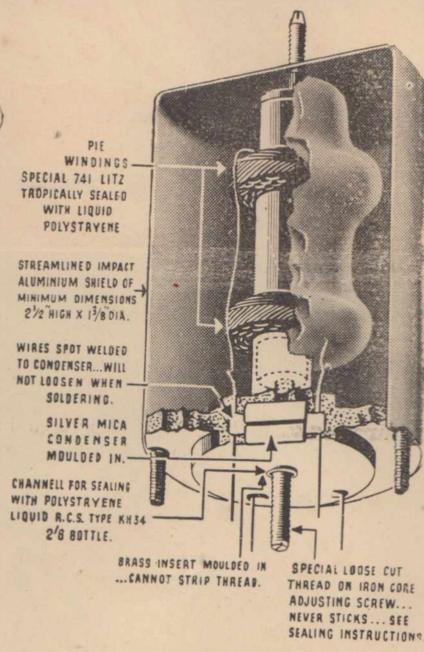
Trimming condenser.



Midget variable condenser.



Resistors.



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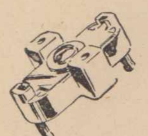
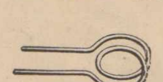
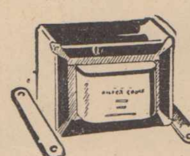


Padding condenser.

Standard broadcast coil.



F.M. Coil.



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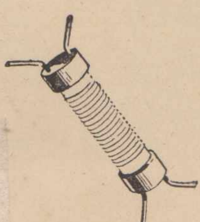

5 band coil.

Loop aerial coil.

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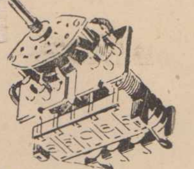
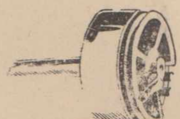
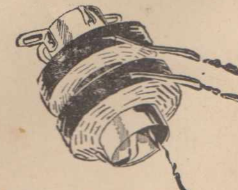


Dual wave unit.

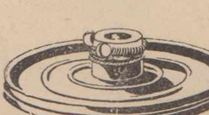


Potentiometer.

Radio Frequency Choke.



Line filter coil.



Dial drive drum.

Radio frequency choke.

If you have difficulty in purchasing R.C.S. components loca... ... us and we will advise you of the name of your nearest retaile... ... whom supplies can be obtained.

THE AUSTRALASIAN

RADIO WORLD

DEVOTED ENTIRELY TO TECHNICAL RADIO

and incorporating

ALL-WAVE ALL-WORLD DX NEWS

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OUR COVER PICTURE . .

Modern manufacture of many types of electrical equipment calls for close liaison with the industrial chemist. Our picture shows one of the Rola laboratory staff conducting P. H. (acidity) tests on paper used for loudspeaker voice coils.

CONTENTS

PERSONAL . . .

I have not had time to prepare a full report of our Hi-fi Party for this issue. As announced in last month's issue, we offered our Melbourne readers a chance to hear some exceptional reproduction. We expected that we would get an audience of fifty or sixty enthusiasts, but the demand for reservations was so heavy that we were forced to hold four parties, each packed to capacity.

Which was very heartening in its way, but brought home to me again so strongly that it is a tough battle to be a one-man organization in the publishing business. With assistance, there is no limit to what can be done with the old "Radio World". I have a wide following which has been built up over many years, but I cannot do everything myself. So I cannot take advantage of the many opportunities offering.

Already I have to do all the office work, editorial work, and the many details connected with the publication. I cannot pursue the advertising as well. Yet if I could get more advertising revenue, I could afford to run much bigger and better issues. My rates for advertising have not been advanced since 1936, offering exceptional value to the keen businessman, but I need the services of good advertising representatives to place these facts before those concerned.

If there is any person connected with the advertising business who can handle "Radio World", even if in spare time or part time, I will be pleased to make him a generous proposition.

A. G. HULL

QUALITY REPRODUCTION

New Radiotron Amplifier

THOSE interested in the eternal search for perfection in the reproduction of synthetic music will welcome this latest circuit from the Radiotron valve factory.

FROM the circuit laboratory of the Amalgamated Wireless Valve Company comes another circuit for a low-distortion amplifier. Known as

By

A. G. HULL

A518, this new Radiotron circuit seems to be a worthy successor to the other successful amplifier circuits which have emerged from this laboratory. Intermodulation distortion seems to be the thing these days, so the announcement which introduces this new amplifier circuit starts off by stating that it has been designed to deliver 25 watts of output with only 2% intermodulation distortion. By public address standards it would be rated at 35 watts output.

This matter of intermodulation distortion is one which I can frankly admit I have not followed as closely as I suppose I should. It seems to go back mainly to an article by Hilliard in the Proceedings of the Institution of Radio Engi-

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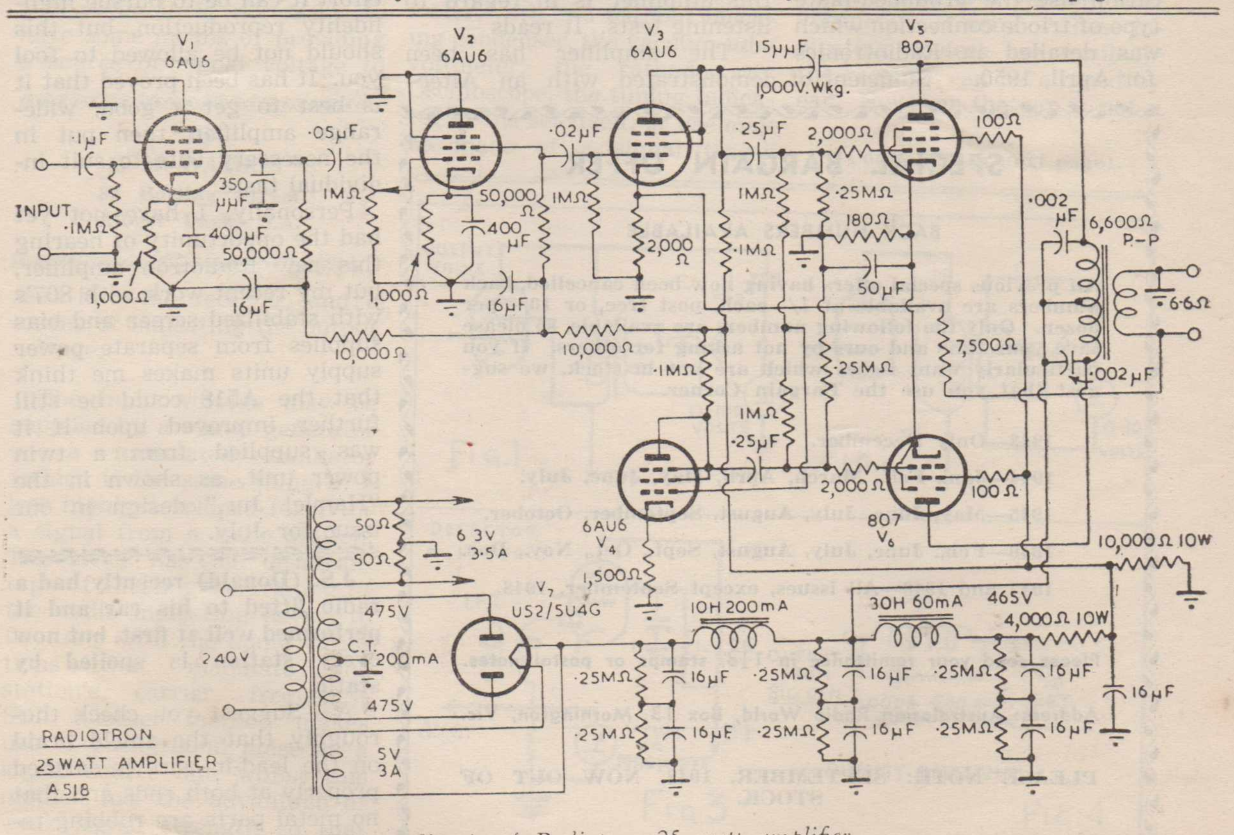

Circuit of Radiotron 25 watt amplifier

AMPLIFIER

(continued)

neers, 29/12, for December, 1941. I have not yet been able to get a clear picture of the factors responsible for intermodulation distortion, nor sufficient grasp of the subject to be able to say that a direct-coupled amplifier is likely or unlikely to have more intermodulation distortion than a resistance-coupled one.

To return to the subject, however, the Radiotron amplifier A518 has been designed with a restricted frequency range so that it is flat within a decibel from 20 c.p.s. to 30,000. The capacity of the coupling condensers limits the response below 20 c.p.s. and the plate by-pass condensers cut the highs above 30,000.

The early stages of amplification use the grounded-plate type of triode connection which was detailed in Radiotronics for April, 1950. Sufficient of these amplifiers are shown in the design to allow the amplifier to be used with low-output pick-ups and microphones. Those who use crystal pick-ups will find it necessary to omit the first two 6AU6 valves and feed their pick-ups into the grid circuit of V3.

Output transformer used by the Radiotron engineers was the one originally designed for Williamson-type amplifiers, but considering the secondary load as 6.6 ohms instead of the original 10, in order to compensate for the lower plate load recommended for the 807's as beam power tetrodes. In the Williamson and Radiotron A515 amplifiers the 807's were connected as triodes with recommended load of 10,000 ohms.

An interesting paragraph of the Radiotronics story about this amplifier is in regard to listening tests. It reads —

"The amplifier has been demonstrated with an Altec-Lansing 15in. speaker, a good quality pick-up and a number of good recordings, including one specially made for demonstration purposes.

"Even when the special demonstration record was in use, the large majority of the listeners preferred the reproduction with a 5 Kc/s low-pass filter following the pick-up, and none considered that any improvement was obtained by increasing the response above 8 Kc/s since the added record noise and distortion products marred the reproduction. If either speaker or pick-up have a reduced high-frequency response it is possible that filters would be preferred with higher cut-off frequencies."

The fact that listeners prefer to hear the amplifier with a cut-off at 5,000 cycles seems to indicate just what a waste of effort it can be to pursue high-fidelity reproduction, but this should not be allowed to fool you. It has been proved that it is best to get a good, wide-range amplifier, then put in the necessary cuts to suit individual taste.

Personally, I have not yet had the opportunity of hearing this new Radiotron amplifier, but my recent work with 807's with stabilized screen and bias supplies from separate power supply units makes me think that the A518 could be still further improved upon if it was supplied from a twin power unit, as shown in the "Hamlet Jnr." design in our issue for July.

J.S. (Donald) recently had a radio fitted to his car and it performed well at first, but now every station is spoiled by static.

A.—Suggest you check thoroughly that the shield braid on the lead-in wire is earthed properly at both ends and that no metal parts are rubbing together due to engine vibration.

Receiver Alignment

OUR popular contributor, Mr. H. M. Watson, writes: "On looking through back numbers to see which subjects have not been covered recently, I came across a note from Mr. Burns, in the April, 1949, issue, where he said that he had never seen an article covering the ways of using a modulated oscillator. So this should fix up this little matter."

ALIGNMENT of the tuned circuits of a receiver is a most important operation as it affects its sensitivity, selectivity and fidelity; all of which play a big part in the performance of the set.

To align the tuned circuits of a receiver it is necessary to have some means of providing a source of signal voltage to

By
H. M. WATSON
89 Botting Street
Albert Park, S.A.

feed into the receiver, and a means of indicating the output voltage.

The input voltage may be supplied by a signal generator or a modulated oscillator (which is the same thing in a less highly-developed form) or a signal from a radio station. The latter has the disadvantage of causing the reading of the audio indicating device to fluctuate with the audio variations that modulate the station's carrier frequency. Still another method makes use of background noise as a signal source but, whilst this method has the advantage of weak signal strength so that the AVC does not operate, it again fluctuates with all sorts of external noises that may introduce momentary voltages in the aerial circuit.

The output indicating device may be one of many different types. This is the A.C. voltmeter, with and without blocking condenser, the vacuum tube voltmeter, the cathode ray Oscilloscope, the tuning indicator of the set itself, or use may be made of a signal tracer using the probe to pick off the signal at any point along its path following the tuned circuit or circuits being aligned.

The indicating device on a signal tracer may take the form of a tuning indicator (magic eye) or a vacuum tube voltmeter. If none of these indicating devices are available the receiver can be aligned by ear. However the ear is not a

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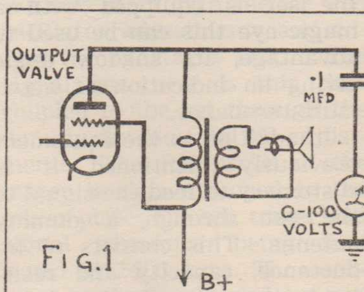

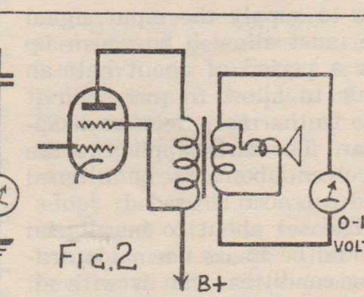

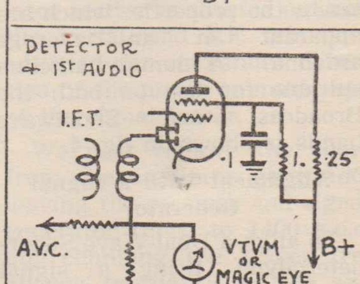

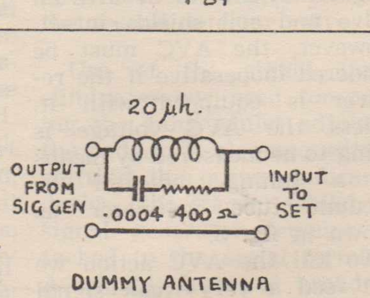

ALIGNMENT
(continued)

very accurate judge of sound intensities, due to its logarithmic characteristic.

An oscilloscope has the advantage of indicating distortion in addition to output. A steady signal from a signal generator should be used when tracing distortion with an oscilloscope as the complex waveform of music, speech, etc., would make distortion impossible to trace.

On the other hand a signal should be tuned in, from a broadcast station, when making distortion checks with the aid of a signal tracer.

In addition to our source of input voltage and a means of measuring the output created by same, it is necessary to have an alignment tool which is a screwdriver constructed entirely of insulating material. It is important that this tool has no metallic parts as these would load the tuned circuit which it is adjusting, thereby detuning it to some extent.

Whichever instrument we use to supply the input signal we must allow it to warm up for a period of about half an hour to allow frequency drift due to thermal effects to disappear. The same applies to the receiver about to be aligned and a tracer if used.

The set about to be aligned should be in its normal operating condition, that is with all valve and coil shields intact. However, the AVC must be rendered inoperative if the receiver is equipped with it, unless the AVC voltage is going to be measured by means of a tuning indicator or vacuum tube voltmeter as shown in fig. 3.

To kill the AVC action we can feed a very weak signal into the receiver so that the amplitude of the signal is too low to operate the AVC circuit. The best idea to minimize difficulties caused by AVC action and "Miller" effect is to feed in the lowest signal voltage that will give a reference level on the output meter or other indicating device, at the same time turning the volume control of the receiver to maximum volume setting to help in this direction.

If the receiver has delayed AVC it is a simple matter to keep the voltage at the AVC diode lower than the delay voltage so that the AVC does not function. Sometimes, however, a receiver is encountered which requires a signal strength greater than that required to operate the AVC system before an indication is given on the output indicator. The remedy in this case is to earth the voltage feed of the AVC rectifier, alternately a vacuum tube voltmeter may be applied across the diode load resistor which will give an indication of the negative voltage fed back to the controlled stages. On the other hand if the set is equipped with a magic eye this can be used to advantage, its shadow angle giving an indication of maximum resonance.

In addition to the equipment previously mentioned it is customary to feed the signal to the set through a dummy antenna. This consists of inductance, capacity and resistance, the properties which are apparent in an average antenna. A dummy antenna suitable for use on both the Broadcast and Shortwave bands is shown in fig. 4.

Alignment with a Signal Generator

To align a Dual-Wave Superheterodyne, using a signal generator, our first step is to couple the output of the signal generator to the mixer grid by means of a .05 mfd. condenser. We next connect the output indicating device in its appropriate position (see figs. 1 to 3). After allowing both the set and signal generator to warm up for about half an hour we short out the oscillator gang to prevent interference from local stations. Next we tune the signal generator to the intermediate frequency of the set we are aligning (455 k.c.s in most cases for modern sets) and the receiver to the low frequency end of the Broadcast band. By means of our aligning tool we commence alignment by adjusting the slugs or trimmers of the IF transformers for maximum output on the output indicator. We first adjust the secondary of the 2nd IF transformer and, working back towards the input end, we finish with the alignment of the primary of the 1st IF transformer.

This completes the alignment of the intermediate frequency stages. This we follow with the alignment of the RF and oscillator stages, it does not matter whether we commence with the B/C or the S/W band as each band is independent of the other. The reason that we switched to the B/C band whilst we adjusted the IF trimmers was to keep the low impedance of the shortwave coil away from the output of the signal generator.

As we are switched to the B/C band we may as well start with it. We now couple the signal generator to the aerial terminal of the set by means of the dummy antenna (fig. 4) and tune both the set and signal generator to 1400 k.c.s or thereabouts, but first we remove the short across the oscillator gang. The oscillator trimmer is now adjusted for maximum output following on with the R.F. trimmer if the set has an RF stage. This is followed by adjustment of the aerial trimmer. We then change the frequency of the signal generator and the set to 600 k.c.s where the padder is adjusted for maximum output. While this adjustment is made we must "rock" the tuning gang so that the RF stages can be tuned to resonance at the same time as the optimum position is found for oscillator tracking. If the receiver has adjustable iron core coils alignment should be carried out at 600 k.c.s first, followed by alignment at 1400 k.c.s. Alignment at each of these frequencies being as above, but coil slugs adjusted at 600 k.c.s starting at the oscillator coil, then the RF, and finally the aerial coil. This completes the Broadcast band alignment although it is advisable and usual practice to go back over the first alignment frequency and make any small adjustments to compensate for effects of alignment at the other end of the tuning range. For instance, if we tune to 600 k.c.s and align the iron cores and padder first, followed by the trimmers at 1400 k.c.s, alignment at this second frequency will not greatly effect that at 600 k.c.s. However, if we touch up the slugs and padder once again we know we have the optimum settings.

This completes the Broadcast band alignment and we now turn to the short wave band. This time we tune the signal generator and receiver to 16 m.c.s and adjust the oscillator trimmer for maximum output, this adjustment is followed by the RF trimmers and aerial trimmer. The receiver and signal generator are then both tuned to 6 m.c.s at which frequency the padder is adjusted, if same is of the variable type. Nowadays, however, in most cases the padder condenser is fixed and adjustment at the low frequency end of the shortwave band is carried out by adjusting the slug of the oscillator coil.

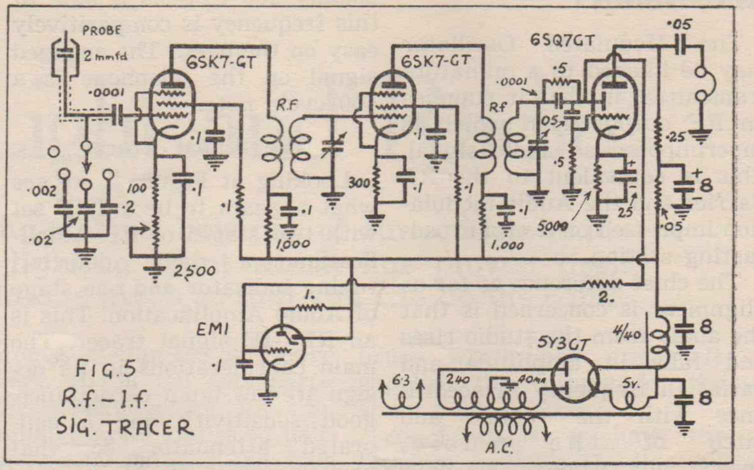

Fig. 5
R.f.-I.f.
Sig. Tracer

Alignment with Signal Tracer and Signal Generator

The alignment in this case is the reverse of that given above. We now start with the RF and oscillator adjustments and adjust the IF stages last. The signal generator is this time coupled to the set through the dummy antenna for all adjustments. The RF probe of the tracer is then attached to the mixer plate; the set, tracer and signal generator being first tuned at 1400 k.c.s. The oscillator section is shorted out and the aerial and RF trimmers adjusted for maximum deflection of the meter or magic eye of the signal tracer.

We next remove the short from the oscillator gang and, leaving the receiver and signal generator tuned to 1400 k.c.s, but changing the tracer frequency to the IF of the set, adjust the oscillator trimmer.

Our next step is to tune the set, tracer and generator to 600 k.c.s. Once again shorting out the oscillator gang; when all three are in resonance, irrespective of the dial reading of the receiver, we again tune the tracer to the IF of the receiver, removing the short from the oscillator gang. Whilst in this position we adjust the padder for maximum indication on the tracer. Finally comes the IF transformer alignment for which we leave the tracer set to the intermediate frequency and tune the set and generator to 1400 k.c.s. We now move the tracer probe along to the plate of the IF amplifier and adjust the first IF transformer for maximum indication of output. We adopt the same procedure for alignment of the second IF transformer except that we now move the tracer probe to the second detector valve.

Use of the signal tracer eliminates our need for rocking the gang whilst adjusting the padder. It also necessitates shifting the output indicating device (the tracer) whilst the signal generator remains attached to the aerial terminal. A signal from a broadcast station may be used for the signal source in lieu of the signal generator.

ALIGNMENT

The Modulated Oscillator may be likened to a miniature transmitter in that it supplies an RF output upon which is superimposed an audio signal. This is equivalent to the RF Carrier and the Audio modulation impressed on it at a broadcasting station.

The chief difference as far as alignment is concerned is that the audio from the studio rises and falls in amplitude and varies in frequency in accordance with the volume and pitch of the music, speech, etc., whereas we have an audio not of a steady amplitude and frequency with which to modulate our RF signal. For a circuit and description of a modulated oscillator see the Feb, 1949 issue. Briefly defined it is an instrument capable of generating an RF voltage and an audio voltage, both functions being achieved by vacuum tube oscillators. The RF output may, or may not, be modulated with the audio output as required.

The RF oscillator is tuned to cover the B/C S/W and IF bands whilst the AF oscillator is tuned to a fixed frequency, usually 400 CPS as a note of this frequency is comparitively easy on the ears. The engaged signal on the telephone is a 400 cycle note.

The Signal Tracer

Looking at Figure 5, we see what appears to be a TRF set with two stages of RF Amplification, a diode detector, tuning indicator and one stage of Audio Amplification. This is an RF—IF signal tracer. The main considerations in its design are low input capacitance, good sensitivity and a calibrated attenuator so that various values of voltage may be applied to its input. The signal is picked off the set, being aligned and fed to the tracer between the probe tip and earth. The probe contains a small condenser, usually 2 mmfds. or less, through which the signal is fed to the grid of the first RF amplifier via the .0001 condenser. The low input capacity of the probe condenser limits the loading capacity introduced into any circuit being aligned to this same value of 2 mmfds. or less, thus preventing detuning of the RF and IF circuits of the set being aligned.

The capacity divider network permits signals of various strengths to be handled, larger signals requiring greater values of capacity switch in from the divider network to reduce the signal at the grid to such a value that the reference level on the magic eye can be observed.

When the switch is in position 1 the capacity is that of the shielded cable and other stray capacities; rotating the switch increases the capacity in steps of ten whilst intermediate values can be obtained by varying the bias on the 1st RF amplifier.

The portion of signal voltage applied to the grid of the first RF amplifier is amplified by this valve and further amplified by the second RF amplifier. It is then rectified by the diode detector and the audio component fed to the audio amplifier via the 05 mfd coupling condenser where headphones are used in the plate circuit for a check on distortion. The negative potential is fed to the magic eye grid via the resistance capacity filter where it gives a visual indication of signal strength.

The RF coils shown in fig. 5 cover the broadcast band only, additional coils should be switched in for shortwave and Intermediate frequency ranges.

Plates are all decoupled to prevent interaction between stages, and screens supplied through separate dropping resistors to help maintain stable conditions.

The valves used are all single ended and of the small type for the sake of compactness. The level indicator is an EM1; a 6E5 could be used here and is about as sensitive. If neither of these two types are available then a 6US/G5 or an EM4 could be used, but these haven't the same high degree of sensitivity as the other two.

New President - I.R.E.

Mr. Thomas Palmer Court, F.I.R.E. (Aust.), has been elected President of The Institution of Radio Engineers Australia for 1950/51.

Mr. Court, who is fifty-five years of age, has been associated with radio for more than thirty-eight years.

In the first war he served as Radio Officer with the Royal Australian Navy on Transports.

In the period 1920/23, he was associated with the construction of Broadcasting Stations 3AR and 3UZ.

Today Mr. Court is Engineer-in Charge of the Consumer Products Division of Standard Telephones & Cables Pty. Ltd., Sydney, N.S.W.

Mr. J. N. Briton, B.Sc., B.E., F.I.R.E. (Aust.), M.I.E., Aust., was elected Deputy President, Mr. H B. Wood, B.Sc., M.E., F.I.R.E. (Aust.), M.I.E., Aust., Senior Vice-President and Mr. T. A. E. McNeill, F.I.R.E. (Aust.), Vice-President.

Home Light and Radio

HERE is an interesting story of how one of our readers made himself a home lighting plant which has proved itself over the years. All data is given so that you can do the same.

A FEW years ago I made up a lighting plant for my home and a radio to work from it.

The lighting plant has been absolutely trouble-free and for six years has given us all the light and radio that was wanted, at the cost of a very modest sum.

Lighting Plant

I decided on a 26-volt plant, using 24 volt globes. Batteries are the weak link in a home lighting set, therefore the less

★

By
E. H. COWLED,
Bethungra, N.S.W.

★

to replace the better, provided they do the job. Hence my choice of 26 volts against 34 volts. 24 volt globes are as readily available as 32v.

I wanted a generator and batteries capable of supplying 10 lights and a radio; the batteries to have sufficient storage to necessitate the engine being run not more than twice a week, about six to 8 hours each run.

I used a 3 HP petrol-kerosene engine, 1000 r.p.m. that was already on hand and was used for shearing purposes.

Generator

I secured a Dodge car genemotor as used in the old Dodge 4 cars. I selected this particular genemotor for its size, laminated poles and good ball-bearings. I stripped the four field coils and rewound them with 200 turns of 18-gauge enamel covered wire. I then taped each coil and varnished them. When thoroughly dry I fitted the four coils to the four poles pieces and joined them all in series (inside to outside of next coil).

Also, in series with the coils, I put a variable resistance of about 12 ohms (made up of discarded electric toaster element) and then wired coils and resistance across from positive brush to negative brush of generator.

As the gearing on these generators, when fitted to the Dodge car is three to one revolution of engine, it seemed to me that 3,000 r.p.m. were normal for generator, anyhow that is the speed at which I drive it and it has been running in a perfectly trouble-free manner for six years.

The batteries I am using are rated to be charged at 16 amps. and this is a suitable rate for the generator, although I have run it at charging rates of up to 20 amps. and it did it quite satisfactorily and did not heat up unduly.

When I assembled the generator after mounting the coils, I, of course, removed the third brush which had previously supplied the voltage for the shunt field.

As I wished to have the brushes movable I did not screw the brush holder end plate in position, but put two bolts long enough to reach from each end plate and fitted in such a way that it held the brush end in place and yet it could be tapped around until the brushes were in the best place for highest voltage and least sparking at the brushes.

I used the ⅝ copper strip taken from the series field coils to connect generator to batteries through a 30—0—30 amp. meter.

For a cut-out (reverse current relay) I used a 12 volt car cut-out and put wire-wound resistors in series with the fine shunt winding until the points closed at about 26 volts. It takes 100 m.a. through this winding to make the points close, so it is quite a simple matter to arrange it to suit a 26-volt bank of batteries.

Yes, the cut-out gets a little warm when the engine has been running several hours, but it is quite satisfactory — I am still using the same cut-out and they originally cost about 7/6.

I would mention that the armature was not altered in any way.

26-Volt Radio

I then made up a five valve

(Continued on next page).

HOME LIGHT
(continued)

radio to run off this plant. As we live half way between Sydney and Melbourne and there are plenty of stations about the same strength, I wanted a radio that was quite selective, good out-put, and effective AVC, which needs control on three stages.

It seemed to me that a set using ECH33 1st detector, EBF35 1st IF amplifier, 6G8G 2nd IF amplifier and 2nd dictors and AVC, 6J7G voltage amplifier driving a 6V6GT with feedback and coupled to a Rola 12/0 speaker should do the job.

I therefore bent up a chassis from a piece of heavy aluminium, drilled holes in it, mounted valve sockets, gang, IFT's etc.

I wired the ECH33 and EBF35 heaters in parallel, then shunted the 6G8G and 6J7G heaters each with a 60 ohm resistor, then wired all valve heaters in series, which means I had 400 odd m.a. flowing in the heater network with 26 volts across.

This is a few m.a. low for a 6V6 but it performs really well, so I have left it that way.

For the HT I purchased a disposals genemotor, 28 volt input, 250v., 60 m.a. output, these genemotors can be bought for about 30/-, and are much less troublesome than a suitable vibrator, the only drawback to the genemotor being the humming noise it makes when running, so I connected the genemotor to the set by way of 20 feet of 3-way rubber-covered flex and put it out on the verandah where it could not be heard, and forgot it.

To fill in the input to genemotor I wound about 50 turns of 18-gauge enamel wire on a bobbin and by-passed each side with a .5 condenser.

On the output side I used an RF choke by-passed each side with a .001 mica condenser; for a filter choke I used an output transformer by-passed each side with a 16 m.f.d. electrolytic.

The hash from the genemotor is hardly noticeable, even when tuned off a station and, of course, is free from hum and everything else when tuned to a station.

The set draws 1¼ amps. at 26 volts, which is about equal to a 30 watt light.

Double Direct Coupled Amplifier

I SENT you a circuit some months ago about adding a 6SN7 in front of the drivers of your Quality amplifier. You mentioned it might take a little taming, but would be OK. I am very pleased with the finished job. I have enclosed its present circuit.

In the driver stage I changed over to a pair of 6J5 Metals RCA tubes, also used a pair of matched 807's, also selected resistors about the different stages.

By

W. T. FORD

54 Oxford St., Burwood.

I made it up first without the feedback. It had hum trouble so I changed the rectifier plate leads. This had no effect, then added the 8m.f.d. suggested by you; this fixed it. The quality at this stage was good. Then I felt I must try feedback, so I put the same amount on as used in the "Williamson." This did improve the quality. Bass was not louder but harder; better speaker damping, the hum—not a sign with my ear against the speaker, reduced valve noise. This job has something that a good "Williamson" has not. I have heard both.

In the near future I will put in a balanced circuit to adjust the 807's plate drain. Then I will be wondering if my set is a modified "Quality Amplifier" or a "Williamson Amplifier," modified.

"I enclose cheque for renewal of my subscription for another two years. The past twenty-four issues have seen some highly satisfactory features, especially regarding direct coupling. The recent twin power supply designs are positively brilliant. Keep up the good work."—**Ray S. Smith, 26 Spearman Street, Roseville, N.S.W.**

"I am an engine driver, steam, gas, and oil (Diesel). In this avocation I have had experience in saw-milling, refrigeration, and electric generating plants. I prefer the latter. I have been interested in radio for many years and like articles on receivers, both broadcast and for hams. I may some day qualify for the A.O.C.P. Here's hoping. I like to read about test gear, too. I read your publication because I find it informative on latest trends in a subject in which we have a mutual interest and believe you are doing a good job." — **W. A. Anderson, 18 Tamar Street, Palmyra, W.A.**

"I am employed by the Windouran Shire Council as truck driver, bridge and road repairer, earth mechanic, etc. I find the job O.K. as I like a great deal of outdoor life. Age, 35 years. I read your publication for the latest news from Paul Stevens, yourself, Aegis, Rola and the high-fidelity amplifier enthusiasts. My favorite feature — ham-band receivers."—**Albert C. Martyn, 11 Hunter Street, Deniliquin, N.S.W.**

"I am a carpenter by trade, and radio is my hobby. I am 55 years of age, employed by Australian National Airways, Mascot. I also like shooting and photography. I have just finished a course with the Australian Radio College, and got through the final exam with three mistakes, only one of which was a bad blue. I had forgotten the formula for the power developed by the output valve. I read A.R.W. because I like it. I have been reading it

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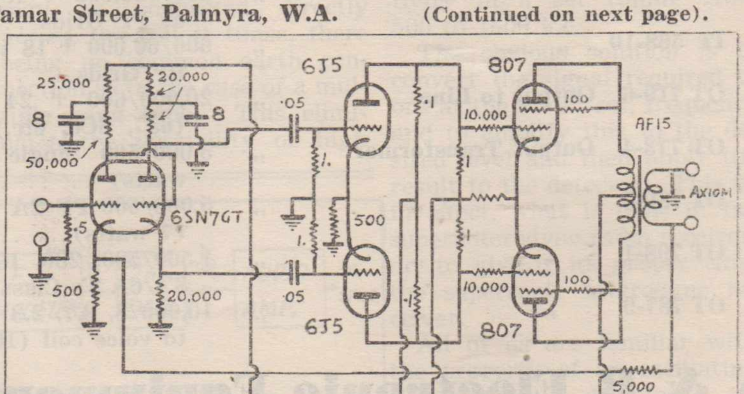

AMONG OUR READERS

(continued)

since shortly after it was started in Sydney. The features I like best are those dealing with service work and test equipment. The series of articles by Mr. Watson were really good. I got a blue print of a valve tester from him and it was quite a good one. I built it up and shortly afterwards you presented it in A.R.W. I am now going to build a signal tracer. I have a pretty well-equipped service bench, with service oscillator, two multimeters, universal test speaker, valve tester, multivibrator and a panel with different types of power points.

I service sets for my friends and for a few old-age pensioners who cannot afford the charges of present-day servicemen. These old folks do love their radios and some of them are of pretty ancient vintage, yet sound surprisingly good when I have licked them into shape again. That reminds me, I was greatly impressed by your articles some time back about old sets sounding so well. I did one job for an old couple on a set with four-volt valves. I changed it over to six-volt valves, re-designing it in order to use all the old components which were of really good quality. In due course I installed the set in its old cabinet, looking quite good after my efforts with a polishing pad and a drop of french polish, and did I get a surprise! That set did sound good. The cabinet weighed about four times as much as modern ones." — **C. A. Rose, 178 Old Kent Road, East Bankstown, N.S.W.**

RADIO THEORY COURSE XII

The Superhet Tuner

FOR the first ten years' broadcasting in Australia, selectivity was not an important factor but, as more and more stations came on the air, the superheterodyne displaced all others.

THE selectivity of the tuned radio frequency type of tuner is in general, poor, but it may be improved by the inclusion of more tuned stages. Anything more than four tuned stages would be impracticable, firstly because tuning condensers having more than four gangs are not normally made, and secondly, a large number of tuned stages may introduce instability unless special precautions are taken, finally there would be a considerable variation in sensitivity over the band.

In part V, when tuned circuits were discussed in some detail, it was pointed out that two coupled tuned circuits were capable of giving better selectivity than two simple circuits. Application of this principle seems to offer a solution to the selectivity problem, but there are several difficulties. The double tuned circuits would require more gangs to the tuning condenser — a receiver using two r.f. amplifiers and a detector would need four to five gangs, the sensitivity would be lower as there would be more losses and this would vary over the dial, the resonance primary system used in ordinary r.f. coils being no longer suitable, and the selectivity would be much better at one end of the band than at the other.

In a receiver designed to receive only one frequency these difficulties are easily overcome, the number of tuned sections being no longer limited by tuning condenser gangs, as each tuned circuit is best fitted with its own adjustable condenser to allow each coil to be separately set to the desired frequency. The use of coupled tuned circuits presents no difficulty as the tuning condenser may be connected directly across the coil it tunes, there being no common earth connection as in the case of a multiple gang type. This eliminates the possibility of high voltages across the condenser plates when a plate coil is tuned.

In addition it is obviously easier to design a pair of coupled coils to give optimum gain and selectivity at some known frequency than to try to get the best average over a frequency range of about 3-1.

It is also possible to get much higher stage gain at low frequencies than at high ones, so that the ideal r.f. amplifier appears to be a fixed frequency amplifier at some frequency about 100 to 200 k.c., as this will give, if properly designed, high gain, good selectivity and simple construction.

This is all very well from a theoretical point of view, it may be said, but how will this allow high gain and good selectivity in a set tuning from 500 to 1600 k.c.

The obvious solution is to convert the signal required to one at the lower, set, frequency and to amplify this to the desired level and then apply the result to the detector. This is, in effect, what is done in the superheterodyne radio receiver, or, to give it its proper title, the supersonic heterodyne receiver.

All of us are familiar with the property of an oscillating regenerative detector to

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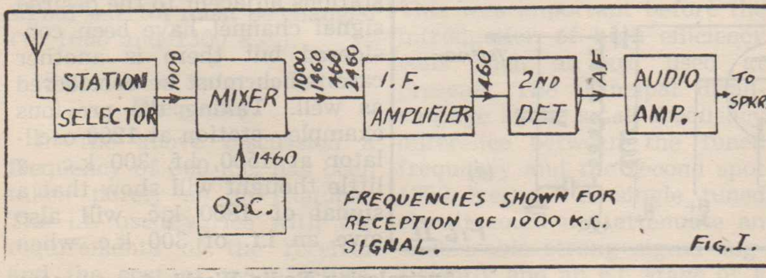

FIG. I.

THEORY
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whistle as it is tuned past a station. If the oscillating receiver is tuned over a station it will be noted that the pitch of the whistle changes, being zero when the set is exactly tuned to the incoming signal, of low frequency with a slight mis-tuning, and rising in pitch as the mistuning increases until it becomes inaudible. However, even when the mistuning is large the whistle is still there but its frequency is so high that it is above the human hearing range.

What actually happens is that there are two signals present at the grid of the valve, one the incoming signal and the other that generated by the oscillating valve and its associated circuits. In other words — if two signals of different frequency are applied to a valve operating on a curved position of its characteristic there will be present in the anode circuit two other frequencies in addition to the two original ones. These two other frequencies will be the sum and difference of the two incoming ones.

For example if two frequencies of 1000 and 1006 k.c. were applied to a detector there would be present in the anode circuit frequencies of 1000, 1006, 2006 and 6 k.c. Obviously only the 6 k.c signal would be audible, but a circuit tuned to 2006 would select this one and leave the others.

In practical superheterodyne circuits the oscillator providing the local signal differs from the desired signal by 100 k.c. to 500 k.c. for broadcast reception, while for short wave work it may differ by several megacycles. The exact value of the frequency supplied to the fixed frequency amplifier, commonly termed the intermediate frequency (i.f.) amplifier varies with different conditions.

So far there has been no mention of modulation. If the desired frequency is, for example, 1200 k.c. and this signal is modulated, when it is fed into a frequency changer with an oscillator of 1500 k.c. there will be four frequencies at the anode, 1500, 1200, 2700 and 300 k.c.'s and, of these, the last three will all carry the same modulation as did the original and an a.f. signal may be obtained by simply amplifying (if necessary) and detecting any one. (There will also be an audio signal as the frequency changer acts as a detector).

The intermediate amplifier will select the 300 k.c. signal and may be constructed to have ample selectivity to prevent a signal of 1210 k.c., which would give an i.f. of 290 k.c., from reaching the detector. At this frequency a single amplifier valve and two double tuned i.f. transformers would be able to give all the gain and selectivity required for normal cases.

Second Channel Interference

So far, only the case of stations adjacent to the desired signal channel have been considered but there is another case which must be considered as well. Taking the previous example—station at 1200 oscillator at 1500, i.f. 300 k.c.—a little thought will show that a signal of 1800 k.c. will also give an i.f. of 300 k.c. when

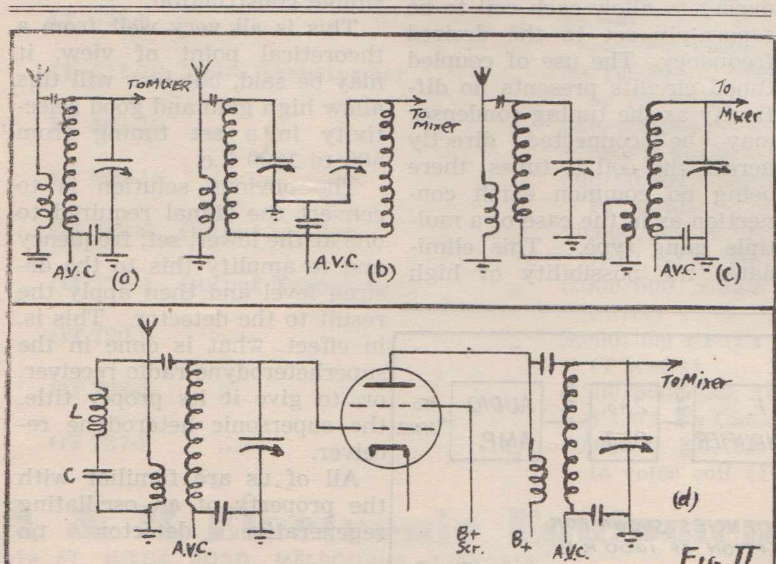


FIG. II

In reference to your paragraph on micro-groove recordings which appeared in the June issue of "Radio World".

Some months ago, I had occasion to hear some Columbia recordings brought out from the U.S.A., played with a Western Electric variable reluctance pick-up, and was amazed at the tonal reality, quality and clarity, with inaudible surface noise.

These 12-inch discs were cut at 400 lines to the inch, playing at 33-1/3rd r.p.m. for 25 mins..

I, for one, would set up immediately to play micro-groove but it is the old story of dollars which prevents me from doing so.

Yours sincerely,
D. E. BRENTNALL,
42 Ivanhoe Parade,
Ivanhoe, Vic.

the oscillator is at 1500 k.c., and no amount of selectivity after the changer can possibly eliminate it. This is termed second channel interference and the tuning circuits before the frequency changer must have sufficient selectivity to reduce the unwanted second spot signal to a very low level because the desired signal may be a distant station, while the second spot signal is a local.

Basic Superheterodyne Receiver

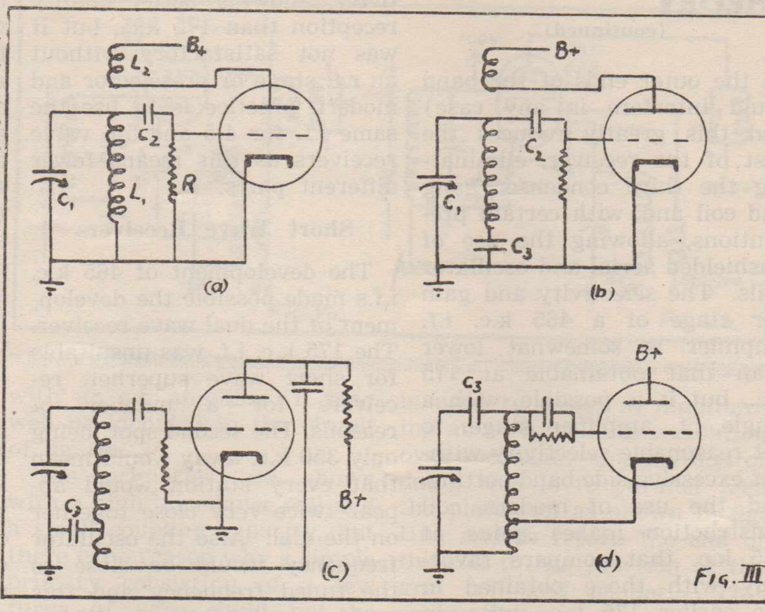
From the foregoing it is possible to draw a block diagram of the superhet. receiver. This is shown in fig 1, and consist of —

(i) an initial station selector;
(ii) an oscillator;
(iii) a mixer or frequency changer;
(iv) a fixed frequency amplifier (i.f. amp.);
(v) a second detector;
(vi) an audio frequency amplifier and power output valve.

It is obvious that to receive more than one station the oscillator in the receiver must be a variable frequency one, so that the station selector and the oscillator may both be set for the desired station. For the example used before the station selector would be set at 1200, the oscillator at 1500 with an i.f. amplifier at 300 (all frequencies in k.c.s) If it is desired to receive a frequency of 1300 k.c. the oscillator frequency as well as the signal selector must be changed (to 1600 and 1300 k.c.).

Selection of Intermediate Frequency

In the above discussion a frequency of 300 k.c. has been taken purely as an example. The i.f. used varies with the requirements of the receiver and the cost of manufacture.



It is not advisable to use a frequency in the band to be received (B.C. band 550 to 1600 k.c.) and is usually made some frequency just outside the band at either end. In practice a value lower than the lowest freq. is generally used.

When superhet. receivers were first introduced, transmissions at frequencies as low as 200 k.c. were normal, and the i.f. used was between 80 and 175 k.c. In Australia 175 k.c. was the standard value for many years, although receivers tuned only from 550 to 1600 k.c. The 175 k.c. i.f. has certain advantages and disadvantages, the principal advantage being the ease with which a high gain and selectivity can be obtained at this frequency. This was important before the introduction of high efficiency coils such as are used at present. The principal disadvantage is the small frequency difference between the tuned frequency and the second spot (350 k.c.). A single tuned circuit could not attenuate an undesirable strong signal sufficiently and an r.f. stage or a preselector became a necessity.

Another disadvantage of the 175 k.c. intermediate frequency is its tendency to cause excessive side band cutting, with consequent loss of the higher audio frequencies. With early reproducers this was not serious, as they did not reproduce the high or low frequencies very well, but as speakers improved the loss of brilliance became important. By using overcoupled i.f. transformers the band width can be increased but this presents difficulties as alighnment requires a special technique, in fact, for perfect results, a frequency modulated signal and a cathode ray oscilloscope are necessary.

The introduction of an intermediate frequency of 465 k.c. eliminated many of the disadvantages of the 175 k.c. system. Firstly, as the second spot was 930 k.c. away from the required signal it was possible to eliminate it satisfactorily with a single tuned circuit (as the band width is only 1100 k.c., only a few stations

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THEORY
(continued)

on the outer ends of the band could interfere in any case) and this greatly reduces the cost of the receiver, eliminating the third condenser gang and coil and, with certain precautions, allowing the use of unshielded aerial and oscillator coils. The selectivity and gain per stage of a 465 k.c. i.f. amplifier is somewhat lower than that obtainable at 175 k.c., but it is possible, with a single i.f. amplifier stage, to get reasonable selectivity without excessive side band cutting, and the use of modern coil construction makes gains at 465 k.c. that compare favorably with those obtained in the earlier 175 k.c. units, in fact, if more than one i.f. amplifier valve is used it is now the practice to use special low gain i.f. transformers to avoid the possibility of instability. Where maximum gain is required, as in car radios, 175 k.c. i.f. amplifiers are still used, but otherwise a frequency of 450 k.c. to 470 k.c. will be found in nearly all modern sets. A few years ago one or two manufacturers used an i.f. of 262 k.c. which had certain advantages, being midway between the 175 and 465 k.c. frequencies for gain and selectivity, allowing better quality reception than 175 k.c., but it was not satisfactory without an r.f. stage or preselector and modern practice is to use the same i.f. for 4-5 and 5-6 valve receivers as this means fewer different parts.

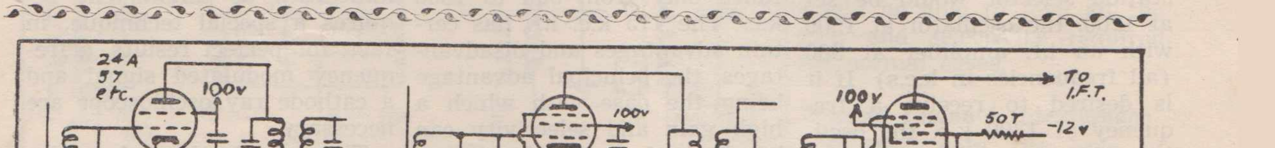
Short Wave Receivers

The development of 465 k.c. i.f.s made possible the development of the dual wave receiver. The 175 k.c. i.f. was unsuitable for short wave superhet. receivers for a number of reasons. The second spot, being only 350 k.c. away would mean that every station would appear twice very close together on the dial. Also the oscillator frequency would be close to the tuned frequency and this could cause uncertain oscillator action or allow large voltages at oscillator frequency to appear at the signal grid, with the possibility of grid current. With an i.f. of 465 k.c. the second spot moves to about 1 m.c. away, and, although the selectivity of the usual short wave coils is not good, the second spot selectivity will be fair.

Higher Intermediate Frequencies

It is possible to use an i.f. of 1600 to 1900 k.c.s for broadcast reception, and this has been done in certain cases where broad band local reception is desired. The selectivity and gain are poor and, in most cases, two i.f. amplifier stages are required, with three i.f. transformers. As the second spot falls far outside the band (4 to 6.5 m.c. is the second spot range), the use of a predetector station selector is not essential, a simple low pass filter being sufficient (to prevent short wave signals causing trouble).

For short wave reception high i.f.s are quite common, frequencies of 1600 to 1900 k.c being common in pure short wave receivers, while for frequencies about 100 m.c. an i.f. of 10 m.c. is used (F.M. receivers). In the case of television sets the wide pass band required (about 4 m.c.) makes a high i.f. essential, and one of 30 or so m.c. is usual. Where good adjacent channel selectivity is required or for use in crowded bands a double change superhet is often used, the first conversion is to, say, 1.9 m.c. or higher, and this signal is then changed again to some low frequency, such as 50 k.c. The first conversion prevents second spot troubles and the second i.f. channel gives the selectivity. The use of a crystal filter is another way of achieving the same result.



TWO-TUBE FREQUENCY CHANGERS FIG. IV.

These methods will give very poor quality on phone reception but are excellent for c.w. reception in the crowded amateur short wave bands.

Each part of the superheterodyne receiver will now be considered in turn.

(i) **The station selector before the frequency changer.**

This is a straightforward tuning circuit consisting of one or more coils, each tuned by a suitable variable condenser and provided with an aerial or plate coupling coil.

Fig. II shows several different coils and preselector circuits. Fig IIa shows a simple single tuned circuit suitable for use in a 4/5 valve receiver using an i.f. of about 450 k.c.; IIb and c show two different preselector circuits of the type used when an i.f. of 175 k.c. was used in 4/5 valve sets. The first case uses capacity coupling between the coils, the amount of coupling depending on the capacity of the fixed condenser C, the coupling decreasing as C increases the usual value being about .01 mfd. Inductive coupling is used in IIc, part of the first tuned circuit being placed so that it couples with the second coil.

Fig. IId shows a typical r.f. amplifier stage, which is similar to those discussed in the articles on t.r.f. receivers. One point of interest is the inclusion of an i.f. trap of the series resonant type. The coil L and condenser C are adjusted to resonate at the i.f. so that any signals picked up by the aerial at this frequency are shorted to earth. Higher frequencies will not be affected, as the impedance of the tuned circuit rises sharply off resonance. This trap is useful because the i.f. is not greatly different from the lowest tuned frequency on the b.c. band. Although it is shown only on the selector,

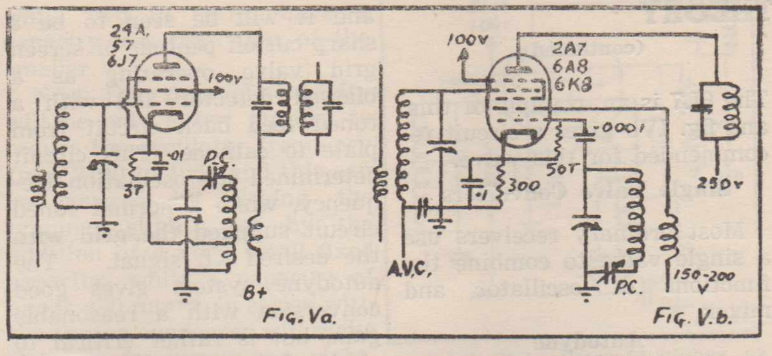


Fig. Va. Fig. V.b.

with an r.f. amplifier, it may well be included in the circuit of fig IIa.

The primaries are shown with a high impedance coil and a small coupling capacity, but there is no reason why a simple primary consisting of a few turns of wire could not be used. This was regarded as normal practice until a few years ago, largely due to the possibility of the high impedance primary resonating at the i.f., but modern coils are made with sufficient accuracy to obviate this possibility.

(ii) **The Oscillator and Mixer.**

As these two sections are very closely associated, in many cases combined, they will be considered together. The basic oscillator circuit is shown in fig. IIIa, but many variations are used. This oscillator consists of a triode valve, a tuned circuit L1, C1, a grid resistance R, and a feedback coil L2. This circuit suffers from one disadvantage, the magnitude of the oscillation varies somewhat over the tuned band.

In practice there is a fixed (or semi-fixed) condenser in series with the tuning condenser in most superheterodyne oscillator tuning circuits. This condenser is usually connected in the earthy end of the oscillator grid coil as shown in fig. IIIb, and in some cases is used to assist in maintaining an even value of oscillation over the band. One method of doing this is to parallel feed the plate coil as shown in fig. IIIc, and to return the end of the coil to the junction of the grid coil and padder. This causes the grid-plate coupling to increase as the variable condenser capacity increases, so that the oscillation is improved at the low frequency end of the band where it is usually least.

Fig. IIId shows the oscillator circuit used with valves having no separate oscillator plate (the oscillator plate shown represents all the other electrodes in the valve), such as the 6SA7, 6BE6, etc. In this case a fixed padder is necessary as the padder must be at r.f. potential and would be difficult to adjust.

The basic mixer circuit is shown in fig. IVa. A pentode valve is shown and it will be noted that the grid is not only supplied with the incoming r.f. signal, but is coupled by a very small capacity C to the oscillator grid. This capacity must be small or the two tuned circuits will affect each other, particularly when the frequency difference becomes small (comparatively) as in short wave work. To overcome this, valves have been developed with separate grids for r.f. and oscillator injection.

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THEORY

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The 6L7 is an example of this, and fig. IVb gives a circuit recommended for this valve.

Single Valve Converters

Most ordinary receivers use a single valve to combine the functions of oscillator and mixer.

Autodyne

The earliest example of this was the autodyne which was useful only for broadcast frequencies but, at these frequencies, gave very good service. Fig. Va shows a typical circuit and it will be seen to be a sharp cut off pentode or screen grid valve operating as a biassed detector and with a tuned feed back circuit from plate to cathode. This circuit determined the oscillation frequency, while a normal tuned circuit supplied the grid with the desired r.f. signal. The autodyne system gives good conversion with a reasonable gain, but is rather critical to circuit values and would stop oscillating for any number of reasons. It requires an i.f. transformer with a large capacity in the plate circuit, as this is in series with the oscillator plate coil.

Pentagrid Converter.

The original pentagrid converter (at least in the American valve series) was the 2A7—the 6A7 and 6A8 are identical but have different heater voltage. The circuit for a valve of this type is shown in fig. Vb. The oscillator triode is formed by the cathode, oscillator grid, and oscillator plate, these two elements being nearest to the cathode. The r.f. signal is applied to grid no. 4 which is shielded on both sides by the screen grid.

The number of electrons reaching the plate depend on the voltage of the two grids so that the desired mixing is achieved. The value of the oscillator grid voltage has some bearing on the conversion gain but it is not critical. Automatic volume control voltages may be applied to the control grid (g4) but the change in a.v.c. voltage causes some change in oscillator frequency with consequent drift. This is not serious except in short wave work.

The 6K8, 6J8, X61M, ECH35 etc.

These are all valves having a mixer section and a separate oscillator in one envelope. The circuit used for these valves is very similar to the one used with the 6A7 types, but they have better frequency stability at high frequencies. In some cases it is recommended that the frequency determining tuned circuit for the oscillator section be placed in the oscillator plate circuit. Fig. VI is a typical circuit showing the use of a tuned plate oscillator.

Single Dial Control of Tuning and Oscillator

The use of ganged control for tuning in t.r.f. receivers presents no difficulty, as all circuits have to tune to the same frequency and may be identical. Similarly, in the superhet, the aerial and r.f. coils present no difficulty, but the conditions for the oscillator are somewhat different as this must tune to a frequency which is **different** from the aerial tuned frequency by a **constant amount.** Simply reducing the inductance of the oscillator coil will not solve the difficulty as this will only make the oscillator frequency proportional to the aerial —

For example—taking an i.f. of 460 k.c.

Frequency tuned 550 k.c.
Oscillator freq. 1010 k.c.

$$\frac{\text{Inductance aerial}}{\text{Inductance osc.}} = \left(\frac{1010}{550}\right)^2 = 3.38$$

That is, the oscillator coil must have an inductance which is .296 of the aerial coil.

At 1000 k.c. the inductance would be $(1000/1460)^2$ or .469 of the aerial coil.

Again at 1500 k.c. the oscillator coil inductance would be $(1500/1960)^2$ or .584 of that of the aerial coil.

Taking the second case as the nearest the tuning and oscillator frequencies with this coil will be—

Tuning	550	1000	1500
Oscillator	803	1460	2190
Difference	353	460	690

The two outer values could be corrected by arranging the shape of the tuning condenser plates so that the capacity is higher than the main gang at 1500 k.c. and lower than the main gang at 550. This is fairly easily accomplished and is current American practice.

There is another method of overcoming the trouble and it is this one with which we are most concerned as no Australian radio manufacturer has taken the trouble to develop the dies, which are rather expensive when the number of gangs to be made is small, and make gang condensers having a special oscillator section. The method depends on the fact that two condensers in parallel have a capacity equal to the sum of their capacities while two in series have a capacity less than that of the smaller.

Now the parallel capacity will be only a few mmfds. to reduce the oscillator frequency from 2190 to 1960 and this can be covered by closing the trimmer slightly or by the addition of a very small fixed capacity, while a capacity of about 430 mmfd. in series with the tuning condenser will make the low frequency end right. This series condenser is called the padding condenser and may be fixed or variable, depending largely on the type of oscillator coil, whether fixed or variable inductance.

The accuracy of this arrangement may be demonstrated mathematically thus:

Rules — $f = 1/6.28\sqrt{LC}$ (f in c.p.s., L in henries, C. in farads)

Thence $f_1/f_2 = \sqrt{C_2/C_1}$
or $C_2 = (f_1/f_2)^2 \, C_1$

Data —

Max. Cap. of Tuning Condenser	450 mmfd.
Minimum freq. ..	550 k.c.
Intermediate Freq.	460 k.c.
Padder capacity ..	430 mmfd.

Frequencies to check — 600, 1000, 1500 k.c.

(All frequencies in k.c. and all capacities in mmfd.)

Aerial coil and condenser —

Freq. = 550	Capacity = 450
= 600	= 450 x $(550/600)^2$ = 378
= 1000	= 136
= 1500	= 61

Oscillator coil —

Condenser capacities at these points will be 9 mmfd higher, as trimmer will be set closer (proved later).

(a) Condenser setting of 600 —
Frequency = 1060
Capacity of gang = 387
Effective capacity

$$= \frac{1}{1/387 + 1/430} = 203$$

This sets the value of the inductance of the oscillator coil, which comes to 11 microhenries. That for the aerial coil is 186 microhenries.

(b) condenser setting of 1500
Frequency = 1500 + 460 = 1960
Capacity = $203 \, (1060/1960)^2$ = 59

This capacity is made up of the condenser capacity and the padder in series.

Condenser capacity

$$= \frac{1}{1/59 - 1/430} = 68.2$$

This is 9 mmfd higher than the similar setting for the aerial capacity so an additional 9 mmfd must be permanently in parallel with the gang condenser — this was allowed for earlier.

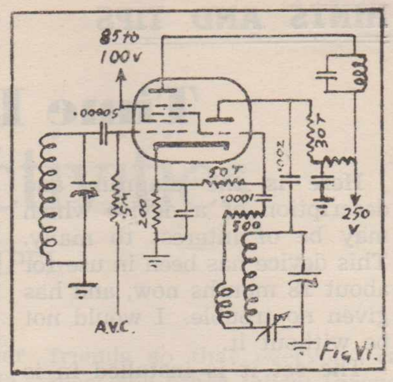
(c) 1000 k.c. setting—
Condenser capacity = 136 + 9 = 145
Effective capacity

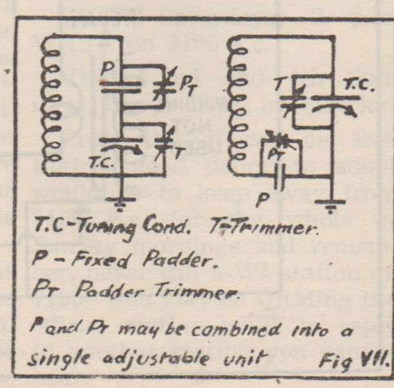
$$= \frac{1}{1/145 + 1/430} = 107$$

Tuned freq. $f_2 = \sqrt{(C_1/C_2)} \, f_1$
$= \sqrt{203/107} \times 1060$
$= 1460$

This is the desired frequency 460 k.c. above the tuned signal frequency.

Checking at points between these will show a variation of two or three k.c.'s but this is negligible compared with the band width of the tuner.





(continued next page)

Time Delay Relay Switch

Here is the diagram and description of a device which may be of interest to many. This device has been in use for about 18 months now, and has given no trouble. I would not be without it.

The set it is installed in is as follows:—

The amplifier is a William-

By
G. B. WOLFE
Box 56
Bombala, N.S.W.

son (similar to description by K. J. Brady in the March issue) but with 6V6s' in output. The tuner is designed around an Aegis KC5 unit. The device is an automatic time switch in the HT return lead, and it allows the valves in the set to warm up before the HT is applied to set. This saves excessive high voltage being applied to the filter condensers, etc.

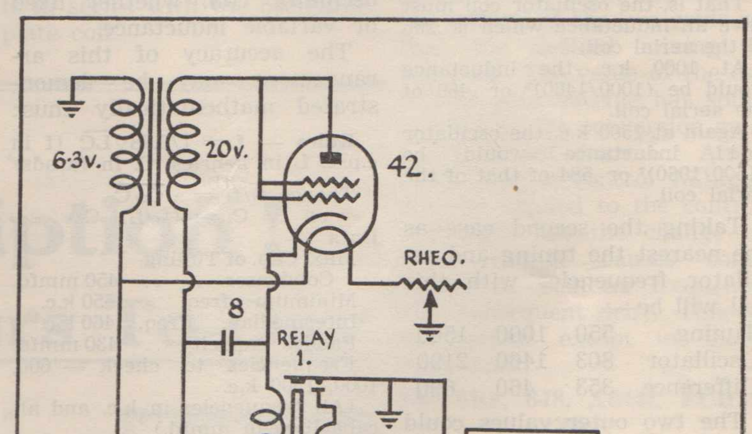
The action of the unit is as follows.—

When the set is switched on, contacts of Relay No. 2 are in closed positions. This allows the control valve to warm up, but the rheostat will cause it to heat up more slowly than the valves in the set. When the control valve draws current, Relay No. 1 contact closes. This allows the main HT of the set to flow through the low resistance coil of both relays, causing contact of Relay No. 2 to open, and so switch the unit off. The current through Relay No. 1 will keep its contact closed, until set is switched off.

The Transformer to supply enough DC to operate Relay is a Speaker Transformer. The Secondary is connected to 6.3 volts. The Primary gives the voltage to operate Relay 1.

The relays are Army Disposals Telephone-Panel Relays.

(continued on page 33)



THEORY
(continued)

The resulting tuned circuit for the oscillator section is as shown in fig VIIa. Fig. VIIb shows the practical arrangement used, both the padder and the gang shaft being earthed. This is necessary with a variable padder. When the intermediate frequency is small compared with the tuned frequency (175 k.c. i.f. or in short wave work) the padder becomes large and is usually a fixed condenser but may have a variable trimmer in parallel.

Amateurs' Activities

• Conducted by J. A. HAMPEL

FROM now on it will be my pleasure to conduct Amateur notes and I hope that they meet with general approval and, what is more, that you will do your bit by letting me have any information useful for these pages.

There will be no references to "splatterers", "hummers" and the like, nor any slinging mud at the other chap, as this sort of penning does more harm to the Amateur status in the public eye than all other forms of publicity. "Australasian Radio World" is a widely read journal in all circles and the notes presented should be of general interest to anyone, whether holding a ticket or not, who takes even a small interest in our activities. With this in mind, here is an Amateur section in which you are cordially invited to participate, too, and, if you will, pass on the news to your friends so that everyone can meet the other fellow through these columns, if not on the air.

Don't think that your gear is unimportant, because if everyone had adopted this attitude down through the years, the story of Amateur Radio would never have been written and its achievements would never have reached the public's ears at all. Anyone knows what the result would have been; with dwindling frequency allocations now. It is up to us all to keep the work of the Amateur, whether in emergency research or VHF communication, in the public eye. Together with other contemporary magazines, "Calling CQ" can do just that through "ARW". Here is how you can help —

— Send in details of your gear, your activities over the years of hamming and any photos of the equipment, etc. Besides appearing in the general notes and news it may make excellent material for the "Station of the Month." The first in this series will appear as from next month.

—Club secretaries are asked to forward notes on their activities, together with any publicity which can appear from time to time. These monthly notes should reach me at Box 262, Berri, S.A., by the 7th of each month.

—Let us know what you are doing and if there are other

(continued next page)

WILL YOU HELP?

Owing to the increased net operations on 40 it is well beyond the time when some sort of list of the frequencies and times used should have been published to avoid the confusion and QRM by others starting up on these frequencies. The writer has written personally to Zone stations and so on with this in mind, but should you not have received a note by now and know of any active net, please drop a line to Box 262, Berri, S.A., so that it can be included in the list to be compiled for publication very shortly. The net, frequency used and times of operation are all that are needed, so little when the amount of QRM that will be avoided is considered.

It is surprising the number of amateurs who continue to weekly QRM the WIA official transmissions, so here are the frequencies and times in use for the various divisions. All amateurs are asked to steer clear of these particular channels during the session and for 15 minutes thereafter.

VK2WI Sundays, 11 a.m. EST., on 7196 k.c.

VK3WI Sundays, 11.30 a.m. EST., on 3580 and 7196 k.c.

VK4WI Sundays, 9 a.m. EST, on 3750, 7196 and 14342 k.c.

VK5WI Sundays, 10 a.m. SAST, on 7196 k.c.

VK6WI Saturdays, 2 p.m. WAST, on 7196 k.c.

VK7WI 2nd and 4th Sundays, 10 a.m. EST, on 7196 k.c.

From this it can be seen that a good policy to adopt would be to keep away from 7196 k.c. for the whole of Sunday mornings and remember, never call a WI station on 7196—you may be QRMing the official station while in reply to another station you cannot hear.

AMATEURS

(Continued)

hams around the district, round up some news from them, too. You may be on 50 or 144 with a DX signal for someone, but the others won't point their beams your way unless they know you are there.

—Any DX addresses obtained from Qsl's would be appreciated so that the other chap can get a card away to that DX station too.

— Anything that you consider should appear in "Calling CQ" is welcomed. We'd like to know some of the DX worked (with frequencies where possible), calls heard on 50 m.c. and above, at your location together with any VHF work at all.

So with all this in mind you can look forward to the Amateur section in this spot from now on.

FROM MY LOG — — —

For this month a least the notes in this section will have to, of necessity, be those gleanings contained in the writer's log as either worked or heard over the recent few weeks. In the future it will be possible to present a more complete picture of the Amateur scene when news from the other states is to hand.

The "S point-versus-power" debate should come in here somewhere when mention of 5CD's signal is made because a recent QSO with Cec revealed he is only running 3½ watts to an 807 which draws its power from an FS6 pack. Cec continues to receive genuine S9 reports from all over Australia, always getting his man except in the usual week-end "dog-fight" on 40. At present in Adelaide, he travels home to Keyneton when he wants to operate. The receiver is an AR8 which Cec considers quite equal to the task for genemotor operation:—:—:

Another AR8 user is Wyke, 5WM, who has a loan of one while the super-dooper double-conversion job emerges from the design stage. Why don't you take to the UHF's "Brudder"?—you have enough pipes to put the RF where wanted. By the way, if you work him, the name is pronounced at "Wick" as found on modulators, to be turned up in bad QRM! .—.—. An enjoyable rag-chewer is Vern, 3YE, in Colac using a Type·3 Mark II to good accord when not on the big rig using a 35T and 40 watts. This seems to be getting quite a habit these days with winter here, and more and more chaps are QSO'd using a Type 3 by the fire's comfort whilst the rig in the shack is left till the warmer months return .—.—. 5PS is shortly to move to a new QTH away from the smell of salt water and cold air, but one consolation will be the freedom from BCI there, or will it? You could be unlucky a second time Warwick, but those old filters can always do duty a second time .—.—. 10 metre stalwart Bill, 5SW, still continues to knock them o'er, and no wonder, after seeing the business end of things on a recent visit to his shack. An 813 in the final runs the full limit, while the motor-operated beam atop a 40 ft. tower would be a welcome addition to any station. Complete with selsyn indicators and a particularly neat indicating map, Bill is able to chase that rare DX across the globe in a matter of seconds. The receiver, already a hot line-up with 717A's in the front end, is shortly due for a re-build, and the outcome should be interest-

For those of the rag chewing fraternity who daily bemoan the fact of QRM spoiling their fun on 40, here is an easy way out of all that, use 80! If any evidence is required take a listen on this band, or still better, work some of the boys on there—like 5BF, who will take time off to extoll the good points about 80. For daytime contacts within the same state 80 is really better than the next band if you consider the simple gear and very low power needed to bring an S9 report from anywhere within the same call area. If any convincing is needed after that here are a few examples of recent working: 5ME worked with 5CD (Adelaide to Keyneton, 65 miles) on 40, with 36 watts, and went to 80 on 4 watts and an indoor antenna; Cec could not hear any change of signal strength although the power was reduced by three times. 5BF works, chaps, using 3 to 4 watts daily and is exasperated by the others on 40 who explain they haven't room for an 80 metre antenna. 5MD and 5BZ work him portable from National Park, near Adelaide, with the diminutive Type A, Mark 3, with any old length of wire still putting an S9 signal into Frank's QTH at Murray Bridge. As the day draws on, the band becomes more reliable for interstate QSO's, thus relieving 40 even more. It is possible to work even ZL on phone at night when 40 is as dead as a dodo. So how about it fellows? For local and cross town stuff what about utilising eighty for a change. What's that you say —BCI—have you seen that very simple filter in this issue? See you on 80.

ing after seeing some of Bill's projected design .—.—. A QSO with that certain touch of Leigh Simpson humour that grows on you, can be had almost any time with 3II on 40. Leigh welcomes a contact at any time but—warning—keeps the overs short and expects you to do the same, a good thing with the present condition of the bands. What about a revival of the old two-day marathons, Leigh? I'm sure 5HI will put the Type-3 back on 40 to be in it again. 5HI at present has the little job on 10 and 20 and, considering the Type 3's inherent limitations, has done a creditable effort in working over 100 countries with it, not to mention the W's WAS for the second time around! Previously John shared the call 5CW with Brother Bob, making the earlier working ineligible for the DXCC etc. A new 100 watt band-switched rig using 834's is on the way, and I know someone who is looking for that Type 3 ,John! .—.—.

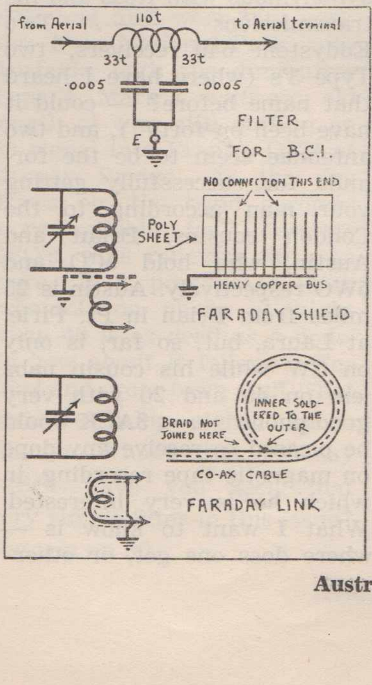
Recently returned from a spell in hospital, 5FL is back on the job again with the usual hi-fi fone quality which is synonymous with Ross and his transmissions .—.—. Two Eddystone 640 receivers, two Type 3's (where have I heard that name before? — could it have been on forty?), and two antennae seem to be the formula for successfully getting your man according to the Condon cousins, Brian and Austin, who hold 5CO and 5WO respectively. Austin is 25 miles from Brian in Pt. Pirie, at Laura, but, so far, is only on CW while his cousin nabs 'em on 40 and 20 with very good phone .—.—. 3ACK would be pleased to receive any dope on magnetic tape recording, in which he is very interested. What I want to know is — where does one get, or otherwise, purloin the tape to start with anyway? .—.—. A Super-Pro receiver and 70 watts to an 813 provide a nice line-up at 2BN who is on VeeFO on all bands .—.—. Double conversion is the order of the day at 3XU's, where the transmitter ends up in a 100th, modulated with 807's operating with zero bias and, although Gordon explains he uses a CRO as well as a phone monitor and over modulation indicator, there is no need to worry where that signal is concerned .—.—.

Well, that appears to be QRU for this month, but if the notes in the Log are a little bit toward VK5 it is only because there has not been sufficient time to receive the notes promised from other stations on activities in their states, BCNU.

B.C.I. Filter for Domestic Receivers

That worry of all of us, except those who have gone bush to operate, BCI, can be to a great extent reduced, if not in most cases cured, by the addition of this simple filter to the receiver giving the trouble with the unwanted ham signal —or should it be vice versa? Lauded by 5PS who had trouble in a block of flats and who passed this circuit on to others since, it attentuates all frequencies beyond 1875 kilocycles and therefore any transmissions emanating from an amateur transmitter. Wick, 5WM had BCI reports from a vintage set user till he found this to be the cure-all for all the sets in his district.

On a 1⅝ inch former, wind on 110 turns of 24g. wire, taking taps off at 33 turns from each end. From these taps connect .0005 condensers to the earth terminal of the receiver whilst the ends of the coil are connected to the incoming aerial and aerial terminal of the set. The time taken to make one or even more of these filters will be well repaid in the extra operating time made available. Even the country hams cannot always look the other way either, as one chap recently found. A freak case, of course, but his signal was received on a portable receiver some 50 miles away while on 40 metres.



Another means of preventing a lot of unwanted signal from reaching broadcast receivers is to install a Faraday shield in the final tank or what is better, the modern version, the Faraday link which consist of one or more turns of co-ax cable used as the link from the final. The inner conductor of the cable is connected to the outer braid at the end of the loop, but the two braids are not joined. A clearer idea of this will be gathered from the illustration. Up till now there has been some doubt in some amateur circles as to whether it was possible to use more than the one turn shown in the handbooks. Reassured by the fact that a leading broadcast station in Adelaide had been using three turns for some time, 5KW went ahead and reports that the new link besides reducing the BCI angle, also loads up better with subsequent better reports all round. The one in use at 5KW also uses three turns which Harry finds the optimum value for Forty anyway. This newer scheme does away with the old bugbear of supporting the screen idea, but for those who still favour this method, a recently seen screen used the very thin copper wires moulded into a polystyrene sheet, while the wire was hot enough to melt the plastic.

Pirates at Work Again in 3 States

At least three stations in three states are experiencing trouble with pirates using their calls on 40 metres. 5MX also finds his call popping up on 144 and 288 megs., much to his annoyance now that he is on these bands too. What is more annoying, whoever he is has John's gear tabulated right down to the last nut and bolt almost. There is hardly any doubt in the mind of anyone working "5MX" for the first time, when such an off-pat description is given. I guess you don't have SWL visitors to the shack any more John? Another suffering the same treatment is Len, 6LG, who has the experience of another 6LG working down the low frequency end of the band whilst he stays up the top. Tipping him off recently in QSO, a listen down the other end of the dial revealed the pirate loudly condemning "that other 6LG up the high frequency end." To quote Len "to work on the same band at the same time as himself, the man must be a madman." And, if that isn't enough, 3TI is having his call used too. Obviously a raw recruit, however, this bloke is poor in procedure and soon ran when caught recently with the old one "calling 3TI, calling you on sked Chas." When Charlie's friends appear on the band the big switch goes off a lot quicker. Ho-hum, I guess we never will be free of pirates in some guise.

TRANSMITTING

Going Up—— ★

THE V.H.F. MAN'S PAGE (By VK5BJ)

The VHF enthusiast in certain country areas of VK2, 3 and 5 are busily preparing for what they hope will be a memorable summer period of DX signals. In Berri, S.A., a reception committee, in the form of 5SL and 5KW, will be ready, and who knows how many of the other Murray boys will be there when the big time comes. Berri is only 17 miles from the Victorian border as the RF flies and, what is more important, only 90 miles over flat country to Mildura where Chas, 3TI, is waking the rest of the boys up to the presence of a VK5 signal so close. Also in the picture is 2OT, in Broken Hill, who hopes to make enough noise with the 522 and corner reflector to work both the 2's and 3's on 144. Reasonably flat terrain between B.H. and the other two locations has built up hopes considerably so that the VHF stations near Melbourne have ideas of working indirectly through to 2OT. This will be possible since Chas revealed the presence of a chain of relay stations on the band between Mildura and the VK3 "big smoke."

The amateur spirit is well to the fore in both Mildura and Broken Hill ,where the local boys are pooling their resources to get one good rig on the air. Realising that all their individual mod. oscillators and "Sqeggers" would be of no use for DX they have chosen the best logical alternative, an example some other country centres might well emulate if they are really interested in doing good on the VHF bands. Exact details of the gear is not yet available for a lot of it is still "up in the air," however, at the VK5 end, really classy rigs have been fired up and successfully tested. 5SL has a crystal controlled rig with an 832 in the final running about 18 watts, whilst the receiver is a 6J6 converter feeding into a double conversion super, at 7 m.c.s and 1900 k.c.s. 5KW has a double change super on the way using four stages of 9.72 m.c.s IF and a highly elaborate front end using home brew slug tuning in the oscillator. Circuits of all these set ups will soon be seen in these pages. Harry's transmitter uses crystal control also with an 832 which drives an 815 amplifier which, in turn, drives a pair of 834's. With 4 element beams in use at both stations, big things are expected for the future. Another country amateur fast becoming interested in 144 is 5DF, at Kadina. Only 80 miles from Adelaide and 60 of those over water, he hopes to be working the city boys by summer. Further up there is interest on 288 between the two towns of Whyalla and Port Pirie on opposite sides of the gulf. As it is possible to stand on a roof at either of these towns and see the other across the water, no trouble should be experienced in these tests. 5GY, of Whyalla, recently went on holidays to Peterborough leaving 5JY to get the parallel lines and so on ready for his return. From 5CO, also at the Port, comes news of the others on 288 m.c. — 5EN, with a 16 element beam and a great deal of enthusiasm to get going, has 5KS and 5OD in the town, interested enough to put rigs on the band. Across the gulf at Whyalla, "Mac," 5CE, has joined 5GY, and they all hope to keep regular schedules in the future.

Stolid supporters of 50 m.c. in VK5 are 5RT, 5QR, 5HD and his brother 5BC, who are active nightly running transmissions at selected times and doing a lot of listening. Until he recently installed the new final with push-pull 834's, Hugh found the Mt. Lofty Ranges a barrier to working his brother 5HD in Adelaide from the Berri QTH. His receiver runs a 9.72 m.c. IF, (Transformers from an ex-disposals 1133H UHF Transceiver) with an EF50 RF stage, 7E5/1201 UHF triode mixer and a 6SH7 sep. osc. in the tuning section. The only worthwhile break through was in the beginning of the month when VK2 signals were workable for about one hour in VK5. As the year draws closer to the summer months of hoped for DX, the calls of stations populating 6 and 2 would be appreciated and, if possible, a listing of these stations, with frequencies used, will be published. Any other news of work up on these frequencies as well will be welcomed at VK5BJ, Box 262, Berri, S.A.

For Beginners

By E. K. RIDGWAY

Most beginners, having learned morse code, naturally tune to a station sending morse to try to copy what is being sent.

At first they recognise a letter here and there, and soon can copy short words in general use, but become confused with "abbreviations," or letter groups which must be "sounded" or pronounced phonetically to make sense.

Examples are: CUM (come), NITE (night), etc. Then other words are easiest abbreviated by dropping all except the first and last letters, such as: TT (that), BK (break), and so on.

The moral is: WRITE DOWN WHAT YOU HEAR; don't try to make sense of it as you hear it. You are not required to, even at the exam. (But you **are** required to **write it down**).

You will soon recognise abbreviations as being such, and you can work out what they are meant to be after you have finished your copying.

HELPING HAND

Let us encourage more of our young men, and women too, to become "hams". We need new blood all the time. Our population is increasing, and so is the commercial demand on the radio spectrum. We must use all the bands available to us, and use them intelligently, whether an emergency exists or not.

—E.K.R.

There are other forms of abbreviations, one of which uses the "name" of a letter to represent a word. Perhaps the most obvious of these is the use of "U" for the word "you." (Remember "IOU"?). A mixture of some of the above methods shows up in "CUAGN," which implies, "see you again."

Another form which has been used with great liberty is the replacing by "X" of part of a word which is otherwise deleted entirely. It possibly evolved from the root meaning of the prefix "TRANS," which is across. Perhaps some imaginative person (and all of us are in some ways) interpreted the meaning as A CROSS (or X). Whether or not such was the case, we find in use "X former" (transformer) and X mitter, or merely "XMTR" (transmitter) to combine the method with one of the others.

Then again, at the other end of the word: "cond X" (condenser) and you will meet with mixtures of all methods as you progress.

Again "X" can be used for "ex," such as in "XYL" which means "ex young lady," generally referring to a "ham's" wife, who once was his YL. Clearing up a bit, isn't it? Later on we may find room to print a full list of the abbreviations in general use.

Referring again to the special slow morse sessions on the eighty metre band, the Friday night transmissions from Tasmania have continued in the two-way contact fashion, and thus have a personal touch which is lacking in a half-hour of morse which is being sent to no-one in particular.

However, perservere with as much copying as you can, from whatever source; stop when you feel you have had enough, but be sure to copy some each day.

OUR AIM

Realizing that many young people are radio-minded, and that **practical** guidance for the beginner is not in over-supply, we have set ourselves the task of presenting radio theories in a more practical and more digestible form than is generally available.

While a mathematically-trained mind can absorb theory as such, it doesn't follow that it can do more than file that theory for future reference. To have a practical understanding of a fact, one must experience the accomplishment of it for himself. Nor is that an unscientific statement, for science itself is "knowledge, gained and verified by exact observation." (Dictionary.)

Emergency Operation

As these notes are being written, rescue work is in full swing in the flooded areas of New South Wales.

Radio, the only remaining communication between safe areas and isolated points, is playing a real part in rescue and relief work.

It is significant that amateurs, and amateur-owned emergency equipment, are handling the bulk of the traffic, every contact heard being between amateurs, or between an amateur and a station from another service.

By

E. K. RIDGWAY
Ballarat

Of course, these other services operated on their own frequencies when not in contact with amateurs, but the amateur is widely distributed and already on the spot when disaster breaks, and is now being recognised officially as the first line of communication in an emergency.

Amongst others heard on amateur frequencies were army "ducks," aeroplanes and air base stations, while the P.M.G.'s monitoring station accepted telegrams to be forwarded through the department's normal channels, which proved to be an excellent arrangement.

The Amateur Emergency Organization worked smoothly, having been built up considerably since June 1949 (in experience and preparedness, as well as numbers).

Emergency operating seems to be topical at least, and though perhaps many of us have said: "It can't happen here," it is never-the-less a good thing to be prepared.

Of course a certain amount of capital outlay is involved, but here is how one ham has done it.

Most of us have seen, if not acquired, "genemotors" at very attractive prices; but a majority of these call for "24 volts of battery" and a charger of some description.

And, who hasn't seen a car battery discarded when it fails to turn the engine with any degree of certainty on a cold morning. Four of these, at a few shillings each, in conjunction with a trickle charger will do an excellent job, as the current drawn by 24 volt equipment is only one fourth of that used by the six volt setup, i.e. for equal power input.

The trickle charger problem can be narrowed down to a defunct power transformer rewound with a thirty-volt secondary and a full-wave bridge-type dry metal rectifier, ex disposals, with a suitable resistor to limit the current to a safe value for the rectifier.

An alternative method is to use a centre-tapped secondary, forty volts each side, and a type 83 rectifier which will deliver an amp. or so without overheating. The resistor is important here, too.

If enough batteries are available, use them in series-parallel, and so increase your reserve of power.

Filaments can be arranged in series for 24-volt operation if special equipment is built for emergency work, or if 24-volt surplus gear is used that arrangement may be already incorporated; but filaments of existing equipment can be heated from a healthy six-volt battery and this will last a long time if used for filaments only.

The 24-volt system is a bit too bulky for portable operation, unless it is possible to utilise a trailer with a built-in battery compartment, and wouldn't that be useful for camping and normal field day outings? Also some of the larger cars could carry the four batteries, and a 24 volt generator could be fitted to the car to be used while transmitting.

What about using a genemotor as a generator? Plate supply direct from it, and a small charge into the batteries as well, as long as the engine is running. Some have shafts long enough to replace the cooling fan with a pulley. The main difficulty is to get enough armature speed, as many of these units operate at four or five thousand R.P.M. But the problem can be solved in some way or other. Watch these columns for suggestions.

Short Wave Notes

Conducted by L. J. KEAST

NOTES FROM MY DIARY

Sunday Rest

If you have an hour to spend on a Sunday morning, tune to:

GSN, 11.82 m.c., 25.38 met.

at 11 o'clock, and hear **English Magazine,** which provides thirty minutes of delightful listening.

At 11.30 you will be reminded that it can be heard every week at this time.

Don't run away—keep tuned and you will hear "In Town Tonight"; another half-hour's excellent entertainment.

Australia Will Be There

Here is an interesting excerpt from the Sydney Sun dated 29th June, 1950:—

"Radio Australia has won second place in a world-wide popularity poll. The poll was conducted by the International Shortwave Club of London. Listeners throughout the world were requested to vote on the most popular station. The competition was won by Leopoldville (Belgium Congo) with 609 points. Radio Australia scored 446 points. Then came Switzerland 435, Radio Canada 419, BBC Overseas 401, Hilversum (Holland) 388, and Voice of America 380."

Dr. Walter A. Maier Memorial Broadcasting Station.

I have received a letter from the Pan American Broadcasting Company of New York giving particulars of the Lutheran Laymen's League Special Broadcasts.

These are transmitted from Dr. Walter A. Maier Memorial Broadcasting Station located in Tangier, international "free zone," across the strait from Gibraltar.

It broadcasts short wave on the 48.4 metre band — 6200 k.c.s to make sure greater audiences are able to receive the daily broadcasts in their homes, in nearly every nation in the world.

Modern studios, latest American recording equipment and modern facilities assure high fidelity broadcasts of all "BRINGING CHRIST TO THE NATIONS" programmes.

Dr. Maier's programme is broadcast over the station in English, Slovak, Russian, Yugoslavian, Roumanian, Ukrainian, Hungarian, Armenian, Bulgarian, Albanian, Polish, Persian, Greek, French, German, Finnish and Lithuanian.

This station broadcasts in English each Thursday from 7.00-7.30 a.m. in a programme they call **"Bringing Christ to the Nations."**

NEW STATIONS

TAV, ANKARA, 17 84 m.c., 16.81 met:
This new outlet from Turkey has been heard testing from: **4.00-6.00 p.m. 7.15-7.45 p.m. and 3.00-9.00 a.m. or later.**

TAT, ANKARA, 9.515 m.c., 31.53 met.:
Another outlet that Radio Ankara is testing from: **6.25-7.00 p.m., 5.40-8.00 a.m., 9.00-10.00 a.m.** This is reported by Rex Gillett.

RADIO BUDAPEST, 11.90 m.c., 25.21 met.:
Reported as testing a new 100 k.w. transmitter. Relaying Hungarian home-service around **2.00 a.m.**

CHANGE OF FREQUENCY

CR7BJ, LOURENCO MARQUES:
Reported as having moved from **9.653 m.c., 31.08 met., to 9.60 m.c., 31.25 met., heard from 2.00-3.55 a.m.**

★

AFRICA (French Equatorial)

RADIO BRAZZAVILLE—
15.595 m.c. 19.24 met. 8.00-10.20 p.m.

RADIO BRAZZAVILLE —
11.97 m.c. 25.07 met. . . .3.00- 5-15 p.m.
2.00-11.30 a.m.

RADIO CONGOBELGE LEOPOLDVILLE —
11.723 m.c. 25.60 met. Heard in French around 7.30 a.m.

RADIO SPRINGBOK JOHANNESBURG—
7.30 m.c. 41.45 met. According to "Sweden Calling Dx-ers" this commercial station will be coming on the air in the near future. Heard testing a few weeks ago.

★

BRAZIL

ZYK-3 PERNAMBUCO—
9.565 m.c. 31.36 met. Daily 11.15-11.30 a.m.
Sun. 7.20- 8.00 a.m.

ZYB-8 SAO PAULO—
11.765 m.c. 25.49 met. 6.00 a.m.- 1.30 p.m.

(continued next page)

SHORT WAVES

(continued)

BULGARIA

RADIO SOPHIA—
7.67 m.c. 39.11 met. English programmme 6.45-7.00 a.m. and 7.45-8.00 a.m.

★

CANADA

CKCS, MONTREAL—
15.32 m.c. 19.58 met. European Trans. 2.30- 9.30 a.m.

CHCX, MONTREAL—
15.19 m.c. 19.75 met. European Trans. 12.15- 2.28 a.m.

CHOL, MONTREAL—
11.72 m.c. 25.60 met. European Trans. 12.15- 9.30 a.m.

★

NEW CALEDONIA

RADIO NOUMEA—
6.035 m.c. 49.72 met. 5.45- 7.15 p.m.

★

CZECHOSLOVAKIA

OLR4A PRAGUE—
11.83 m.c. 25.36 met.
English Broadcasts 1.30- 1.50 p.m.
9.00- 9.30 p.m.
8.15- 8.30 a.m.

OLR3A PRAGUE—
9.55 m.c. 31.41 met.
English 5.15- 5.45 a.m.
6.30- 6.45 a.m.
and news at 7.45 a.m.
8.15- 8.30 a.m.
Concert at 9.00- 9.45 a.m.

★

DENMARK

OZH COPENHAGEN—
15.165 m.c. 19.78 met
Dx-News is included in a programme entitled "Everybody's programme" broadcast every second Tuesday from . . . . 8.20- 8.50 p.m.

OZF COPENHAGEN—
9.52 m.c. 31.53 met.
Dx-News every second Tuesday . . . . 1.00- 1.30 p.m.

★

FINLAND

OIX-5 HELSINKI—
17.80 m.c. 16.85 met.
Now on the air 1.00- 3.00 p.m.
10.00-11.10 p.m.
2.45- 3.45 a.m.
7.00- 8.00 a.m.

OIX4 LAHTI—
15.19 m.c. 19.75 met. 11.00-11.10 p.m.
2.45- 3.45 a.m.
7.00- 8.00 a.m.

OIX2 LAHTI—
9.55 m.c. 31.41 met. 1.00- 3.00 p.m.
10.00-11.00 p.m.

OIX1 LAHTI—
6.12 m.c. 49.02 met. 2.30- 4.10 p.m.
6.50-10.10 p.m.
1.00- 7.00 a.m.

★

GERMANY

AUSTRIA—
The Blue Danube Network, Vienna 9.56 m.c. 31.38 met. Now heard in this Frequency.

MUNKH—
6.135 m.c. 48.90 met.
Heard at 3.00 p.m.—"Sweden Calling".

★

(To be continued next month)

CHANGES IN U.S.A. TRANSMITTERS

★

Short-wave listeners have probably noticed that the United States Department of State have bunched their transmitters together, and the following 28 stations have been replaced.

KCBA	KCBF	KGEX	KNBA
KNBI	KNBX	KRHO	KRHK
KWIX	WCBN	WCBX	WGEA
WGEX	WLNL	WLNK	WLWR
WLWS	WNBI	WNRA	WNRE
WNRI	WNRX	WOOC	WOOW
WRUA	WRUS	WRUW	WRUX

The complete list of transmitters now in use has been prepared. The schedule of the West Coast stations (including HON, HONOLULU) appeared in the last issue and the schedule of the East Coast transmitters will be shown in the next issue.

Readers are reminded that my times are taken from the latest list received by airmail from Washington, but are advised to tune in on the 1st and 15th of the month for any alterations to schedules that may be announced.

AMONG OUR READERS

(continued)

"I have been reading your paper for the past four years, now, and have found something of great interest in each one. I was wondering if you would like to hear about a little five-valve personal portable that I have built up, using a different type of chassis construction, which seems to help cut down the overall size quite a bit." — **Russell G. Heath, Yarrandabbie, via Walla Walla, N.S.W.**

(Yes, the different style of construction sounds interesting and I am sure our readers would appreciate further details from you. A.G.H.)

"I have managed to construct two or three receivers and at the moment am busy on the car set that appeared in the issue of April, 1941. It is only since coming to this country that I have taken an interest in wireless. As I have not much spare time, my knowledge of this science can be written quite large on a postage stamp with a white-wash brush. To try and improve the shining hour I read many publications and finally decided that Radio World was most suitable for me. I have now reached the stage where I know why the chicken crossed the road, even if I still have to find out what it does when it gets to the other side." — **J. Dickie, C/o Bank of N.S.W., Burwood, N.S.W.**

"YJ1RV is not back on the air yet, but I hope to have my station re-activated with about 100 watts phone on the 20-metre band in about four or five months time. Wishing you continued success." — **F. H. Harvey, Bonkovia, Epi, New Hebrides.**

Pirate Caught

Colin Martin Frazer, a married man, of Highett, who illegally erected receiving and transmitting equipment at his home in Tibrockney Street, was definitely "off the receiving end" at Cheltenham Court last week when he was fined £20 for the offence.

A Commonwealth Investigation Service officer and three P.M.G. inspectors, who visited the Frazer home early in May, were told by the defendant that he had no licence to operate or erect the set, having failed on several occasions to pass examinations. When the officers left they took the equipment with them.

Frazer told the Court that he built the appliance to gain experience which would enable him to get his licence.

—Standard News (Vic.)

RELAY SWITCH

(continued)

They are very sensitive. They have two windings. I have applied 400 volts to them without a breakdown of their insulation. The mounting screws have to be insulated from chassis (if chassis is mounted).

The control valve in my case is a discarded 42. The rheostat is a low resistance from a very old set.

One relay has to be altered. The reed is taken off and turned over. The contacts are removed, and main contact only, is screwed in where back stop was. A piece of very thin mica or piece of paper is glued across magnet pole piece, to prevent short circuit from pole piece to reed. Of course if you happen to have a sensitive double pole, double throw relay all the better.

The valve does a dual task by being time delay device and rectifier. In my case 20 volts DC was applied to Relay, and is applied to high resistance coil. The filter condenser is nesessary to prevent relay reed from vibrating.

The correct connections for the negative HT lead from the set to the low resistance coil of Relay No. 1 will have to be found by experiment, as wrong connection would cause the reed to chatter due to reversal of the magnetic field.

The low-resistance coils are in series, so the high tension flows through both relays; keeping one closed and the other open. An indicator lamp (red) is connected to Relay No. 2, and shows at a glance if the unit is working.

A double-pole, double-throw switch is provided to short out the unit if the stand by switch is used frequently or delay is not required. One set of contacts on switch cut off the unit at same time.

A second indicator lamp uses one set of contacts on the switch (yellow) to show that the unit is shorted out.

To explain better—In position 1, 6.3 volts are switched through to relay unit, and red light comes on. In position 2 the transformer centre tap is earthed (or connected direct to set) and yellow light comes on.

Red light has gone out and unit switched off. If the relay is used with a small amplifier and current through relays do not keep them closed; on the finest adjustment of reed tension, I would suggest placing a resistor in the lead to the CT and using the voltage developed across it, on the high resistance coils of the relays.

My unit was built on a wood base board and the lot mounted on the chassis of power supply.

Speedy Query Service

Conducted under the Personal Supervision of A. G. Hull.

B.M. (Ryanston, Vic.) has a problem which is a common one. He wants to know what to do with his wet "A" battery to prevent damage to furnishings, etc., from acid.

A. — Most people seem to have accepted the wet battery (or lead-acid accumulator) as a necessary evil, but it is possible to make it fairly respectable nevertheless.

When the battery returns from the charging station, give it a wash with warm water and soap. Just pour the water over it if it is new or fairly clean. Thus you remove the acid from the exterior, and with it most of your trouble). While it is drying, cut two felt washers (Feltex will do nicely) about 2½ inches in diameter, with a half-inch hole in the centre and work vaseline well into the felt. Push these down over the terminals and the vaseline will stop any moisture from creeping up to the clips. The latter are best cleaned in hot water with soap, or washing soda if too dirty, and should be coated with vaseline or petroleum jelly.

The felt washers should be removed while the battery is being charged; and the battery should be washed **every time** it returns, and the felts replaced.

This treatment is a little trouble, but will definitely solve the problem. Just for safety though, use a rubber mat under the battery.

A.L.G. (Korumburra, Vic.) has been told that a pair of 2A3's he had in an amplifier were gassy because of a blue glow inside them. He bought a new pair, and they are the same.

A.—There are two kinds of blue glow possible in valves.

The type indicating presence of gas is visible between the elements of the tube, and is accompanied by high plate current and distortion, and in advanced cases overheating occurs.

The second type is visible on the inside surface of the glass, or on the mica disc supporting the elements, and is due to electrons hitting the glass, or mica. While not intended by the manufacturer, it is generally considered by those who have studied the phenomenon to be an indication of a good reserve of electron emission from the filament or cathode.

The display is often "modulated" by any signal passed through the amplifier, and can occur in various types of tetrodes and pentodes as well as triodes.

It is a good thing to have a spare pair of valves, anyway.

J. McL. (Geelong) is interested in radio theory, and wants to know how a condenser got its name, and what it does.

A.—A condenser was originally used to store electric charges generated by friction (as with a Wimshurst machine), and was known as an "accumulator" as it could collect or accumulate a large number of small charges and hold them to be released later as one big discharge.

The name of accumulator was later applied to the rechargeable type of wet cell or battery, and another name had to be found.

Perhaps condenser was used because of the fact that small charges could be concentrated (though not strictly condensed) on the plates of the device. 'Condenser" then, is not truly descriptive, and CAPACITOR is the term most favoured in advanced laboratory circles.

The said capacitor is, incidently, much more than a reservoir. Capacity exists in every electrical setup, whether desirable or not; and it is essential in tuned circuits, without which radio communication could not exist.

If you follow our Notes for Amateurs you will get an insight into some of the uses to which this simple but interesting device can be put, and a fuller explanation of how it works than can be given here.

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