AMATEUR RADIO

JANUARY 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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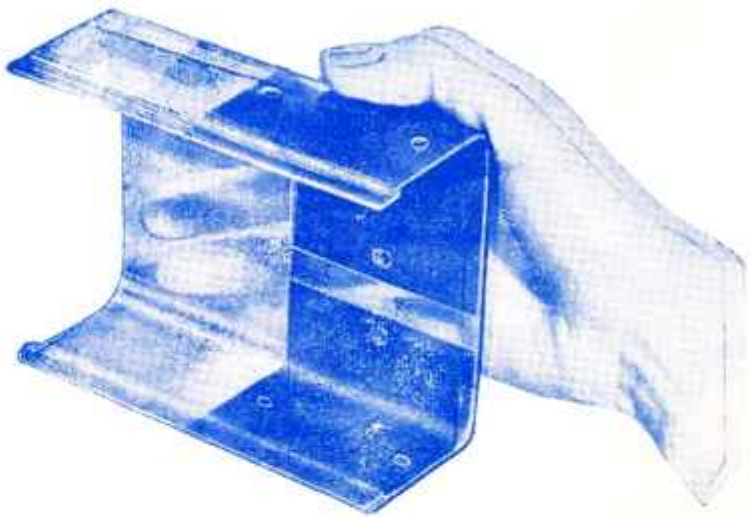

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AMATEUR RADIO

VOL. 14 JANUAURY, 1946. No. 1

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

For some months we have been anticipating the reissue of Experimental Licences.

That day has arrived, for by this time all Hams who completed their application for licence should have received advice that their licence will he issued on receipt of the required fee. In fact many licences have already been issued.

In this respect we wish to draw your attention to the Federal Secretary's comments in FHQ Notes in the October, 1945, issue . . . "The fellows who have 1939 rigs in going order, requiring only the insertion of tubes, coils. etc., may he for the most part O.K.; but imagine what is going to happen if a thousand or so hurriedly built transmitters are suddenly to open up? Remember, too. that such rigs would likely be feeding even worse contraptions in the way of skywires. Just consider for a moment the chirpy signals, overmodulated phone, off frequency operation, harmonics and BCL QRM likely to result. Whether you are a new Ham or an Old Timer, if you have to build a new rig to get on the air, for the love of Amateur Radio be sure of what you are doing. We will be starting off with a glorious war record; let us preserve its memory in good operating and gentlemanly conduct."

The days of hit or miss methods have gone—the introduction of precision measuring equipment and components—and at a reasonable price, too—gives the Ham no excuse for poor quality transmissions either on telegraphy or telephony.

Gone too are the days when one could act more or less as he wished—good conduct while on the air—and off it too—should be the aim of the Ham Fraternity.

IN THIS ISSUE

A 2½ METRE CONVERTER

By F. DICKSON, VK2AFB*

FOLLOWING upon the release of frequencies above 28 mC. for Amateur operation, this article should prove of timely interest to most Hams. When used in conjunction with a reasonably good superhet, a converter of this type offers a very satisfactory way out of the VHF reception problem. *Some modification in coil design may be necessary, as since this article was written, information has come to hand which indicates that 112-116mC is no longer available for amateur use. In its stead, 166-170mC has been allotted. (Tech. Ed.)*

For those who do not wish to build a separate superhet., but are not satisfied with the performence of superregenrative receivers, a converter is the obvious thing to obtain V.H.F. reception.

The unit here described is for the 2½ metre band only, as the writer lost interest in 5 metres a year or two before the war, and the prospects for 1¼ are still rather doubtful. There would, however, be no particular difficulty in soldering banana plug receptacles onto the condensers to take plug-in coils instead of soldering the coils to the condensers. The converter is very simple and gives excellent results when operated with a receiver which has good frequency stability around 21 mcs. This feature is worth emphasising: If the receiver suffers from frequency drift the ruits will be poor and frequent retuning necessary, no matter how good your converter may be. Very high gain is not needed in the receiver, a set with R.F. stage and normal valve line up would not be required to run with the gain control more than half maximum setting.

A number of experiments showed that at 116 mcs. penthode R.F. stages whether acorn, miniature or all glass were not worth the work and expense involved. Admittedly a small amplification is attained and some improvement in signal to noise ratio, but not enough to justify the R.F. stage.

In the mixer stage, a triode was chosen, though here again a pentode could be used with some small advantage. The triode has the merits of simplicity, economy and entirely adequate performance. Cathode injection as used in this converter is very easy to get going and is excellent as regards freedom from interlocking with the oscillator.

The oscillator needs little comment. It is a cold plate Hartley, in which one side of the condenser can be earthed. The voltage stabilising is well worth while.

The intermediate amplifier is an EF 50 (VR91 to many of us). This is an all glass (i.e. no bakelite base) pentode of very high slope and amplification. There are no difficulties in high gain I.F. stages with these valves. but a few tips may be handy. As in all single ended valves of high gain a shield should be placed across the socket to isolate anode and grid circuits and well bonded to chassis. As will be seen in the photo, all by-pass condensers are returned to a common point on the shield and the internal screen and suppressor grid connections are soldered directly to it.

Mica by-pass condnesers should be used and preferably those with flat connections rather than wire pigtails. Since the screen operates at 250 V. no screen dropper is needed.

A few points about construction are called for. The photograph shows the layout quite clearly. The coils, condensers and acorns are below the chassis to get everything compact with short connections. Obviously an above chassis arrangement would be nearly as good, but we originally intended to have an R.F. stage on top with the anode protruding through a hole in the mixer.

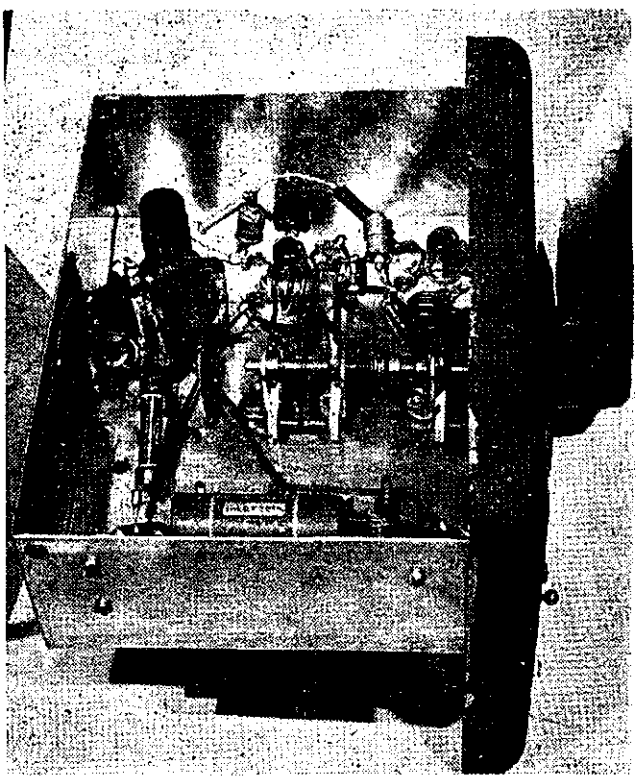
The coils are soldered direct to the condensers, which, together with the acron sockets and 1" pillars are then mounted. Cathode leads and earth returns for these components are made of copper strip for low impedance. The air trimmer tuning the mixer anode circuit is mounted at the acorn socket and its earth side goes to earth via a mica condenser under the socket. This is necessary to give a short return path for the V.H.F. components of anode current.

The first I.F. is made on polystyrene tubing and placed in the corner of the chassis. It does not require shielding. Its untuned grid winding is connected between EF 50 grid and the return point on the shield. The second I.F. is mounted in the shielding can above the chassis and has a low impedance secondary. It is important that all coils be rigidly mounted and connected.

The power supply and voltage regulator are perfectly straight forward and can be placed where convenient on the chassis or as a separate unit.

Having constructed the converter the next thing is to line it up. Mixer and I.F. valves should be in place, but the oscillator out. Couple the unit to the receiver tuned to 21 mcs. and connect a signal generator to the grid of the EF 50 and adjust the anode trimmer. Now transfer the generator to the mixer grid and tune up to anode

(Continued on page 4)



*Transmitting Department—Philips Electronic Industries

HAMS HAD THE NEWS

By FI/Lt. W. M. MOORE, VK2HZ

This is the story of Hams and cranks in their endeavours to supply news to inmates of Japanese Prisoner of War Camps.

The writer's first contact with the Japanese was at Tasikmalaya Aerodrome in Central Java, where had assembled some 6000 Airforce personnel after the capitulation of Java. He had arrived with ZL2UP, and later met up with VE2JT and VE2CD, all Radar Officers.

We naturally wanted the news, but it was quite easy, as ZL2UP had arrived with an allwave portable. During the ensuing days we inspected the various pranged aircraft around the 'drome—most of them destroyed by the Dutch just before the fall. A considerable amount of the radio gear was intact, the souveniring instinct took over and with an eye on the future Ham activity some of the gear was purloined. These parts were to play a big part in the receiving of news in P.O.W. camps.

The writer fancied a pair of Kitty-Hawks superhets. as a momento, plus all available spares.

Some weeks later a search was threatened, and the hurried dropping of all excess gear into a nearby well saved the day. The search was only superficial, so it was decided to salvage some of the dumped metal valves. It looked like a diving competition until someone fished up an old permag speaker—the rest was easy—a length of wire. the magnet dropped into the well, a slight click up was brought a tube ——. The best haul was three. It was two of these salvaged tubes that we used practically the whole of the three and half years.

At the end of April, the writer was separated from the others, when Australian personnel were brought to Batavia and placed into a camp with the rest of the Australians and Americans. This was Cycle Camp, where a C.O. of an Australian Unit had a 1.5 volt super. installed; placed in a dummy shelf in a cupboard. The set supplied the news for some months until during a hurried covering up, the Colonel's batman extinguished the 1.5 volt valves. As no more 1.5 valves were available at this stage, a two tube regenerative receiver was constructed in an issue kidney-shaped dixie, which was filled with sugar in an emergency. This receiver was used for about six months, run from the superhet's batteries.

In September, a Kitty-Hawk receiver was brought from its hiding place in the roof. The front section cut off and a T.R.F. job constructed. 1.5 volt valves were used, these tubes were smuggled into the camp by lads working on outside working parties. One rather optimistic type arrived back with a 50 watter dangling between his legs.

The T.R.F. job was located under the bed beneath the floor, where three removable tiles allowed easy access. The writer extinguished this set of 1.5 volt valves, and decided there and then that the filaments of these types were a little flimsy for hasty burials as required in P.O.W. camps. Metal tubes, 12 volt heaters were always used thereafter.

Cycle Camp was rather an ideal camp for constructing and operating sets. Most of the huts were divided into small cubicles, allowing plenty of warning for a quick disposal of gear At this stage, October, 1942, there were three other sets operating in the camp of 3000, one by VK4JB ,and two by Americans. During this month, 95% of the camp strength left for the ill-famed Thai-Burma railway, included amongst them was VK4JB. The question then was how to transport his gear.

The receiver was hurriedly built into a dummy water-bottle. Spares and batteries were fitted into meat and vegetable tins cut in half and re-soldered with a label stuck over the offending join. The writer heard later from returning P.O.W. at Moratai that the receiver operated successfully in Thailand.

The batteries used were standard torch cells in series, purchased ostensibly for emergency lights in the hospital.

The Japs at this stage were tightening up and it was apparent that future Jap policy would incorporate the switching of personnel at short notice from camp to camp Gear now would have to be readily transportable and concealed well enough to pass a thorough search, both leaving the old and entering the new camp.

During the ensuing six months the writer was in three camps in the Batavia area, and the gear was carried in M. and V. tins. On returning to Cycle Camp, a small receiver was constructed and fitted into the bottom of an issue water bottle. The bottom of the bottle was removed and a dummy section soldered in about four inches from the top, leaving a compartment 4 inches x 5 inches x 2 inches for the receiver. The inquisitive eye sees four inches of water if the cork is pulled out.

At this stage batteries were running short and a midget power supply was constructed with hand wound transformer and choke. This was secreted in the base of another water bottle.

This set was operated till towards the end of 1944. It was removed from the bottles for operating and fitted under a bamboo bed with sliding top. Procedure was to erect mosquito net, unroll bed, slide panel and swelter while the B.B.C. came through.

At the beginning of 1944, the Nips conducted some very thorough searches, all personnel were removed from the camp area and the Nips counterpart of the Gestapo went to work. Fortunately no one was ever caught with the goods.

About this time, all metal water bottles were seized for the use of native troops, and that rather cramped future movements. It was finally overcome by the use of wooden shoes (clogs) as containers. These clogs were the universal footwear of natives and prisoners alike.

The camp variety were generally two inches thick and the outline shaped to the size of the foot. A canvas strap across the toes allow you to drag them along. The sole and heel sections were hollowed out to accommodate the radio components. In the soles were housed the receiver, condensers and rectifier, while in the heels the headphones and autotransformer. It was this receiver used by Messrs. Collins and Arnold, of Royal Corps of Signals, that received news of the final Jap surrender.

It was remarkable the way the news came through at every camp in which I was imprisoned. At least one set was in operation by the writer or another Ham or crank. Other methods of conveying sets from camp to camp were as follows. A common method was the distributing of the parts amongst a large number of people and they were secreted in tins of powder, sugar, socks, etc. The use of water bottles, food tins and clogs have been mentioned; but the classic is the effort of "Buck" W8ITB.

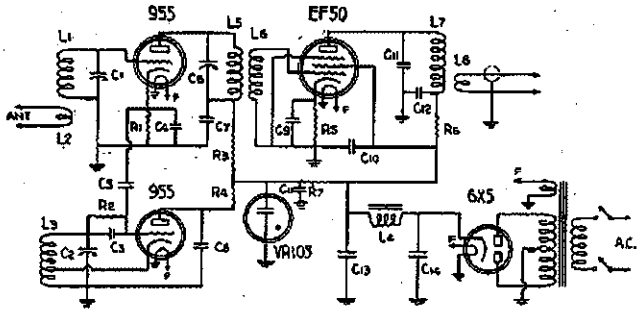
As a student at Annapolis Naval Academy he lost a leg while on duty about a minesweeper—yes, believe, "Buck" carried his set in his artificial leg. He was quite happy about it until the filament dropping resistor became a little too hot one day and burnt the leg. So a less inflammable hiding spot was found about the camp.

A.C. leads for receiver supplies were often a problem, but with the use of dummy shelves and bamboo tubes and pins stuck into V.I.R. cable, these difficulties were overcome. The antenna was no problem as mosquito net supporting wires were satisfactory, as a piece of 26 g.

(Continued on page 8)

A 2½ METRE CONVERTER

(Continued from page 2)



PARTS LIST.

C1, C2—Hammarlund 3 pl midgets 1 stator plate removed. Ganged.
C3—50uuf Philips Ceramic.
C4—30uuf Philips Ceramic.
C5, C6, C11—3-30 Philips Air Trimmer.
C7, C8, C9, C10, C12—.002 uf mica Simplex.
C13, C14—8uf 525V Ducon tubular.
C15—.01 mica Simplex.
R1, R2—10,000 ½W.
R3, R4—5000 1W.
R5—150 ½W.
R6—1000 ½W.
R7—15,000 2W.
L4—30 hy. choke 40mA.
Power Trans.—40mA 350-0-350 and 6.3 V.
Acorn valve sockets—2.
9 pin T socket (EF 50)—1.
Octal sockets—2.
Polystyrene tubing.—2 pieces ¾ inch x 2½ inches, 1 piece ½ inch x 1 inch.
Mains switch—1.
Shielded output cable—3 ft.
1¾ inch square I.F. can—1.
Chassis—8½ inches x 7 inches x 3 inches—1.
Panel or box to fit chassis.
Good quality vernier dial.
2 x 955 valves.
1 x EF 50 valve.
1 x 6X5GT valve.
1 x VR105/30 valve.

COIL DATA.

L1—3 turns 14 swg. enam. ¼ inch long on 1 inch x ½ inch polystyrene tube.
L2—2 turns 20 swg. rubber covered, at earth end of L1.
L3.—4 turns 14 swg. enam. ¼ inch long ½ inch I.D. Cathode top/1½ turns from earth end.
L5—11 turns 18 swg. enam. close wound upper end of ¾ inch polystyrene tube.
L6—11 turns 18 swg. enam. close wound spaced 3/16 inch from L5.
L7—11 turns 18 swg. enam. close wound lower end of other polystyrene tube.
L8—2 turns 20 swg. rubber covered at earthy end of L7.

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circuit. The I.F. channel should now be in line and quite stable. Insert the oscillator valve and make sure it oscillates without squegging. A pair of earphones in series with its anode supply is probably the easiest check. Hissing noise indicates superregeneration and normal oscillation is revealed by the "plopping" sound on touching the coil.

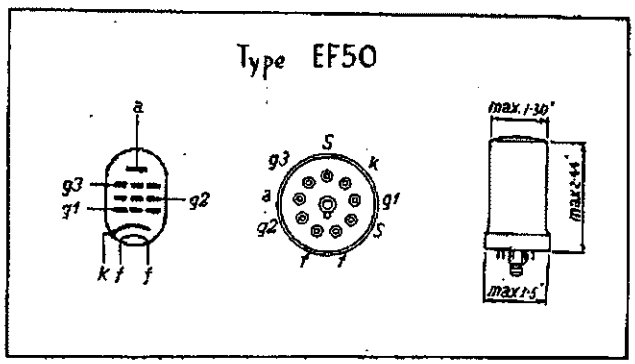
If you have a signal generator that can be heard on 2½ you can proceed directly with lining up. Otherwise a simple test oscillator can be knocked up or the harmonics from the H.F.O. of a super on ten can be used, though a modulated signal is nicer.

Tracking is achieved by judicious coil stretching or squeezing at the high frequency end, and by careful bending of condenser stator plates for the low end. Very little bending is necessary and the whole business is one of patience, and repeated trials. The oscillator coupling condenser will require adjustment. Starting from nearly minimum, increase its capacity little by little for highest conversion gain, judged from output of the receiver, but don't use enough capacity to stop the oscillator in patches, nor to pull its frequency severely.

A word about results may be of interest. There have not up to the time of writing been any amateur signals on this band, but the 116.4 mc. aircraft channel gives plenty of signals if you live anywhere near an airport. From the writer's location, Croydon, and not a good DX location at that, strong signals have been heard from Mascot, Bankstown, Camden and several other airports and several times signals from planes over Canberra, which is a reasonable DX on 2½ .

EF 50 DATA.

Variable mu R.F. Pentode. Indirectly heated cathode.
Heater—6.3 V, 0.3A. Anode voltage—250 V. Anode current—10.0 mA.
Screen voltage—250 V. Screen current—3.0 mA. Grid voltage—2 V.
Slope—6.5 mA/V. Amplification factor 6500. Internal resistance, 1.0 meg.
Capacities—Input, 7.8 uuf. Output—5.3 uuf. Anode/grid—0.003 uuf.



FINISHING TEST INSTRUMENT PANELS.

A very fine and workman-like finish can be made with panels for test instruments, etc., by first cleaning the aluminium panel with some steel wool and spraying (a fly spray is excellent for the job) with clear varnish as used for coating charcoal and pencil sketches. This varnish can be obtained from most stores dealing in artists colors and oils. Another good clear coating (which the writer prefers) is ordinary clear nail lacquer. This can be brushed on with a fine camel hair brush or even the small brush that comes with the bottle. It leaves a very clear and durable finish.

If prior to varninshing, the panel is drilled and lettering done with black Indian ink, a quite professional job results and the coat of lacquer protects the ink from cracking or being rubbed off.

VK3SZ

THE 1946 HAM STATION

In the October issue we asked readers to submit their ideas for the layout of their proposed new outfit, or to submit to ns their ideas which would perhaos help considerably in the operation of their Ham Station. We desire to point out that ideas need not have been actually tried out, but providing that the idea is sound, someone else may be able to improve on it, and he in turn can then pass on the improvements.

W/O B. L. McCubbin, VK3SO, starts the ball rolling with his ideas for his new station ,and readers may gather from the description and the accompanying sketch that considerable thought has been given to the subject.

Next month we intend to describe an idea for powering the rotary movement of a beam, which, as far as we know, has not yet been used.

I note that you appeal for ideas on the post-war Ham rig. The enclosed sketch gives my idea of a handy lay-out. We start with a good solid bench, wide enough to accommodate Receiver, Exciter and Mike pre-amplifier, etc., and allow space in front for the Log, Scrap Book, etc.

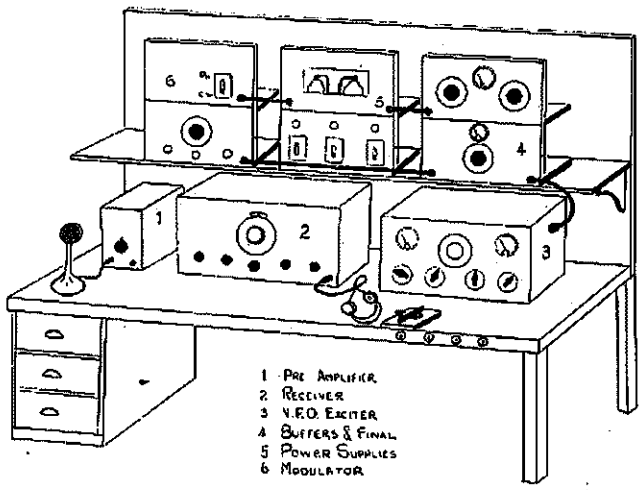
A solid shelf above the operating table supports the Power Amplifier, Modulator and Power Supplies mounted in small racks. The whole lay-out can be made clean and easily accessable.

The exciter unit is the heart of the transmitter, and my idea of this is a Pearce Crystal Oscillator arranged with Crystal switching to accommodate as many 3.5 M/cs. Band Crystals as are available, together with a good stable V.F.O. as an alternative to Crystal Control.

The frequency multiplying stages will be fitted with frequency switching arranged with L/C values to tune the Ham Bands only, thus eliminating any possibility of off band operation due to incorrect harmonic selection. All stages in the exciter are to operate on the minimum possible power and a buffer stage is to be included to provide sufficient output through a coaxial line to excite the Power Amplifier (in my case I anticipate a pair of 807's in push-pull) without additional amplification.

I also visualise the exciter fully screened to prevent spurious radiation. The keyed stage will be included in the exciter as close to the oscillator as possible and the whole outfit (the exciter) will be supplied from a built-in power supply, thus providing a complete low power transmitter. The exciter should be capable of providing output on 3.5, 7 and 14 megacycles, using the last stage as a buffer, and by doubling in the last stage, provide 28 M/c output.

It may be necessary to use plug-in coils in the exciter output to obtain this versatility, the object being V.H.F. transmissions, the 28 M/c output being a starter for further doubling to obtain V.H.F. output.



It is difficult to make really concrete plans since the frequency alocations still seem to be somewhat up in the air. (You are on the right track, Om.—Ed.) The question of F.M. also seems to be still in the lap of the Gods, so for the moment I intend to devote my energies to good quality A.M., and for this I prefer high level modulation.

U.H.F. IN THE WAR

By F. T. LUBACH, VK4RF.

Despite the fact that amateurs the world over stand a good chance of again being granted use of most of our old frequency bands in the post-war period, it is only to be expected that a large percentage of Hams will migrate to the U.H.F. bands, as they offer tremendous scope for experiment ,and even a chance of DX as has been recently proved in the Northern theatre of war.

Writing from practical experience and quoting reports from other U.H.F. operators in this region, it has been disclosed that ranges of 400 to 500 miles are not uncommon, using only low power in the vicinity of 80 megacycles. One report states hearing a U.H.F. signal near this frequency 1500 miles away! Therefore, the old "visual distance" theory for waves higher than 56 megacycles receives somewhat of a setback, and for this reason U.H.F. "Walkie-Talkie" and other portable equipment hasn't the security it was at first thought to possess and use of plain language is therefore restricted.

Apparently the more prominent factors which make this long-distant U.H.F. communication possible are Temperature and Humidity, as well as ionospheric and atmospheric conditions. For instance, when a pronounced temperature inversion or change of moisture takes place immediately above the transmitter at a height of only a few thousand feet, unusual distances have been covered.

It has also been found that for frequencies below 100 megacycles ionospheric conditions sometimes combine to make even short-range work unreliable, whereas, in the 100 to 200 megacycle band, chances of long range communication are even less as may be expected, but, above 200 megacycles, atmospheric conditions sometimes help the U.H.F. waves on their onward flight. It must be borne in mind that all these reports are relative to low power portable equipment, and it is realised that higher powered equipment could accomplish much greater feats of DX.

By way of comparison, I personally have found 'Walkie-Talkie" outfits in the 3 to 6 megacycle band suffer from the same "line of sight" complex as U.H.F. equipment experiences most of the time, and it is not unusual for signals to fade out when an intervening hill crops up between your Landing Barge and receiving station. It is only to be expected that before this war draws to a close even greater strides, and discoveries will be made in this field, but I feel sure the Ham of tomorrow will have more than enough room for even further experiments on the U.H.F. bands.

WIRELESS INSTITUTE OF AUSTRALIA

NEW SOUTH WALES DIVISION

36th ANNUAL REPORT

To be presented at 36th Annual General Meeting to be held at Science House, Gloucester Street, Sydney,

FRIDAY, 25th JANUARY, 1946.

Gentlemen,

I have much pleasure in placing before you the 36th Annual Report of the Wireless Institute of Australia, New South Wales Division. The period under review has been a momentous one. Many times during the past years the prophecy has been made that the next report would see the lifting of the ban on Experimental transmissions. By the time you read this report it is confidently expected that this prophecy will have become an established fact.

Regulations have now been gazetted for the control and operation of Experimental Stations, and a number of frequencies made available, viz.,

28-29 mC/s.
50-54 mC/s.
166-170 mC/s.
1345-1425 mC/s.

The release of the lower frequency bands is at present impracticable, but these bands will be made available when they are cleared by Service Commands. Members are requested to bear this in mind. Some have been under the impression that the lower frequency bands have been lost. Such is not the case. The frequencies listed above are only a beginning.

With reference to the Regulations there have been certain vital alterations compared with pre-war days; the main variations being the increase in the minimum age to eighteen years, 14 w.p.m., two classes of Licence "A" with a power limit of 100 watts, "B" 50 watts, whilst music and entertainment of any description is banned. This Division has strongly opposed making the A.O.C.P. harder to obtain or increasing the age limit, but it is now apparent that the Department was adamant on both these points. It would appear that the Department has a very short memory. When one recalls the early days of 1939 and the part played by the Australian Experimenter in furnishing a pool of trained Operators. How eagerly the services of the "ham" were sought. It must be admitted that there were a few irresponsibles whose thoughtless actions brought down the wrath of the powers that be, but these selfsame fellows willingly took their places in the front ranks with the Fighting Forces with their brother Experimenters. Again there are many present day Experimenters who, if they had waited until they were eighteen years of age, would never have bothered about a "ticket."

The ban on recorded music or any form of entertainment has received universal approval.

The new Regulations will soon appear in print and may be purchased from the Institute or direct from the Superintendent of Wireless. It is imperative that every Member should obtain a copy.

I think you will agree that events have moved swiftly since V-P Day and the most optimistic of us did not expect to be on the air for at least twelve months. Much of the credit must be given to E. H. Cox, VK2GU, for his splendid work, and at the November General Meeting of the Division, Life Membership was conferred upon him as a token of appreciation. It is felt that Federal Headquarters could have been a little more enterprising and more attention given to details. This criticism is offered reluctantly, but in view of the error that occurred in the qualifications for the Class "A" Licence and its repercussions in this State, it must be made. In their favour it must be said that V-P Day came much sooner than, they, like a lot of other people, expected.

Increasing attendances during the early months prompted Council to decide to seek larger space for General Meetings, and to again obtain the services of leading authorities in the Radio world as Lecturers. The first step was to obtain the old meeting place at Y.M.C.A. and this proved a popular move. It was decided that negotiations should then be entered into with Science House Management Committee, as it was felt that in view of the part played by the Institute in the early days of Radio its logical headquarters should be Science House. Accommodation was secured in the Lower Hall, but this soon proved inadequate, and after discussions lasting several months, the Institute's application for the use of the Main Hall was approved. It should be pointed out that accommodation at Science House is not easy to obtain and it is only available to scientific bodies of repute and long standing, such as the Wireless Institute of Australia and kindred bodies, and the recognition of our claim is a tribute to the Institute's standing in the community. Therefore, commencing January, 1946, Institute General Meetings will be held on the Fourth Friday of each month in the Main Hall, Science House.

Many outstanding Lectures were delivered by leading authorities on Radio and allied subjects, and this opportunity is taken of thanking Messrs. J. Reed, R. J. Honnor, G. Parker and E. G. Beard. An outstanding demonstration was that provided by Mr. Foster Stubs, of the Australian Amateur Cine Society. This demonstration showed the work being performed by Amateur Cine enthusiasts in this country, and the standard was astounding and difficult to realise that it was not the work of professionals.

With the cessation of hostilities. the need for the Emergency Communication Network was no longer apparent, and it was decided to disband this unit. The Network made history in, not only New South Wales, but the Southern Hemisphere. The State Operational Controller, Colonel L. Lorenzo, D.S.O., has asked me to convey to all operators his personal thanks and appreciation of the work done.

The Bushfires Emergency Radio Scheme is operating at both Young and Dubbo under the able guidance of Messrs. Taylor and Moore respectively. As yet neither unit has been in operation, but should they be called upon during the next few months there is not the slightest doubt that their assistance will be of great value to the local Bushfire Brigades., With so many Servicemen returning to civil life, it is anticipated that in the very near future it will be possible to extend the scope of this Net to embrace a far greater number of country towns.

A long cherished hope will be realised early in 1946. Upon many occasions the possibility of A.O.C.P. Classes have been discussed as it was felt that this was a field that the Institute could be very well represented in. Commencing on 7th January, 1946, a Class will be commenced under the able guidance of Mr. J. Howes, VK2ABS, and selected assistants. Applications for enrolment have been far greater than anticipated. This Class will present a splendid opportunity for newcomers to obtain their A.O.C.P. under the able guidance of Experimenters well versed in all aspects of Radio.

The Official Organ, "Amateur Radio," is once more appearing in printed form and the Magazine Committee are to be congratulated upon the change from the wartime roneo editions. It is particularly gratifying to learn that all Divisions are now including the Magazine in their annual subscription. The magazine is a very fine publication, but unfortunately costs are high these days. This Division has suggested to the Magazine Committee that the price of fourpence per copy should NOT include

postage. Again an appeal is made for technical articles. In the past this Division has on many occasions provided sufficient copy for a complete issue of the magazine. Unfortunately, during the past year very few articles have appeared under VK2 Call signs. It must be pointed out that the Magazine Committee acts in a purely honorary capacity and their burden is lightened considerably by always having a number of technical articles on hand.

During the year, Council were unfortunate in losing the services of two outstanding administrators, namely, Messrs. Dickson and Priddle. These gentlemen had rendered yeoman service to Amateur Radio whilst Councillors of this Division. It is pleasing to note that they have still retained their interest in Institute affairs, particularly Mr. F. P. Dickson, who acted as liaison between Mr. Cox and the Division during the negotiations with the Department. Newcomers to Council were Messrs. Dukes, R. Patterson and D. Knock. All of these gentlemen have proved themselves to be definite acquisitions to Council, particularly Mr. Dukes, who has acted as Membership Secretary. 2NO requires no introduction, whilst quite a lot more will be heard of 2AJW in the future.

Membership has continued to increase and far exceeds the target set for 1945. It is very pleasing to note that of the three members who failed to renew their subscriptions, only one is an Experimenter! It is confidently expected that 1946 will see a further large increase in membership.

Hand in hand with the increase in membership has been a healthy financial position. An investment of £20 was made in the Third Victory Loan, whilst rent at Science House for 1946 has been paid in advance in order to obtain a concession. The Treasurer, Mr. G. Cole, has proved himself one of the most able men to have occupied this position and it is hoped that the Division will be able to avail itself of his services for some time to come.

It has been decided to revive the Annual Dinner, and the 1945 Re-union took the form of a welcome home to Institute Members, Messrs. Moore, Brigden and Edwards who were P.O.W.'s. In addition, this dinner was a farewell to the retiring Superintendent of Wireless, W. T. S. Crawford. W.T.S.C. during a long term of office has always shown his interest in the Experimental Movement and in pre-war days donated the W.T.S. Crawford Trophy for the best Amateur Telegraphist. It was always a pleasure to interview him on any matter, and his advice was always forthcoming and readily given.

The Experimental Advisory Council will function from the 1st January, 1946, and from the following six names, viz., Messrs. Cole, Fryar, Higgins, Peterson, Patterson, and Ryan, submitted to the Superintendent Messrs. Cole, Patterson and Ryan were chosen to act under the Chairmanship of an officer of the Department. In view of the High Frequencies allotted it became necessary to take into consideration location when deciding upon the personnel of the Committee.

This, gentlemen, is a brief review of the year's actities. What of the future? It has been definitely decided that the Institute is to have its own permanent rooms, and as a first step in this direction a ballot was held to increase subscriptions and was carried by an overwhelming majority. Lack of suitable accommodation is at present a bar to the immediate acquisition. Once these quarters are obtained it is intended to provide members with—

(a) Test Room and Workshop with all associated facilities.
(b) Library—both of Publications and Meters.
(c) Technical Service.
(d) Marker Stations for all Bands.
(e) Free QSL Service, both inwards and outwards.
(f) Subdivide the Institute into various sections. Phone, C.W., U.H.F., S.W.L. with a General Meeting once a month.
(g) Overseas publications, QS.T., Radio, Call Book, etc.

Ambitious, certainly, but by no means impossible.

In conclusion, I desire to express my appreciation of the honor bestowed upon me when I was recently elected a Life Member of this Division of the Institute. If my efforts have helped Experimental Radio at all, that would have been my reward, but members decreed otherwise, and again I thank you. I must also thank my fellow Councillors for their assistance and unswerving loyalty, not only during the past year, but also during the war years. For the future I ask that every member of the Institute make it his bounden duty to attend as many meetings of the Division as possible and take part in all discussions. If you do this you will have a strong virulent body worthy of the title of "The Oldest Amateur Organisation in the World."

W. G. RYAN, VK2TI, Retiring Chairman.

HAMS HAD THE NEWS.

(Continued from page 3)

running through the leaves of the thatched roof was practically invisible.

We had many close shaves while operating and building sets. The writer had the doubtful pleasure of bowing to the Japanese Camp Commandant with a set under his arm. Sets were invariably operated at night under a mosquito net (Sandfly trap) and it was strange how quickly one could get to sleep with a wireless set as a pillow with a Nip guard about.

The dissemination of news during the first two years consisted of the passing of a typewritten bulletin around. Later the problem became rather ticklish as it was known that informers were present in the camp. From then on news was passed to a select few and broadcast for general consumption under the guise of extracts from Nip newspapers and flashes from outside camp.

The news of the Jap capitulation was common knowledge on the evening of the 15th of August, but the camp Japs made no statement till some twelve days later.

It was great fun while it lasted, but you can rest assured the reward of most secret radio operators was a few extra grey hairs. It is regretted that no photographs of gear are available. After the capitulation plenty were taken, but in the hurry to get away from glorious Java and its rice, prints were not available. The only momento brought out by the writer was a headphone that did a 1000 B.B.C. news broadcasts.

CORRESPONDENCE

137 Walkerville Tce., Walkerville.

Editor "A.R."

This all started through a visit to a fellow Ham. As Hams will, when they get together, the main topic is radio in general for a start and then Ham radio receivers are discussed. And do we have a rag-chew on the subject. Do we not!

The other chap talks of rebuilding the RF stage and mentions that he is thinking of having an RF stage and using gang condensers for band set and band spread.

Now with due respect to the fact that there are two sides to every argument, why have gang condensers at all? With gang condensers, to get the maximum from your receiver it is usual to have small variables across your main condensers, these being operated from the panel. Thus by my way of thinking you are not making the set any easier to operate but only result in that there are more knobs to play with.

Why not have a single midget across the oscillator

(Continued on page 10)

IN REVIEW

TECHNICAL BOOKS - - - - - - - RECORDINGS - - - - - - - - - - - - PRODUCTS

RECORDINGS

Among the popular hits listed for release are two from Victor Silvester, although entirely different combinations. His Jive Band play two old favourites, "The One I Love" with "There's Honey on the Moon To-night," on the reverse. His Ballroom Orchestra give us, strictly for dancing, two first releases, "Someone Is Thinking of You," Waltz ,and "Saturday Night is the Loneliest Night," Quickstep, a catchy tune which has already gained popularity from being heard on the radio.

Joe Loss and Orchestra also presents a first release and popular hit, "Little on the Lonely Side," with Jack Payne's Band playing "The Sun Never Sets On My Dreams."

From Felix Mendelssohn and His Hawaiian Serenaders we have two numbers, "Whispering," an old favourite, and "In the Still of the Night," the latter of course a famous Cole Porter number re-dressed in Beguine rhythm.

Among the vocals, Richard Tauber with Nancy Brown, sing "If You are in Love," the reverse side being "There are Angels Outside Heaven," in which Carol Lynne joins them. These two numbers are composed by Tauber.

Crosby Fans will be delighted with the long awaited recording of Bing's "That's an Old Irish Lullaby," which is backed by "The Day After Forever," with John Scott's Orchestra.

The Andrew Sisters make their appearance once more, this time singing "I Wish I had a Dime," and "Jack of All Trades."

Vera Lynn, with her orchestra, sings "The Happiest New Year of All" (Let's hope it is), coupled with "Estrellita" (Little Star).

George Formby with his Ukelele and Orchestra presents "Sentimental Lou," and "Blackpool Prom."

The many admirers of Flanagan and Allen will be delighted with a new recording by them, both first releases, "Dreaming" and "Flying Through the Rain."

For the Jazz and Swing Lovers, Duke Ellington and Jimmy Blanton (Piano and String Base) play "Body and Soul" and "Mr. J. B. Blues."

Bud Freeman and the Summer Cum Laude Orchestra play "Oh, Baby," and "Sensation."

Sidney Bechet, Soprano, Sax, Clarinet, Piano, Bass and Drums. (What, no vocal?) "Blues of Bechet," and "Sheik of Araby."

Benny Goodman and Orchestra, "Tuesday Night at Ten," and "Air Mail Special."

Van Alexander and Orchestra, "Night and Day," and "On the Road to Mandalay."

Harry Leader and Orchestra, "Southpaw Special," and "Cossack Patrol."

The Queensland State String Quartet will delight lovers of classical music with their brilliant first recording of the "Quartet No. 11 in D Minor," composed by Alfred Hill, a noted Australian who has a considerable number of compositions to his credit.

Noel Mewton-Wood, famous Australian pianist has recorded two rarely played, but warmly appealing Weber sonatas. No. 1 in C Major Op. 24 and No. 2 in A Flat Major Op. 39.

Technically and artistically these discs are worth adding to your record library.

Classical Music Lovers will be interested to learn that a Music Lovers' Club has been formed, and recorded music recitals are held every second Thursday night at 8 p.m. in the Victorian Music Teachers' Association Rooms. 4th Floor, Kelvin Hall, Collins Place, Melb.

The programmes and equipment are first class and those interested can ring Miss Findlay, F 3145 (daytime) and Mr. R. Dreyfus, Wind 4565 (evening) for further particulars. The next recital is on January 31st, 1946. Enquiries are welcome.

BOOKS

PRINCIPLES OF RADIO—Keith Henny.

This is the fifth edition of one of the standard manuals of radio first published in 1929 and periodically brought up to date since that year. The author, of course, is well known as the editor of our contemporary, "Electronics" (How to keep sweet with ye Editor, in one easy lesson).

The subject coverage of previous editions is too well known to require mention here, but the following will give an indication of the new material added:—Wave guides, velocity modulation tubes, F.M. Klystrons, U.H.F. techniques and apparatus, new chapters on measuring instruments, magnetic circuits, additional data on use of Kirchoff's Laws, power factor, filter circuits, differentiating and integrating circuits, pulses, transients, square waves, voltage and current regulator tubes, etc.

Mr. Henney has some interesting comments to make on BCL receivers—"Manufacturers of receivers have spent the energies and capabilities of their engineering departments in reducing the cost of receivers for the sake of mass production of low-priced units instead of in improving the tone fidelity of reproduction. So much distortion and noise are inherent in the average broadcast receiver that, if the frequency response band were widened out to reproduce what is available from the average broadcast transmitter, the receiver would be unsalable." Mr. H., you've said it! That is good, let's have some more. " . . . their output (BC Transmitters) is vastly beyond the capabilities of the average broadcast receiver to reproduce . . . devices of limited tone response full of distortion products which make the reproduced sounds quite unlike those picked up by the studio microphones."

Henney's "Principles of Radio" needs no recommendation, it stands on its own merit.

PRINCIPLES OF RADIO—Keith Henney (John Wiley & Sons Inc. N.Y. with Chapman & Hall, London, 1945) 522 pages 5 x 7 and index, 319 diagrams—31/6.

RADIO SERVICE TEST GEAR—W. H. Cazaly.

The illustrations and all but the first chapter of this useful little book appeared originally with very slight alterations as a series of articles in the "Wireless World" about two years ago, and those who had the good fortune to read those articles will appreciate W. H. Cazaly's knowledge of the subject of Test Equipment.

This is a very useful guide for those who desire to assert their individuality by building their own instruments. It forms a valuable introduction to the subject of Test Gear and will assist in gaining an understanding of the fundamental AC and radio theory which forms the background of the subject.

It is a guide only, explicit constructional details are not given. The author gives as a reason, amongst others, " . . . design data for all instruments mentioned are to be found in a large number of technical books and periodicals if people take the trouble to search for themselves—which is far better for their own radio education, than being told exactly where to look."

Sound advice, and Mr. Cazaly logically adds that the constuction of one's own gear, together with voracious reading of technical literature is by far the best method of improving one's knowledge of radio theory and technique. "The school of practical experience still charges extremely high fees, but in radio they are worth paying."

The subjects covered include: Standard Signal Generators and Test Oscillators, Output Meters and Attenuators, Valve Voltmeters, Testers and Bridges at AF for Inductance and Capacitance, Electrolytic Condenser Testing and Inductance and Capacitance at RF, Beat Frequency Oscillators, Valve Testers, and Multivibrators.

RADIO SERVICE TEST GEAR—W. H. Cazaly (Sir Isaac Pitman & Sons Ltd., London, 1945), 89 pages, 5 x 7 and index, 46 diagrams, cloth bound, 9/6. Copy by courtesy Technical Book and Magazine Co., Melbourne.

OUR FRONT COVER

MAINLY FOR "A" CLASS STATIONS.

All amateurs are vitally interested in making the most out of their licensed input, in other words in obtaining higher efficiency. The Philips TB1/100E, a graphite plate 100 watter is a valve which will operate in suitable circuits at better than 75% efficiency at 30 mc/s and is therefore ideal for 10 metre DX. When you can put 75 to 80 watts of your 100 watts input into an efficient antenna, you have the answer to the question of going places on ten. On the 50 mc band, too, a splendid performance can be obtained and the long life of these tubes at 50 mc/s as raw A.C. fed oscillators speaks volumes for the punishment they can stand.

GENERAL CHARACTERISTICS.

Filament, thoriated tungsten	10 to 10.5V, 2A
Amplification factor	23
Transconductance at 100 m.A	4200 Micramhos
Capacities, grid to plate	4.5 mmf.
grid to filament	3.5 mmf.
plate to filament	1.7 mmf.

DIMENSIONS AND CONNECTIONS.

Overall length—7⅞"
Diameter, including grid cap—2⅞"
Plate connection—Top of bulb.
Grid connection—Side of bulb.
Filament connection—Large pins to standard UX base.

FOR THE C.W. MAN A USEFUL RATING IS:—

Plate voltage	1000V.
Grid bias	—120V.
Plate current	100mA
Grid current	20mA.
Grid drive	5 watts.

When on plate modulated phone, a fixed bias of —30V is recommended ,and a grid leak of 8,500 to 10,000 ohms for operating bias. The grid drive of 75% efficiency is then 7 watts.

C.W. men sometimes like grid modulated phone as a side line; TB1/100E will give you 40 watts for 100 watts input on ten metres, with 1500V on the plate.

We have not yet had the chance to try them out on 166 mc/s, but as in self excited oscillators we can run at 1000V. with 54% efficiency, the outlook is favourable.

CORRESPONDENCE—Continued from page 8.

band set and have separate controls for the RF and Mixer stages? When chasing that weak signal we usually keep trying to peak up the signal on the RF and Mixer trimmers to try and get that little bit extra out of the set to bring the signal above the background noise. So where is the advantage of gang tuning condensers?

I could go on for hours on this subject especially on AVC and Crystal Filters—bet you that raises a howl—but I think that this is sufficient to start the ball rolling.

—Yours, etc.,

W. J. MEAD, VK5JM.

FEDERAL HEADQUARTERS

FREQUENCIES.—First important news to break since our last instalment of F.H.Q. notes was that of the frequencies allotted for our use immediately following reactivation. These frequencies are:—

28-29 Megacycles.
50-54 Megacycles.
166-170 Megacycles.
1345-1425 Megacycles.

So it looks as though for a time we will all be going VHF, which incidentally will do no harm.

It would be as well to explain, before we go any further, that our other bands are quite safe (with the probable exception of 160 Mx), but cannot be made available yet. The first of these will be 80, probably in about three months time, 40 and 20 to follow as soon as possible.

In the meantime all and sundry can set about deciding whether that proposed array for 166 Mc/s should have 20 elements or 120, and whether that pre-war 3.5 Mc/s rock will hit the 50 Mc/s band, how many racks full of doublers, triplers and so forth will be required (you know it would almost pay someone to go into the doubler business at so much per foot of panel—saw them off in the lengths required!).

And that 1400 Mc/s band—you fellows who have been playing around with Magnetrons and other assorted jitterbug bottles lately will be in your element—if you had the foresight to bring any of the said gadgets home with you. And who would have thought the crystal detector would ever come back into its own? How things change—or travel in circles maybe!

REGULATIONS.—Tucked away at the bottom of a page in the Comonwealth Gazette of 29th November, was a brief announcement—that copies of Statutory Rule No. 185 of 1945, Amendments to the W/T Regulations—were now available at the modest sum of fivepence per copy.

This was the news for which we have all been waiting, news that made the great industrial holdup a thing of but passing interest, a mere shadow of the backdrop (particularly in VK2 where of course a tthe moment of writing a certain amount of shadow is compulsory after 2100 hours.

The new provisions in our regulations are now public property and a resume will be found in this issue, what has for some time been off-the-record at FHQ is now there for all to read.

We take this opportunity to point out that it is the usual policy in all Government Departments to reveal nothing of any proposed regulations until they are gazetted, in this case Federal Executive was taken into the confidence of the Chief Inspector at the time the regulations were drafted, this being necessary so that we should have the opportunity to voice our opinions on behalf of all members. Naturally any breach on our part this confidence would have been most serious, so you will understand now why we have previously made no reference in this magazine, or elsewhere for that matter, to the final results of the proposals submitted by us to the Chief Inspector. Certain information did trickle out in other States, but it did not come from the Federal Executive.

Our friends at Treasury Gardens are now well into the task of dealing with those licence applications which you good people were so kind as to forward and any day now you can expect a polite request for the sum of one pound, being the fee now payable for all classes of licence issued under the W/T Act.

NEW EXECUTIVE MEMBER.—The existing Members of Federal Executive take this opportunity of welcoming Vaughan E. Marshall, VK3UK, to Federal Executive. Vaughan has been appointed in place of Bill Williams, VK3WE, who has now returned to the country.

THE COMING YEAR.—Many at this season recall the quotation made famous by the King in an Empire broadcast, "I stood at the gate of the year . . . "

To-day the world stands with mingled hope and misgiving at the gate of a momentous year, the first year of peace after the greatest calamity in the history of man. The clouds which came so suddenly have as suddenly gone, and man turns his face to the sun and the stars, and begins to build anew, as he has always done after the storm has passed.

To the Radio Amateur the gate of the year is opening on his beloved persuits, his lamp is the lamp of science and of comradeship, his ideal that of service without thought of reward. His fraternity has in the past years achieved notable things, his war record is cause for the honest pride that is born of satisfaction with a task well and nobly done.

Soon the ether waves will whisper his language again, carrying his mesage of good fellowship from town to town, city to city, and from one land to another, until the whole world shall know the Amateur is back.

May this year and the years to follow see the brotherhood of the radio amateur rise again to what it was be. fore, and become even greater, may the kings and the commoners, the politicians, and the people of the world learn at least a little from the great international link that is Amateur Radio.

OVERSEAS.—Late news has been received that the RSGB have been notified that the frequencies immediately available on the issue of Licenses will be:—28-29 M/cs; 58.5-60 M/cs; CW and Telephony to holders of pre-war licenses. Power 100 watts on 28, and 25 watts on 58. The same bands but 25 watts telegraphy only for the first 12 months will be available to pre-war A.A. licence holders (subject to Morse test by GPO).

EXTRACTS FROM AMENDMENTS TO THE WIRELESS TELEGRAPHY ACT 1905-1936, AND STATUTORY RULES 1942 No. 348, AS PERTAINING TO THE OBTAINING OF AMATEUR OPERATOR'S CERTIFICATES OF PROFICIENCY AN DTHE ISSUE OF EXPERIMENTAL LICENCES.

These Regulations were published in the Commonwealth Gazette, dated 29th November, 1945, copies of which may be obtained from the Sub-Treasury in each State.

The examination for a First Class Amateur Operator's Certificate of Proficiency shall be such as to show that a successful candidate posseses the knowledge and qualifications specified in this regulation, namely—

(a) A general knowledge of wireless telegraphy and wireless telephony and electrical principles.
(b) A knowledge of such of the Radiocommunication Regulations for the time being in force under the Telecommunication Convention and the Wireless Telegraphy Regulations as relate to the operation of experimental stations.
(c) Ability to send correctly, and to receive correctly by ear. in Morse code, a message in plain language at a speed of 18 words per minute.

The examination for a Second Class Amateur Operator's Certificate of Proficiency shall be such as to show that a successful candidate possesses the knowledge and qualifications specified in this regulation, namely—

(a) An elementary knowledge of wireless telegraphy and wireless telephony and electrical principles.
(b) A knowledge of such of the Radiocommunication Regulations for the time being in force under the Telecommunication Convention and the Wireless Regulations as relate to the operation of experimental stations.
(c) Ability to send correctly, and to receive correctly by ear, in Morse code, a message in plain language at a speed of 14 words per minute.

There shall be two classes of experimental stations, namely, Class A stations and Class B stations.

A licence for a Class A station may be granted to any person who—

(a) is over the age of eighteen years;
(b) is the holder of a First Class Amateur Operator's Certificate of Proficiency or such other certificate of proficiency in Wireless Telegraphy as is determined by an authorized officer; and
(c) has operated an experimental station for a period of twelve months to the satisfaction of an authorized officer.

A licence for a Class B station may be granted to any person who—

(a) is over the age of eighteen years; and
(b) is the holder of a Second Class Amateur Operator's Certificate of Proficiency or such other certificate of proficiency in Wireless Telegraphy as is determined by an authorized officer.

The licensee of an experimental station shall use his licensed equipment solely for the purpose of investigation or research into, or instruction in, wireless telegraphy.

Except as provided in regulation 29; the licensee of an experimental station shall not communicate with any station other than an experimental station.

When communicating with another experimental station, the licensee of an experimental station may transmit and receive only mesages of an unimportant character in plain language relating to experiments ,or consisting of remarks of a personal nature:

Provided that the licensee shall not use his station for the purpose of communicating with countries whose Administrations do not allow the transmission or reception of such messages.

The licensee of an experimental station shall not, in any circumstances, undertake the transmission or reception of messages for third parties.

The power (measured at the anode of the valve or valves delivering power to the aerial circuit) to be used in an experimental transmitting station shall not, except in such special cases as may be approved by the Minister or an authorized officer, exceed 50 watts in the case of a Class B station or 100 watts in the case of a Class A station.

The licensee of an experimental station shall install and maintain, to the satisfaction of an authorized officer, approved instruments for indicating accurately the power used.

Except with the approval of an authorized officer, the licensee of an experimental station shall confine his transmissions to continuous wave and telephone transmissions.

The licensee of a Class B station shall confine his transmissions to continuous wave emsisions for a period of six months from the date of commencing operations:

Provided that an authorized officer may waive this requirement in respect of any person who held a licence for an experimental station under the Wireless Telegraphy Regulations repealed by Statutory Rules 1942, No. 348, or in such other circumstances as an authorized officer may determine.

The licensee of an experimental station shall ensure that his transmitting equipment is always accurately tuned to the frequency on which he intends to operate and for that purpose he shall, unless exempted from so doing by an authorized officer, maintain, in good order. apparatus of a type approved by an authorized officer.

The licensee of an experimental station shall not, except for brief tests and adjustments, cause a carrier wave to be emitted from his transmitting equipment unless such wave is subjected to intelligible modulation.

The licensee of an experimental station shall employ

(Continued on page 16)

DIVISIONAL NOTES

NEW SOUTH WALES

The November General Meeting of the Division was held at Science House, Gloucester Street, Sydney, on Thursday, 22nd November. Again standing room was at a premium, but Members should take heart in the knowledge that January General Meeting would take place in the Main Hall, Science House, with ample seating accommodation for everyone

Chairman, in declaring the meeting open, extended a welcome to many visitors, including Mr. D. Wyles, Chairman of the Institute of Radio Engineers, Wing-Commander Meyers, and quite a number of other servicemen, whom we had not seen for some time.

A very interesting lecture was given by Mr. E. G. Beard, of Philips Electrical Industries. The majority of members present were amazed at the many and varied methods of producing Frequency Modulation, although not a great number of them would be applicable to Amateur Stations. At the conclusion of the lecture, the speaker was bombarded with questions as evidence of the interest shown. A very hearty vote of thanks was carried in the usual manner.

The Vice-President, Mr. E. Treharne, informed the meeting that it was a recommendation from Council that Life Membership be conferred on the Chairman for his services to Amateur Radio during the past years. The recommendation was unanimously adopted.

Quite a deal of discussion centred around the new Regulations, and whilst members were in favour of a majority of them, it was felt that quite a deal had been lost by making the A.O.C.P. harder to obtain, particularly from the point of view of the age increase. After much discussion, it was decided that F.H.Q. be approached with a request that the age limit for the granting of an A.O.C.P. be sixteen years.

YOU ARE REMINDED THAT THE JANUARY GENERAL MEETING, WHICH WILL BE THE 36th ANNUAL GENERAL MEETING OF THE DIVISION, WILL BE HELD AT SCIENCE HOUSE ON FRIDAY, 25th JANUARY, 1946.

Full Member	**£1/1/0**
Associate	**15/0**
Service	**7/6**
Student	**7/6**

VICTORIA

At the last monthly meeting of the Division held at the rooms on Tuesday, December 4th, there was a very large gathering of members and visitors. The atmosphere was

more tense and the meeting was conducted in some way different due to the subdued air of members than what has been previously noted. There appears to be some just reason for the said change, particularly since official notice has been received from the P.M.G.'s Department concerning the return of gear held in custody.

The discussions of the leftists have disappeared, and more so on this occasion possibly to make way for "Ears to the ground" attitude to take in all news of pending happenings. We hope that very soon, suspense will give way to celebration, lots of activity and happy DX hunting, etc. Also it is hoped that the foregoing will not interfere with the keenness displayed in attending meetings as in the past.

The welcoming of visitors and new members was efficiently handled by Max Howden, VK3BQ, who was in the chair, vice Harry Kinnear, VK3KN, earlier reported ill. In extending a hearty welcome to overseas and Interstate visitors, the following were named:—Major J. Squires, VK6JS; Capt. Cadell, VU2EB; H. Cullerton, VK2AIY; E. Treharne, VK2AFQ; E. Martin, VK2AHY; R. Torrington, VK2TJ; and A. T. Wishart, VK4WT.

New Members literally abound and the following applications are in the hands of the Membership Secretary: H. O. Kellas; J. K. Herd, VK3JK; W. L. Stevens; E. W. Martin, VK2AHY; G. Strachan; F. W. Hand, VK3YH; A. M. O. Atkinson; R. R. Jepson. VK3JI; J. H. Matthews; L. Spurrier; H. M. Walsh; and J. E. Groves.

The meeting was attended by over one hundred of the local Ham fraternity, and owing to a hitch caused by some reorganising there are no call signs included this month. The production of these notes is at present in the hands of another Syndicate—so bear with us, dear readers, as in taking over we have not yet caught up and have left some behind.

When FHQ Secretary rose to take the floor all ears went to ground. There was considerable listening to an eloquent flow of talk regarding the possibility of future doings, frequency allocations, restrictions and what not. (These details to be found elsewhere in the Magazine).

Another "highlight" of the night's proceedings was the presentation to this Division of an elaborate Field Portable Transmitter and receiver. This apparatus was very generously donated by the Director of Services Reconnaisance as a result of an approach made by Lt. Colonel Israael and Captain Cadell, VU2EB. The set was handed over by Capt. Cadell. The Chairman thanked Capt. Cadell and the donor on behalf of members, and spoke tribute in moving a vote of thanks. The said gear is extremely portable, efficient and will no doubt be appreciated by student members, who will be able to gain considerable experience in practical training to qualify in operating procedure, also for any other members keen on field communications.

This apparatus was donated by the Director because of his keen appreciation of the work of the Amateur Wireless Operators and their devotion to duty in the Army Signal Corps during the war. By this gesture, the Army has no doubt acquitted itself, very much to our benefit, of any obligation felt in this respect. This Division and all Amateur Operators should feel justly proud that their services, as such, should be recognised, and that the esteem is expressed by the splendid token.

Captain Cadell, VU2EB, who is a very diligent personality at the Division's monthly meeting, responded to the Chairman in such terms as to leave no doubt that he was as keen to play his role as the recipients.

The Federal Convention of the Wireless Institute of Australia is to be held during Easter Vacation period and all States are specially requested to work hard and fast on the Agenda to be submitted in time for that worthy period.

By the way! Where is George Thompson, VK3TH? Snow Campbell, VK3MR, did not give us anything, but he may have one ready for January? Could VK3YL be prevailed upon re that receptionist job on the ground floor, meeting nights? President Harry Kinnear, VK3KN, looks more robust than ever after operation and illness. Bob Anderson, VK3WY, is being very QRL with illness of daughter, Brier, and other Institute matters of great import. The foundations of Law Court Chambers will be shaken by other news concerning Vaughan Marshall, VK3UK, in FHQ circles. Forget what you read about George Thompson, we heard something, "Secret yet" you will soon know—so be patient.

The next General Meeting of the Division will be held at Law Court Chambers, Top Floor, 191 Queen Street, Melbourne, at 8 p.m., February 5th. Members and friends, in fact everyone interested in radio, is welcome.

We hope all our readers have survived Xmas happily, and trust you will enjoy a happy and undisturbed hunting for 1946.

WESTERN ZONE

ACTIVITY RESUMED.

The meeting was held at Hamilton on the 17th of November, 16 Hams and prospective Hams were present, and apologies were received from five other active members.

Proceedings commenced with a Dinner at the Victoria Hotel, a sumptuous three course repast, after which those concerned adjourned to one of the studios of 3HA (by kind permission of the management) and the business of the evening commenced in earnest.

Those present at the meeting were: 3FA, 3HG, 3II, 3QC, 3JA, 3TW, 3JX, 3TN, Messrs. Learmonth. Nayor, Palmer, Ferrier, McGrath, Ross, Woodburn. Apologies were received from 3NK, 3SC, 3YW, 3KJ, ex-3PG.

Naturally the first item on the agenda was the election of office-bearers for the ensuing twelve months, and resulted as follows:—

President: George (Tim) Wells, VK3TW.
Vice-President: Neil Templeton, VK3HG.
Secretary and Treasurer: Mort Riley, VK3TN.

Together with a committee consisting of Leigh Simpson, VK3II, Jack Sydow, VK3JX, and Brian Falkenberg, VK3FA.

Possibly the most important business of the evening resulted from a motion by Bruce Plowman, VK3QC, in the form of a recommendation as fallows:

"The Victorian Division of the Wireless Institute of Australia to accept views of this zone as to the ideal set up of the Wireless Institute of Australia.

"That organisation to be based on a Federal Headquarters with a paid secretary, to act as a nucleus of all V.K. activities, such Federal body to comprise an equal number of members from each State (irrespective of numbers of State membership). Said State divisional headquarters to consist of delegates from each zone and each State division to have a paid secretary. State and Federal headquarters to meet at predetermined regular intervals.

"The salaries of the above secretaries to be paid by means of a levy on all members of the Wireless Institute of Australia, or alternatively by higher subscriptions."

On a motion moved by Leigh Simpson, VK3II, the subscription to the Western Zone was fixed at 2/6 and also that only financial members of the zone be permitted to engage in the competitions at present being organised by the zone committee.

A motion submitted in absentia by VK3YW that C.W. abreviations be banned on phone was discussed at length and it was finally decided to adopt the motion by a majority vote, three voting against.

It was decided that immediately operations are commenced, code practice transmissions on a roster system would be inaugurated on frequencies to be fixed by the committee, and also that VK3WI be asked to provide marker transmissions at regular publicised intervals.

Many other matters pertaining to the Western Zone were discussed at length, including Vigilence Officers (.). Assistance to Hams and prospective Hams. Emergency operations.

A general meeting of the Western Zone is scheduled to take place at Hamilton three months after the resumption of operations.

The President spoke in moving terms of the great loss Amateur Radio in general and the Western Zone in particular has sustained by the untimely and tragic death of Gordon Templeton, VK3OW, at the conclusion of years of active service to his country.

QUEENSLAND

The last month has seen a good deal of activity here with quite a few chaps busy making their equipment perk on the higher frequencies, as it seems that we are to be allowed on there first.

At the November general meeting, the lecture promised by L. Rickerby, VK4VR, had to be postponed owing to that gentleman's absence from town on business. However, Herb. Sprenger, 4ES, rose to the occasion and regaled members with an interesting account of the Police Radio System. Herb. also outlined the problems to be overcome when establishing reliable high-frequency communication between fixed and mobile stations and the methods adopted in overcoming these unexpected difficulties.

Congratulations go this month to Arthur Walz who recently celebrated his marriage. We trust that you will return to Ham activity as soon as you are settled down, Om.

Plans are to be finalised at the next G.M. for a grand reunion to be held early in the new year, with the idea in mind of having both the re-union and a celebration of our newly found, or should I say restored, freedom.

By the time these notes are in print every Ham in Queensland will have received a letter inviting him to join the Institute. We are hoping for a good response from country men whom we are unable to contact personally.

OUR ACTIVITY.

4RY—Busy wiring up power supplies and dusting the dust off the rig. Has got to get an antenna up yet.

4RC—Doing an awful lot of listening on what must be an excellent receiver. Bob will have all the DX lined up ready for the big day.

4DY—Eric emerged from the dim and distant past and presented himself at the last meeting. Welcome back, Om.

4CZ—Just when we think that all the old Hams have come to life, along come these fellows and upset our theories. See you on the air sometime, Om.

4WT—If you see this, Willie, I'll bet you receive a surprise. Well, one of my spies saw you recently in Melbourne. How's business? (Says he's going to be a VK3—Ed.).

4EN—Eric, following a terrific initial outlay of energy, is now taking things a little easier.

4KO and the Ipswich gang.—How are things going, Om's? I was thinking that Ipswich would be a useful centre of co-operation in 56 mc. activity, so I hope some of you chaps are interested in V.H.F. activity.

4KH—Been building any more supers lately, Bill? or was the last one beyond improvement?

4AP—An old Ham who seems as keen as ever.

4ES—Wrongly reported recently as being in the south on holidays. He tells me it was just hard work.

4FB—Doing some good work sending along prospective members. Thanks, Fred.

4LP—Is in the Army up in Darwin doing Radar work. Hope you'll soon be with us, Om.

On the eve of resumed activity, it might be pertinent to give a little advice to newcomers to the Ham ranks, and to also give a reminder to old timers. The following words of wisdom are from the April, '39, QST, and for the use of, and the slight alterations to the text, my apologies are due to W4IR of the "Dixie Squinch Owl."

And the Lord said unto Moses: "Go ye up on top of the mount and receive the Ten Commandments." So Moses picked up his Ham gear and toted it up the hill. He set his coherer on a stump, put the cans on his conk, picked himself up a flat piece of rock, fished his hammer and chisel out of his pocket, cranked up his haywire and says "K." Then the lightning flashed and the thunder rolled and Moses said: "QRN, QRN, send louder please, there is Skip Distance." And the mount trembled and shook as Moses copied on the stones:

1. Thou shalt not make more than six dots for the letter "H."
2. Thou shalt sign thy call at least once every 100 CQs.
3. Thou shalt not have loud harmonics nowhere, nohow, notime.
4. Thou shalt not thump BCLs much.
5. Thou shalt not modulate over 300 per cent.
6. Thou shalt not say "R.R." when you didn't get it.
7. Thou shalt not shoot at local Fone men.
8. Thou shalt love the Ham that squawks all over thy freq. even as you do his'n.
9. Thou shalt always be a good W.I.A. member.
10. Thou shalt keep thy haywire in the ham bands so that thy days may be long in the call book.

SOUTH AUSTRALIA

The monthly general meeting, which took the form of a Social, was held on Tuesday, 11th December, at the Bohemian Cafe, when more than sixty attended. As a matter of fact, we were fortunate to have been able to hold the meeting at all, as the very next day severe lighting restrictions were imposed prohibiting the use of electricity at public gatherings!

The President, Mr. Ivor Thomas, VK5IT, opened the meeting and introduced the visitors, who were Major Sharland, M.C., Sq.-Ldr. H. M. Bain, VK3HB, representing the Air Force, the Superintendent of Wireless, Mr. Harrington, with Messrs. Pike and Thompson, representing the P.M.G.'s Department, and the President of the I.R.E., Mr. Don Gooding. Apologies were received from Professor Kerr-Grant and Capt. Darby.

In the course of some brief remarks, the Chairman traced the progress of the Institute since its re-establishment from scratch, last July, to the present membership of 135.

Major Sharland then gave a talk on his experiences in the Securities Branch during war time. He made some remarkable disclosures of espionage in this State, which was the Headquarters for Australia of the enemy's organisation, and traced its activities back almost to the last (1914-1918) war. It was certainly an eye-opener to most of us to hear of all that had gone on and also gratifying to know that our own side were very wide awake to what was happening.

The toast of the P.M.G.'s Department was proposed by the Secretary, Mr. Barbier, VK5MD, and Mr. Harrington, in responding, paid a glowing tribute to the war effort of the Amateurs in the services and also in A.R.P. and Listening Post work. He then gave the latest information on the license position and explained the salient points of the new regulations. He was afterwards besieged with questions by members seeking further details affecting their own particular cases.

Mr. C. H. Baseby, VK5BZ, proposed the toast of the visitors, and Sq.-Ldr. Bain, who replied, also praised the Amateurs and sketched their value to the R.A.A.F., particularly in the earlier stages of the war when very few other skilled technicians and operators were available.

Among those present and welcomed back to the Institute were Sq.-Ldr. Harry Wheeler, D.F.C., (VK5HW), Flt.-Lt. J. C. Jemmison, D.F.C., Flt.-Lt. Clem Tilbrook, VK5GL, and Mr. H. E. E. Brock.

The Technical Committee, which was proposed at the previous general meeting, has now been formed and consists of Mr E. P. McGrath, VK5MO, Chairman; and Messrs. H. M. Brown, VK5MB; S. R. Buckerfield, VK5DA; A. C. Smythe, VK5MF; and A. F. Wreford, VK5DW. The Committee is available for advice and instruction on technical matters, and members are accordingly invited to write to the Committee, c/o Secretary, of their problems.

The next meeting is to be held on Tuesday, 12th February, at 17 Waymouth Street.

TASMANIA

This Division's monthly meeting took place at 8 p.m. on Wednesday, 5th December, at which 22 members were present.

Council Members met at 7.30 and dealt with the bulk of the business. Present were VK7LJ in the chair; VK7BJ VK7CW, VK7ML, ex-VK3LL, and VK7PA. Apologies were received from VK7CJ.

Several new nominations were dealt with and the essential matters prepared for the General Meeting which followed.

A comprehensive list of FHQ's proposals for Regulations and the attitude taken by the various Divisions and the P.M.G.'s Department was read and appreciation of the Federal Secretary's thoroughness was expressed. A minute was recorded expressing the Divisions appreciation.

Satisfaction was expressed at the notice of immediate frequency allocations, for although limited they show that we are not being left out and allow us to get under way as soon as licences are issued.

At the general meeting many new Hams were evident amongst those present and the President welcomed the returned men back into civil life.

VK7CM was congratulated on his being selected as one of Tasmania's Rhodes Scholars. Charlie secured his Degree of B.E. at the Tasmanian University in 1942, and of 25 subjects secured 16 high distinctions, and 8 distinctions as well as many prizes and scholarships. From January, 1943, he served in the Forces on Radar work in Australia and the Islands, and carries two pips. The good wishes of all are with him.

Three members were selcted to represent the Institute on the new committee which is to replace the old Vigilance Committee. On the recommendation of the Council one selection was from Council and two from non-office bearing members. Although this job is one that is not relished like many others, it has to be done; and it is hoped that full co-operation will be forthcoming from all concerned.

Owing to our next meeting night falling on the 2nd of January, it was decided to hold it on the following Wednesday the 9th of January, to enable any who would be absent over the New Year to have a chance of attending.

At the conclusion of the meeting, a number of receivers were produced and a discussion took place on this very open question. Three commercial models were made available—two Australian constructed, an S.T.C. and an A.W.A. Communications receivers were amongst the collection, as was a Halicrafters 1938 model.

Comparisons were made and much noise endured, due mainly to the locality, and by the general interest shown it would seem that some bank rolls may suffer a setback, or worse still a mortgage may be the outcome.

The pros and cons of crystal filters, noise suppressors, band spreading, and what not were discussed vigorously; and as an outcome it would appear you can have, needn't have, don't need, some, any, all more or less of them, take your pick, but the most inspiring point to the unfamiliar one was the number of knobs and buttons that the panel of each displayed, almost as bad as a modern bomber.

The exhibited contrast of a small home built 3-tube super was also put through its paces and showed great promise. In all, the gear displayed was much appreciated and gave the meeting just what it takes.

The pros and cons of Heterodyne Frequency Meters is on the programme for the next meeting, and it is hoped that this subject will be of equal interest.

VK7 regrets that we have not as yet been allotted a band suitable for interstate contacts, but wishes all happy hunting on the frequencies allocated and prosperity in the New Year together with the hope for contacts in the not too distant future to renew old acquaintances and to make new ones.

F.H.Q.—Continued from page 12.

in his transmitting equipment such circuits, devices or methods as will ensure freedom from the effects of frequency variation (other than necessary modulation), harmonics, key impacts or other unessential emissions.

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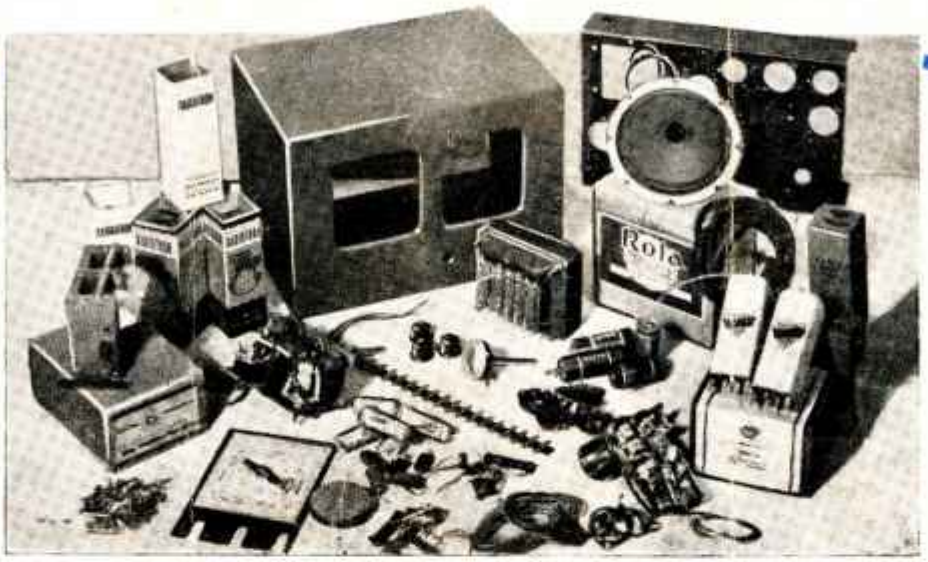

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FEBRUARY 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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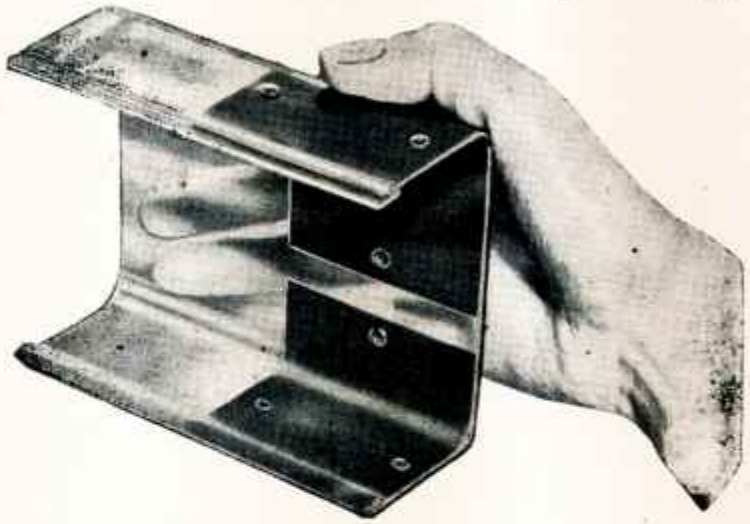

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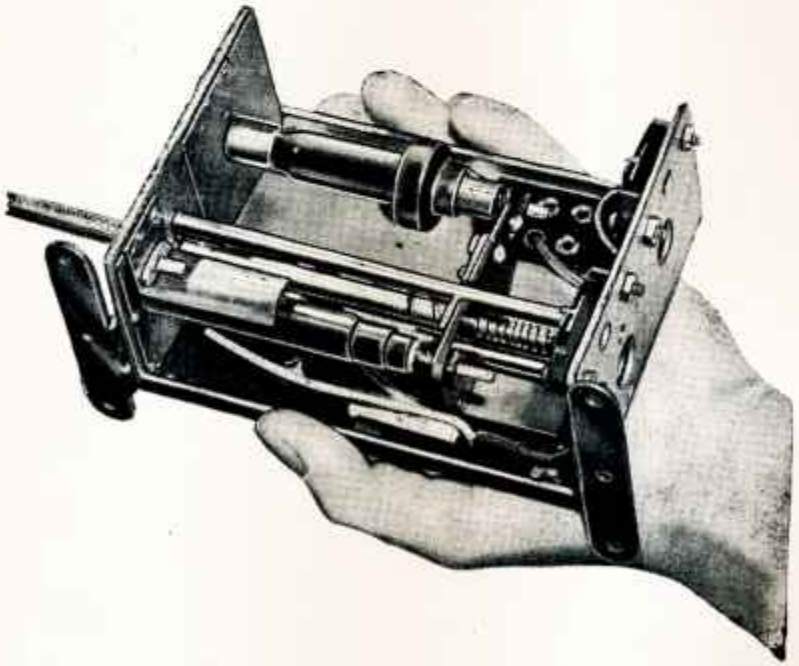

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AMATEUR RADIO

VOL. 14 FEBRUARY, 1946 No. 2

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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W. J. LEWIS
20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

The Federal Convention has been fixed for Easter to be held in Melbourne, the dates being Friday, 19th; Saturday, 20th; Sunday, 21st and Monday, 22nd, April.

As there has been no Federal Convention since 1939, this Convention may well prove to be the most important in the history of the Wireless Institute of Australia, and it behoves each Division to do their utmost to send a delegate.

Divisions are recommended to thoroughly consider the whole internal mechanism of the W.I.A. and to place any changes in constitution, etc., which they may consider necessary, on the Agenda.

It is then the duty of each Division to study carefully and discuss items on the Agenda, so that their Federal Councillor may obtain the feeling of the Division on any particular matter.

It is believed that in the past Divisions have instructed their Federal Councillor to vote "yes" or "no," leaving him no power to exercise his discretion.

This is an undesirable state of affairs, for Federal Council may place a completely different interpretation on that matter, and although the Councillor, already instructed how to vote, knows that his Division would agree—he has no alternative but to vote against it.

It should be left to the Federal Councillor to make the decision after the matter has been thrashed out by the Convention.

IN THIS ISSUE

The Federal Constitution

The Wireless Institute of Australia will hold a Federal Convention in Melbourne at Easter this year, the first for six years. It is believed that the Federal Constitution will come up for considerable discussion at that Convention, and acting on a suggestion we are publishing the existing Constitution, so that Members may acquaint themselves of what the Constitution contains.

(As adopted, confirmed, and ordered to be distributed by the Fifteenth Annual Convention of the Institute holden in Melbourne, April, 1939).

1. NAME: The name of the Institute shall be "THE WIRELESS INSTITUTE OF AUSTRALIA."

2. OBJECTS: In general the objects of the Institute shall be to further the interests of wireless development in every way. The objects of the Institute are set out in further detail in the Articles of Association or Rules of the respective divisions.

3. CONSTITUTION:

(1) Divisions.

(a) The Institute shall consist of Divisions, one of which shall be located in each Wireless District, as constituted under the Wireless Telegraphy Act, 1905-1919, or any other Act amending or in substitution for the same. The Government of these Divisions shall be entirely domestic.

(b) Each Division shall consist of all Members, Associate Members, Junior Members, Associates, Student Members, Honorary Members, and Life Honorary Members elected or appointed in each Wireless District as aforesaid.

(2) Federal Executive.

(a) Federal Executive shall consist of: a Federal President, a Federal Vice-President, and a Federal Secretary, and any other officers, not exceeding two in number, and shall be appointed to specific positions from among the members of the Division, which is from time to time appointed by the Annual Convention, to be H.Q. Division. The appointment of these Officers by this Division shall be ratified at the Convention, or by vote of the Divisions, within one month after Convention. Such Officers shall hold office, until the next succeeding Convention, provided that in the event of a vacancy occurring in the Federal Executive by resignation or otherwise, it shall be competent for the H.Q. Division to appoint a successor. The said Federal Executive to be located in the one Division for not less than two consecutive years.

(b) The said Federal Executive shall carry out the directions of the Federal Council and shall, subject to such directions, be the body which shall carry into efect the policy of the Institute.

(c) The Federal Executive shall have the right to require any Division to do or omit to do any action if the performance or omission of performance of such action is deemed necessary or expedient in the interests of the Institute. The Division concerned shall have the right of appeal to the Federal Council hereinafter mention if such Division considers that the requirement of the Federal Executive is unwarranted or unnecessary. The decision of the Federal Council in this respect shall be final and binding on all parties: Provided that neither the Federal Executive nor the Federal Council nor any individual member of either such body shall be liable for damages or for civil or legal action in respect of the exercise of any powers herein conferred.

(d) The Federal Executive shall submit at each Convention a report of its activities since the last convention

(3) FEDERAL COUNCIL.

(a) The Federal Council shall consist of one member from each Division who shall be elected by a majority of the members of such Division. The said Federal Council shall also include the Federal President, Federal Vice-President, and Federal Secretary. In the event of an equality of votes, the Federal President or Chairman, shall have the right to exercise a casting vote; but the Federal Vice-President and Federal Secretary shall be non-voting members.

(b) It shall be the duty of such Federal Councillor to record the vote of his Division on all matters referred to.

(c) The Federal Council shall have a definite mandate from all Divisions to execute or handle all matters referred to it by any Division and also all matters of a Federal nature and matters likely to affect more than one Division.

(d) All Divisions shall be required to advise the Federal Executive through their Federal Councillor of decisions, within a period of six weeks.

(e) The Division shall appoint a Federal Councillor, who shall hold office at the discretion of his Division. F.H.Q. shall be notified of such appointment at least seven days prior to each Convention. Any change in Councillor shall be immediately notified to F.H.Q.

4. MEMBERSHIP:

(1) Membership of the Institute shall be divided into grades as provided in the Articles of Association or Rules of the various Divisions.

2. (a) Within one month after the election, promotion, appointment or resignation of any person to or from any grade as prescribed in the Articles of Association or Rules of the respective Divisions such Divisions shall submit to the Federal Executive the name, address, grade of membership, and any other special particulars of such person. The Federal Executive shall keep a roll of Members of all grades.

(b) It shall be required that all Divisional Secretaries shall forward Federal Executive yearly, a statement showing numerical strength of his Division. These statements must be received by F.H.Q. by the 31st December in each year.

5. CONVENTIONS. There shall be held once in each year a Convention of the Federal Council or duly appointed proxies for the members thereof. Such Conventions shall be held at such times and in such places as the Federal Council shall decide. At such Conventions all matters submitted by Divisions or by the Federal Executive shall be discussed. Such matters shall be listed on an Agenda Sheet which shall be sent by the Federal Executive to each Division not later than one month before the date set down for the Convention. All decisions of the Conventions shall be binding upon the Institute and upon all Divisions and members thereof. All such decisions shall be circulated to all Divisions as early as possible after the closing of such Convention, and in any case not later than two months after such Convention.

6. PROXIES. In the event of any member of the Federal Council being unable to attend personally at any Convention it shall be competent for the Division concerned to appoint some other member of the Institute to act as proxy for the Division for the purpose of attending and voting at such Convention. All such appointments of proxies shall be in writing and shall be in duplicate, the original being given to the proxy so appointed and the copy to the Federal Executive. No proxy so appointed shall have any powers other than to act for the Division so appointing him at the Convention for which he is so appointed, and the appointment shall automatically lapse at the close of the Convention for which he is appointed unless the appointment shall have specifically authorised the said proxy to act for any longer period. Notwithstanding any such appointment of a proxy the member as proxy for whom he is appointed shall have the full rights, privileges, and duties of his position as a member of the Federal Council during the currency of such appointment of such proxy other than those of acting at such Convention. The appointment of any proxy may be cancelled by the Division so appointing him at any time by notice in writing sent to the proxy and to the Federal Executive. No proxy shall have any greater powers, rights, privileges, or duties than those of the member as proxy for whom he is appointed.

7. VOTING: At Conventions voting shall be by a show of hands or, if any member so desires, the Chairman shall direct that the vote be by secret ballot. The members of the Federal Council (or their duly appointed proxies) appointed by Divisions shall have the right of voting at Conventions. Provided that in the event of an equality of votes the Chairman shall have a casting vote.

8. QUORUM. At Conventions two-thirds of those entitled to vote as herein prescribed shall form a quorum.

9. FINANCE. The funds of the Federal Council shall be controlled by the Federal Executive, subject to any direction of the Federal Council. All receipts shall be placed to the credit of an account in a duly recognised bank and withdrawals shall be made upon the signature of the Federal Secretary and the Federal Treasurer of the Federal Executive appointed by the Federal Council. The books and accounts of the Federal Council shall be subject to audit by an auditor duly appointed. Such audit shall be made each year prior to the Annual Convention and a report upon the audit shall be submitted to the Federal Council for consideration at the next ensuing Annual Convention.

10. CAPITATION. At the close of its financial year, each Division shall forward to the Federal Executive, an amount equal to 1/- per member, by way of capitation fees.

11. DIVISIONAL RULES: Each Division shall furnish the Federal Executive with two copies of the Articles of Association or Rules of such Division and shall within one month after any amendment has been made in such Articles of Association or Rules furnish the Federal Executive with two copies of such amendment. All such Articles of Association or Rules and any amendment thereof shall be in accordance with the policy of the Institute.

12. AMENDMENTS: Amendments to these Rules shall be made only after notice of motion shall have been given to the Federal Council by any Division. Such notice of motion shall be referred to all Divisions by Federal Executive and the decision of the Divisions shall be communicated through their Federal Councillor to the Federal Executive within six weeks after the date of the notice referring the notice of motion to such Divisions. It shall be necessary for two-thirds of the Divisions to vote in favour of the motion before it shall be deemed to have been carried. Any Division not recording its decision within the period of six weeks as aforesaid shall be deemed to have voted against the motion. Upon the receipt of the decisions of the Divisions or after the expiration of the period of six weeks as aforesaid whichever shall be the sooner, the Federal Secretary at the discretion of the Federal Executive shall notify all Divisions of the result of the voting by Divisions. Upon such notification the amendment, if carried, shall become and be a part of these rules.

13. OFFICIAL ORGAN: The Official Organ of the Institute shall be the Institute's own monthly magazine —"Amateur Radio." No Division of the Institute shall accept or use as its official organ, any other radio newspaper or radio magazine, either in conjunction with, instead of, or in addition to, the Institute's magazine "Amateur Radio." This shall not preclude the issue of Divisional bulletins.

14. EFFECTIVE DATE: These Rules shall come into force and have full effect as from the tenth day of April in the year of Our Lord one thousand nine hundred and thirty-nine.

AMERICAN AMATEUR TRANSMITTER TEST

The following information is taken from the current issue of "Radio."

"The 1st annual Amateur Transmitter Contest is being inaugurated by Taylor Tubes Inc. of Chicago, Illionois, together with nine other radio-component manufacturers participants as an expression of appreciation for the outstanding work done by the thousands of Servicemen in the Communications branches of the military, and the many amateur radio operators, or 'hams.'

"The prizes consist of two transmitters, designed by the contestants complete from microphone to antenna post, plus 1125 dollars in Victory Bonds, furnished by the participating manufacturers. Two prizes will be awarded; one in final power input classification up to 250 watts, and the other in the power input classification of from 251 watts to 1000 watts. The closing date is February 15, 1946."

No details of the actual contest are given, but one surmises that the entries are to consist of a design of a transmitter.

Australian radio component and tube manufacturers could well follow suit and inaugurate a similar contest for the benefit of the Australian Amateur—Editor.

R.C.A. TO CONDUCT WIDE BAND TESTS

R.C.A. has received F.C.C. construction permits and licences for four new experimental class 2 portable stations to develop and test a system of wide band, multichannel radio-communication, and to conduct other related experimental operations. In addition to observation on equipment performance, propogation on s-h-f will be studied under actual operating conditions. Analysis will cover horizon transmission path capabilities, diurnal, atmospheric and other influences on the communication ranges; characteristics during magnetic disturbances and lightning storms; seasonal variations in propogation with particular reference to refraction effects.—"Communications."

Receiver Design for 28 Megacycles and Upwards

* By J. K. RIDGWAY, VK3CR

We have received many requests for an article dealing with the problems associated with reception on the 28-29 mC band, from Hams who have been endeavouring to make their pre-war receiver work with some semblance of efficiency at these frequencies.

Now this is rather a large matter to be dealt with in one short article, so it has been decided to feature a series on the subject, dealing with both the theoretical aspect, and the practical design and constructional requirements. In this latter respect, two very efficient converters are in process of development and will be described shortly, whilst a complete receiver for 28 mC and upwards is being designed. This receiver is to be built around an intermediate frequency channel operating somewhere in the vicinity of 3-5 mC. It is hoped to be able to arrange for the manufacture of transformers of this frequency.

Most receivers designed for operation on lower frequencies fail to come up to expectations on 28 mC. Chief disadvantages appear to be, poor image ratio, low signal to noise ratio coupled with high inherant noise level, general lack of sensitivity, etc. Let us consider firstly the problem of image ratio. Image ratio is a direct function both of the intermediate frequency and the selectivity of the signal circuits. For any given intermediate frequency the mixer tube has a choice of two signal frequencies to produce the desired beat. Let Fs. represent the signal frequency, Fo the oscillator frequency and Fi. the beat or intermediate frequency. Then Fs. plus Fo. equals Fi, and Fs. minus Fo. also will equal Fi. In the case of 465 kC intermediate frequency, it does not require much calculation to see that two signals 930 kC apart can produce the desired beat. The use of 465 kC in present day receivers is a compromise between the selectivity and gain obtainable at the lower frequency and image ratio. On the lower frequencies it would be a simple matter to take care of this matter by simply increasing the selectivity of the signal circuits, but on 28 mC it is a different matter. Due to various causes, chiefly the damping effect on the tuned circuits by the low input resistance of the average R.F. pentode at this frequency, selectivity at 28 mC is particularly hard to come by. Obviously then, the solution lies in the use of a higher intermediate frequency. If a really good image ratio is desired, 3000 kC is to be recommended. The use of a higher frequency I.F. also removes another trouble which is very prevalent at the higher frequencies, that is locking of the oscillator with the signal frequency. Unless the isolation between mixer and oscillator input grids is good there is a tendency for the oscillator frequency to "pull in" with the signal frequency. The increased separation given by the use of 3000 kC intermediate frequency will overcome this trouble. The disadvantage of the use of the higher frequency I.F. lies in the reduced gain obtainable. It is usually necessary to use two or more stages of amplification to provide sufficient overall gain. The use of some of the newer high transconductance tubes such as 1852, 1853, 7G7/1232, EF50, etc., offer a satisfactory means of obtaining some of this amplification, for, although these tubes have a low input resistance with consequent associated damping of the input circuit, we can put up with a certain amount of this here. One very excellent idea which has gained a fair amount of prominence overseas is the use of two intermediate frequencies. Following the mixer tube there is a stage of I.F. at, say, 3000 kC, this takes care of the image response Then comes another frequency converter which changes the frequency to 465 kC. If a crystal filter is fitted here the problem of selectivity can be overcome. Although somewhat extravagent in the use of tubes, an I.F. system is obtained which fulfills all requirements. Care would have to be taken to ensure that stability was maintained.

*Technical Editor—"Amateur Radio."

REQUIREMENTS FOR GOOD R.F. DESIGN.

Possibly the most common cause of failure to obtain good results from the R.F. end of the set at 28 mC and upwards is the use of unsuitable tubes. Standard type R.F. tetrodes and pentodes exhibit a very troublesome fault; that is, as the input frequency increases, so the grid input resistance decreases. It is quite beyond the scope of this article to describe in detail the reasons for this. Suffice to say that the main cause is due to what is known as "Electron transit time" losses. On the lower frequencies the time taken for an electron to travel from cathode to plate is but a very small fraction of one cycle of the applied input voltage waveform. Consequently the alternating current flow in the grid circuit due to the passage of electrons through the grid wires from cathode to plate, is almost entirely capacitive and leads the grid voltage producing it by a phase angle of 90 degrees. Hence there is no absorption of power in the grid circuit and grid input resistance is very high. As the frequency increases, the transit time of an electron from cathode to grid becomes an appreciable fraction of the grid voltage cycle. This causes the current flow in the grid circuit to be delayed and the grid current leads the grid voltage by an angle less than 90 degrees. In other words, a conductance component is introduced into the grid input admittance. This conductance increases as the frequency increases. Now every Ham knows that an increase in conductance means the same as a decrease in resistance. Therefore with normal types of valves having wide electrode spacings and consequently long electron transit time, the grid input resistance at 28 mC is very low. For types 6J7, 6K7, 57, 58, etc., the input resistance at 28 mC is of the order of 20,000 ohms. Now no sensible person would go to the trouble of designing and constructing an LC circuit of high Q and then deliberately shunt it with a 20,000 ohm resistance, which is virtually what we do when we use standard receiving tubes at 28 mC. Do not be misled by the figures and characteristics quoted for types 6AC7/1852 and 6AB7/1853 tubes. On first examination it would seem that these types offer the perfect solution to the problem. But unfortunately high transconductance in R.F. pentodes is accompanied by low grid input resistance. Consequently these tubes have about the lowest input resistance of any standard tube, with the result that the tuned circuit is damped to such an extent that selectivity is practically non-existant, and the effect of high Q LC circuits is almost entirely destroyed. The high tranconductance of these types does however compensate to a small degree for these effects, but the only really satisfactory way out is to use tubest having small interelectrode spacing such as the acorn types or the newer bantam eries types 9001-9003. Reference to Table 1 will show the difference in input resistance between standard and acorn tubes. Even at 14 mC there is ample justification for the use of acorns.

INPUT RESISTANCE IN OHMS.

Frequency	954-9001	6K7-6J7	6AB7/1853	6AC7/1852
7 mC	4,080,000	220,000	189,000	118,000
14 mC	1,020,000	71,400	59,000	33,700
28 mC	255,000	21,000	16,900	9,505
54 mC	63,700	5,850	4,530	2,360

(Continued on page 8)

An Economical Ten Watt Audio Amplifier

*By R. J. COLLINS, VK3OI

Here is an economical ten watt amplifier using a minimum of parts, yet capable of excellent fidelity. Just the thing to have around the shaek for experimental work. It is also capable of plate modulating inputs of twenty watts R.F. and would be just the thing for grid modulation of the hundred watt final.

Most Amateurs and experimenters can find a use for a good, economical and simple ten watt amplifier. Such a size is convenient for use as a high-fidelity radiogram or radio-receiver amplifier, public address amplifier, or modulator for a low-power radio-phone transmitter.

The amplifier to be described uses two 6V6GT tubes in push-pull, Class AB_1, fed by a 6SN7GT degenerative phase-inverter. Once section of the 6SN7GT is used as the phase inverter, and the other is available as a pre-amplifier. Alternatively a 6C5G, 6F5G, or 6J5GT can be used as the phase inverter; other triodes are also suitable. The plate supply voltage for the amplifier is only 250 volts at approximately 90 ma. The voltage gain of the amplifier from the input of the phase inverter tube (V2) to the input of the two 6V6GT tubes is 25 times, so that an input of 4 volts (rms) to the grid of the phase-inverter is sufficient to load the amplifier to full input.

A conventional duo-diode-triode such as a 75, 6Q7G, or 6B6G as used in the detector first audio stage of a receiver, or the extra section of the 6SN7GT, if this tube is used as a phase-inverter, is capable of supplying sufficient input to the grid of the phase-inverter to load the amplifier to full output. The pre-amplifier tube, marked V1 in the diagram, may have a potentiometer volume control in its grid circuit, and the input may be the output from the detector of a radio receiver, crystal microphone, or pick-up.

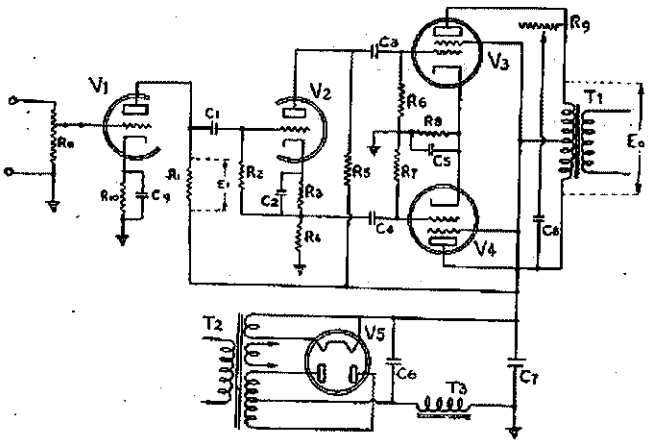
Referring to the circuit (Fig. 1), the output of V1 feeds V2, which is conected in an inverse-feedback circuit. The output of V2 is split so that the voltage applied to the grids of the two 6V6GT tubes is separated by a phase-angle of substantially 180 degrees. (This effect is similar to that obtained with an interstate transformer having a centre tapped secondary winding). V2 may be any one of a number of triodes, proviled the correct bias is applied by use of a suitable cathode-bias resistor. The gain of V2 is nearly independent of the tube type, because of the large amount of inverse feedback used.

In this circuit one half of the output of V2 is fed back to the input of V2. The stage gain with feedback is:

$$Gf = \frac{Go}{1 + n\,Go}$$ where Go is the gain of the stage without feedback and n is the fraction of the output voltage fed back to the input. Thus when V2 is a 6SN7GT, Go = 16 and Gf = 1.78. With V2 a 6SN7GT grid current does not flow until the peak value of the signal is approximately 40 volts.

This phase-inverter circuit has a practical advantage in that the effects of possible variations between tubes in position V1 affect the input to each 6V6GT tube by the same amount. Because of inverse feedback and this particular phase-splitting circuit arrangement, variation between tubes in position V2 also have little effect on the symmetry of the input voltage to the grids of the 6V6GT tubes. For this reason specially selected tubes are not required, and age-ing of the tubes does not unbalance the circuit to any noticeable extent.

*Collins Radio, Lonsdale Street, Melbourne.



PARTS LIST.

V1-V2—6SN7GT.
V3—6V6GT.
V4—6V6GT.
V5—5Y3G.

C1-C3-C4—.015 mfd 400v. (.02 also suitable).
C2-C5-C9—10 mfd 20v. Electrolytic.
C6—8 mfd. 525 Peak volt electrolytic.
C7—24 mfd 350 Peak volt electrolytic.
C8—.03 mfd 400v.
R1—.1 megohm ½ watt 10% tolerance.
82—1.0 megohm ½ watt 10% tolerance.
R3-R10—7000 ohm ½ watt 10% tolerance.
R4-R5—.125 megohm ½ watt 10% tolerance.
R6-R17—.25 megohm ½ watt 10% tolerance.
R8—165 ohm wire-wound ½ watt 5% tolerance.
R9—50,000 ohm Potentiometer.
R11—½ or 1 meg. volume control.
T1—Output transformer, centre tapped: 10,000 ohms impedance, plate to plate.
T2—60 watt power transformer. Secondary 260-0-260v. rms at 100 milliamperes.
T3—10 henry choke, about 100 ohms resistance.

From Table 1 it will be seen that the rise in d.c. plate and screen currents with power output is small, approximately 16 ma., hence a power supply with relatively poor regulation may be used without noticeable loss in power output. This, plus the fact that a d.c. supply of only 250 volts is required reduces the cost of the power supply, and makes power available for other tubes, such as r.f. and i.f. amplifiers if such a supply is at at any time needed.

The savings from this economical amplifier and power supply might well be put into a good permag speaker—one with a magnet of from 20 to 40 ounces and capable of taking power inputs averaging 5 watts with peaks up to 10 watts. It is manifestly absurd to have a good amplifier feeding an inadequate reproducer.

The conventional dynamic with a field coil, normally used as part of the power supply filter is not recommended for these reasons:—

(Continued on page 11)

FEDERAL HEADQUARTERS

CONVENTION. It has now been decided to hold the 1946 Federal Convention in Melbourne at Easter, which this year falls late in April, Good Friday, which will be the first day of the Convention, being the 19th April. It is hoped that each Division will be able to send a delegate rather than have to rely on a proxy, which arrangement, with all due respect to those gentlemen, is rather unsatisfactory. We feel, and we are sure the who have in the past consented to act in that capacity, members of the Institute will agree, that the first post-war Convention should be a fully representative one, and with a view to easing the difficulties of visiting delegates we recently asked the Victorian Division to call for volunteers among its members to act as hosts to the delegates ,the idea being, of course, that several members should each provide accommodation in their homes (if any) for one visiting member. The response, we are pleased to report, was most gratifying, and we are now able to say that the accommodation problem is solved. Now we have only to swindle reservations on trains and/or planes for our Interstate friends. We know from wartime experience that such is not impossible.

Of great importance at Federal Conventions is the matter of Agenda Items. Divisions have been asked to forward these in time to reach FHQ not later than 1st March, so if any members have any ideas suitable for consideration at the Federal Convention they should contact their Divisional Secretaries without delay so that these already overworked people will have time to place suggestions before their Divisional Councils. We would like to remind you that the Wireless Institute of Australia is a wholly democratic affair, and therefore your ideas are just as welcome as the next fellow's, and entitled to just as much consideration.

MEMBERSHIP. We are able to announce that the Divisions which more or less faded out during the war are now once again on a solid footing. The rise in membership in these Divisions during the past few months has been most gratifying, and if present figures are any indication the Institute can look forward to a very high percentage of Australian Hams being members in the future. Which after al lis os it should be—every Ham should be a member.

Although we do not like to make comparisons, and to do so without consideration of the numbers of potential members available, we consiler that the efforts of the enthusiasts responsible for the re-organisation of the South Australian Division, are most noteworthy. Since last June, when this Division's membership was to all intents nil, the figure has risen to the rather surprising total of 152. When compared to the present totals in New South Wales—around 290—and in Victoria —334—we think you will agree that the VK5 gang are deserving of the heartiest of congratulations. Good going, VK5 .and we hope you can keep up the good work.

Figures from the other "little brother' States are also cause for much satisfaction, starting from scratch, Tasmania has in the same time found 28 members among the very limited supply available in the Apple Isle. while up the Brisbane Line the Queensland Division has been able to net 65 members during the same period. Figures from the West are not yet available, but we have no reason to believe that the W.A. Division total will be any less satisfactory, local competition notwithstanding.

We note in passing, not, let it be said, in any way in connection with the above pleasant remarks (and without inference) that the smaller Divisions seem to be the first to come forth with their per capita payments!

BROADCAST. About 10th January, the Department of Information in Melbourne received a cable from United Press (U.S.A.) asking for information about the return to activity of Australian Hams. After cabling a reply setting out our temporary frequencies and advising that the re-issue of licences was in progress it was decided by D.O.I. that a short broadcast on the overseas service might go over well. A seven minute feature was decided upon and Alan Stowe, VK3AS, being a member of the technical staff of the A.B.C. was asked to assist. Alan, with the assistance of FHQ, promptly produced the required screed in professional style and record time. The result was not a seven minute but a sixteen minute feature which was radiated in the North American, British and South East Asia transmissions on Friday the 18th and Saturday the 19th of January. The script commenced with a few introductory CQ's sent on the A.B.C.'s only buzzer, followed by a commentary read by well-known War Correspondent, Bob Burns, and rounding off with a short three-way interview between VK 3AS, VK3DH as an active Ham. and VK3VX as the Federal Secretary of the W.I.A. We regret that space limitations make it impossible to reprint the full script, but we publish herewith, by courtesy of the Department of Information and the Australian Broadcasting Commission, the commentary given by Bob Burns.

Among the first people affected by World War Two in this part of the globe were the Australian "hams," when on Saturday morning, September 2, 1939, the Government suspended all amateur transmitting licences and ordered sets to be dismantled and vital equipment sealed. Next day Australia was at war.

Now restrictions have been lifted and already many licences have been re-issued. Before the war there were 2,000 "VK's" operating throughout Australia and the Mandated Territory but, according to members of the Wireless Institute of Australia, this figure will be greatly increased when conditions return to normal. General interest in short-wave work among both old-timers and new-comers is higher now than at any other time, and activity promises to be on a wider scale than pre-war.

Chief obstacle at the moment is the lack of high frequency equipment but, it is hoped, this position will be rectified soon. In the meantime, amateurs are working flat-out rebuilding sets with old equipment and generallly making every effort to get back on the air in the shortest possible time.

At the present time the only frequencies that "VK" amateurs may use are 28 to 29 megacycles, 50 to 54 megacycles, 166 to 170 megacycles and 1345 to 1425 megacycles, with a power input of 50 watts. A wider range of frequencies has been promised by the Government, and it is anticipated that a return to lower frequencies will be made before the end of the year.

In Victoria (VK3 calls) now there are only 20 amateurs operating but the State's figures will mount rapidly as equipment becomes available. Before the war, Victoria had nearly 600 "short wavers" operating, while New South Wales (VK2 calls) led the field with about 700. Figures for other States were: Queensland (VK4), approximately 250; South Australia (VK5), 175; West Australia (VK6), about 100; Tasmania (VK7), about 70. Three stations in Papua, using VK4 calls, and about 10 in New Guinea, using VK9 calls, were also operating.

Of the 20 "hams" working in Victoria at present about 15 are operating on the 28 to 29 megacycle band but have been making only local contacts to date. A few American stations have been heard in this band, although it is not known whether any two-way contacts have been made.

At the moment there is very little news of amateur activity in States other than Victoria. However, the few reports to hand reveal that frequency modulation and pulse transmission is creating a great deal of interest and operators are eagerly waiting for the official "go ahead." Television is another field that has many followers but high costs are expected to be a limiting factor in this experimental work among amateurs.

The war was a direct challenge to the amateur short-wave enthusiast of Australia and the glove was quickly picked up. From every part of the Commonwealth they rallied to the colors and for six long years served in practically every theatre throughout the world. The work, once just a pleasant, expensive hobby,, was now a matter of national importance.

The training of a radio operator is a long, tedious business, but because of the practical and general technical knowledge of these men the process was greatly shortened. Not only did they serve in direct operational work, but they trained hundreds of young, inexperienced men so well that at the end of hostilities Australia and its armed services had one of the best radio comunication set-ups in the world.

Of the 2,000 "VK's" operating before the war, 23 per cent. served with the Royal Australian Air Force, 18 per cent. with the Australian Military Forces, 6 per cent. with the Royal Australian Navy and Merchant Navy, 12 per cent. in the Service Reserves, A.R.P. organisations and auxiliary fire services; while the remaining 41 per cent. were either medically unfit for active service or retained in work of high priority in the reserved occupation class.

Large numbers of the latter class were engaged in communication work in Australia such as telephone and telegraph services and the technical side of broadcasting.

One of the most dramatic stories to come out of the war was provided by a "ham" attached to an Australian Commando unit serving in Portugese Timor in 1941. He was well known to American amateurs before the war as VK7ML or Max Loveless.

7ML was attached to the Commandos, known as the "Sparrow Force," as a radio operator. Mister Nip was going well in those days and he reached Timor on February 19, crushing everything before him with the efficiency of a steam roller. The "Sparrow Force" wasn't crushed, but it was sadly bent, and eventually, against overwhelming odds, was forced to retreat into the hills. Loveless and four other Australian radio men lugged with them the wreckage of a small transmitter.

During the following two months Commando raiding parties collected scraps of wire, solder, odd pieces of tin, two mangled receivers wrecked by the Japs ,and finally captured an engine driven battery charger with the fuel to drive it. From all this a sickly looking transmitter was evolved.

After many disappointments the transmitter went on the air when on April 19 Loveless dit-dahed Darwin. At first there was no response but on the second attempt Darwin cut in and "Sparrow Force," long given up as lost, were in contact with H.Q. again. "Ham" ingenuity had triumphed.

Loveless came through the war O.K. and is once again back at his old hobby.

American amateurs will be pleased to know that "Snowy" Campbell, call sign VK3MR, winner of many amateur contests, is another safely back in "civvies." "Snowy" enlisted in the R.A.A.F. He was shot down over Africa and "sweated out" the rest of the war in P.O.W. camps in Italy, Germany and Poland.

Another interesting personality back on the air is Max Howden, VK3BQ, the man who made amateur short-wave history on November 2, 1924, when he made two-way contact with America, the first trans-Pacific contact ever made. The American station was W6AHP. On November 24 of the same year he also made the first Australia-England contact, the English amateur being G2OD. Both contacts were made using morse, but on February 8, 1925, VK2BQ and G2OD were successful in a two-way contact using telephony both ways.

RECEIVER DESIGN

(Continued from page 4)

So much for the R.F. stages, now let us discuss the mixer-oscillator stage. The choice of a mixer tube, particularly where no R.F. stage is used, is very important.

Mixer tubes also suffer badly from low input resistance, particularly types 6L7 and 6J8G. Types 6A8, 6K8 and 6SA7 are not so prone to this effect and are to be preferred to the previously mentioned types at 28 mC. Unfortunately there are no true mixers in the acorn range. (Tube manufacturers please note), and although good results can be had from the use of types 954-9001 by using the suppressor for oscillator voltage injection, it is often found better to use a standard type tube and put up with the loading effect in order to realise the added gain from the higher transconductance of these types. If a separate oscillator is used the 6A8 makes quite a good mixer at 28 mC. The oscillator voltage should be fed to the oscillator grid (grid No. 1) and the oscillator plate tied to the screen. The 6K8 is also a very good mixer at these frequencies. Using this tube it is not necessary to use a separate oscillator as the 6K8 oscillates quite vigorously even up to 50 mC. This is due to good tube design, and also to the fact that oscillator grid current requirements for this type are low (max. 150 micro-amperes). Plate tuning of the oscillator is desirable. Another combination mixer-oscillator tube which should prove useful at 28 mC is the Philips ECH2. The oscillator transconductance of the ECH2 is 5,500 micromhos, whilst the pentode plate resistance is 1.5 megohms. This

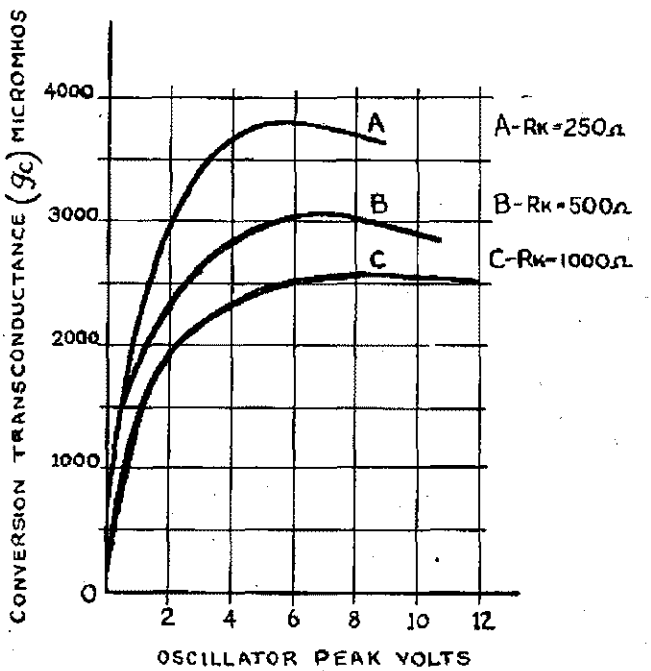
type has not actually been tried, but it is proposed to use it in an experimental model shortly and results will be reported in "A.R." Now the following may seem to be a very contradictory statement in view of what has previously been said regarding the 1852, but this type does make a very good mixer. True the input loading is quite high, but, provided that at least one R.F. stage is used, together with a high frequency I.F. the extremely high conversion transconductance obtainable from the 1852 (see graph 1) makes its use a very worthwhile one. It will be noted that grid injection is recommended. Unfortunately the suppressor characteristics of the 1852 require too high an oscillator voltage for suppressor injection to be used.

6AC7/1852 CHARACTERISTICS AS MIXER.

Ef	6.3 v.	Es	150 v.
Ep	300 v.	Esu	0 v.

Eg.—Self bias from cathode resistor (Rk) as indicated on graph.
Oscillator and signal voltages applied to signal grid.

However, provided that the high frequency I.F. is used there should be no troublesome effects from oscillater pulling. Now a word about H.F. oscillators. Tubes with a high mutual conductance make the best oscillators, type 6J5 is excelent at 28 mC. Another tube which is a particularly good oscillator is our old friend 1852, provided that the supply voltages are fed from a regulated supply. Voltage regulation is a good idea in any case. VR105 and VR150 types are being manufactured locally, so should be readily available. Wherever high oscilator votages are required, do not overook the possibilities of the audio pentodes and beam tetrodes. 6F6's and 6V6's make excellent receiver oscillators, and can be made to operate with a minimum of trouble. It is advisable to use a grounded cathode circuit, for with the cathode at R.F. potential, much trouble is experienced from hum modulation of the oscillator voltage.



CHARACTERISTICS OF 1852 AS A FREQUENCY CONVERTER.

(Continued on page 16)

HAMS ON SERVICE

I know many of you during your activities in the Services have read this column under many varied and strange conditions. It has, as I've stated at times been written at all kinds of queer hours of the morning, but I never at any stage, thought it would be typed by the aid of a hurricane lamp at 9.15 p.m. Strange indeed are the opening phases of this "New Order" business. It is to be hoped all the progress is not to be made in the present direction, Hi! Why, some chappie told me we would be on the air on January 1, and it's more than likely we will have to use Battery rigs all through 1946. Hi (These notes were written for the January issue. —Ed.).

I had a pleasant surprise in a visit from Jack Coulter, 3MV, the other night. Jack's ship, the Mildura, is having a stay in Sydney for some alterations and some leave. Ending the story before I begin it, he rang me up during his leave as we had arranged that he come out and showed me a midget rx he had built. Well, at the time trams were travelling at half speed after 6 p.m. and he was as far from Eastlakes as he could get and all the journey was by tram. We reckoned it out that if he started early and left almost before he arrived here he should get back home at 1 a.m. or so. Hi I have yet to see the receiver. The Mildura, like most of our pre-war interstate ships had a very busy wartime career, and she took part in many varied excursions, and Jack saw many places, but as he said in a letter he always arrived at a place just before he received "Amateur Radio" telling him what hams were in that location. The last trip of the Mildura was at the taking over at Hong Kong, and the number of mines made the entry far from unexciting. 3MV has a very interesting collection of photos and other items of interest, but is now mainly concerned in how to get on the air.

Tom Slawson, 2AFN, who spent years in the Nip P.O.W. camps, is reported in Uralla Hospital with stomach disorders. As Tom over the years survived Nips, Beri Beri, Dysentery and Malaria, he reckons that under Aussie hospital conditions, he'll soon be on 28 Mc. Apart from the tummy trouble, Tom is said to be quite fit and his old self.

Sqd. Ldr. Frank Goyen, 2UX, is yet another who is now out of the R.A.A.F. and trying to decide the usual question—whether to take all one's leave and have a nice long holiday, or to go to work early in one's leave period and save more shekels. Hi On the phone I cannot report any progress "to the good" as a result of his years in the R.A.A.F. Hi!

Sgt. Alan Jocelyn, 2AJO, was just about to go into civvies when the M.O. decided that he had better first have a little spell in Concord A.G.H. Alan says it is a wonderful hospital and the view from the third floor would be lovely only from his bed he can just see his own home, and when he thinks of the gear and tubes awaiting his attention lest everybody else gets on "ten" first—he nearly has a relapse.

P/O Leo Myers, 2KS, was at the last meeting of the W.I.A. When asked to say something, Leo said he really had nothing to report, as he had "just gone here and there." Well, the Mentioned in Despatches, on his ribbons told us he'd "been here and there," in fact he had even "had a hand in the doings."—but—the silent service, said never a word. Hi! But I have slender hopes of the future (2YC).

C.P.O. Tel. Frank O'Dwyer writes from England that his discharge has come through, but as Frank says, "What's the use when one is 12,000 miles from home and the Australia is due to leave about the middle of December, anyway. I hear that that Mrs. 3OF is now encouraging the back and front lawns and thinking out new garden plots—and of course a new fowl house. Hi

Sydney Clarke ,of the HMAS Shropshire, has arrived back in VK after his trip to see the Nips. He expects to return to them early in the new year. Syd says it was a very quiet trip with nothing to report, but he said "you should see Tokyo" or where it used to be. Syd is far more interested in the date of the AOCP than the navy at the moment. He has it all planned as to how he can sit for the Eam if the ship has left Sydney before due date.

VK3NQ, Jim Watson, "the old Bonegilla veteran"—3¼ years in one camp—announces that he has at last returned to Civvie Street. He rejoiced to find that all "in the precious box" were not all mashed together as he used to picture when things were very black. Hi! After four years of service life he, like all the rest of you, is finding this civvie business has its disadvantages—2½d. postage, and the look on Mum's face when you pass back the plate for another piece of steak at breakfast—and it is even rumoured that the Tax People again take an interest in one—truly its a savage life among civilians.

Ray Carter, 2HC, has also returned to civilian life at Yarraman, after his sojourn in Brisbane. He is not looking forward to the cold winters there, but like everybody else—glad things are over.

Bill Moore,2HZ, is still in R.A.A.F. hospital at Jervis Bay with his fractured ankle, but expects to spend Christmas at home at Springwood. The ankle seems to be knitting properly and next year should see Bill back at the Water Board once more.

Sqd. Ldr. Frank Hine, 2QL, was down from Darwin again recently. He is not at the old position and his new job makes a trip per "Lib." to his home a much rarer event. So he is building up his gear for 28 Mc. Hi!

A TEN WATT AUDIO AMPLIFIER

(Continued from page 5)

(a) The field makes the speaker hot and tends to distort the voice coil, which rubs on the pole-piece;
(b) The voltage to energise the field is additional to that required by the amplifier, makes the power supply more expensive, more likely to breakdown.
(c) The flux through the voice coil is usually much more powerful with a permag, hence bass-note response is better.

The power supply can be included on the same chassis as the amplifier, but transformer and choke should be placed well away from V1 and V2 to prevent hum pick-up. Because the d.c. supply valtage is quite low, fairly large electrolytic condensers can be used—24 mfd 350 Pv cost little different from 8 mfd 600 Pv required with conventional amplifiers. Increased capacity in the filter condensers reduces the hum level of the amplifier.

It will be observed that this amplifier is not only very quiet (free from hum and noises), but it has a very wide frequency response and is free (because of degeneration) from transient "tails." With conventional amplifiers when there is a transient note, like the thump of a drum, there is a tendency for the speaker cone to rumble on for a few cycles at it's own resonant frequency. This is the transient "tail," and it blurs the naturalness of the music. With the amplifier described these transient "tails" are practically non-existant. Because of the wide frequency response of the amplifier a tone control is usually desirable. This may consist of a .03 to .05 mfd fixed condenser connected in series with a 50,000 ohm one watt resistor from plate to plate of the output tubes. A variable tone control, or a step-by-step tone control may be used alternatively.

Data on circuit constants for other than 6SN7GT phase-inverter tubes will be supplied. Send a stamped addressed envelope to the Technical Editor, stating the type of inverter tube you wish to use.

TABLE I.
6V6GT TUBES, PUSH-PULL AB1 OUTPUT.

Heater voltage—6.3 volts.
Plate voltage—250 volts.
Screen voltage—250 volts.
Grid bias— —15 volts.
Peak signal voltage (Grid to grid)—30 volts.
Zero signal plate current—70 milliamperes.
Maximum signal plate current—79 milliamperes.
Zero signal screen current—5 milliamperes.
Max. signal screen current—12 milliamperes.
Load resistance plate to plate—10.000 ohms
Power output—8.5 watts.
Total harmonic distortion—4 per cent.
Second harmonic distortion—Nil.
Third harmonic distortion—3.5 per cent.

HAMS ON SERVICE

And so to 1946. A Happy New Year to you all, whether home in Civvy Street or only "on the way Home." Very many thanks to all, and every Ham who in 1945 helped to make Slouch Hats and Forage Caps the column for the Ham on Service and at Home, without your help it would have been impossible to produce and any credit is shared by all of you—73—and a host of notes from "those Returned" to 78 Maloney Street, Eastlakes, Mascot, or if in Sydney, Phone MU 1092.

CORRESPONDENCE

The Editor wishes to acknowledge a letter from Peter Adams, VK2JX, expressing the same views as Alan Fairhall, VK2KB, in the December issue. As the letter is a lengthy one, the Editor has decided that, in the interests of space, not to publish it. Future correspondents are requested to keep their letters short.

DIVISIONAL NOTES

NEW SOUTH WALES

Well, as predicted, quite a few stations in VK2 and VK3 were able to exchange greetings per medium of Amateur Radio. What a surprise the Yanks received to hear VK stations! Amid the general rejoicing of the lucky recipients there was general regret that the Department did not speed up the issue of licences so that every one should receive his call as a Christmas gift, but such is officialdom and it is very difficult to speed things up.

A.O.C.P. Classes are now in full swing after an initial setback. Applications became so numerous that after several modifications in the size of the class it became necesary to definitely refuse to accept more students. The Classes are being held in the rooms of the W.E.S.C., and Class Manager is Mr. Jack Howes, VK2ABS, ably assisted by Neil Pieremont, VK2NQ, "Mac" Hicks, VK2ADV, Mrs. F. V. MacKenzie and several of her girls. Students are showing a keen interest in their work and even at this early stage it is confidently expected that the majority will secure their "Tickets" at the April examinations. Numbered among the students are several Servicewomen, and believe me, you chaps will have to watch your laurels.

During the month several very interesting overseas visitors have been entertained including Arthur Middleton, VQ2MI; VE4RL; VE4ALE; VE5EP and G8TB. All are anxious to get back to their respective countries and work many of the chaps they contacted whilst in this country. The VE's have had a Cook's Tour and hate to think how many miles they have travelled before they get back home. Every opportunity was given these chaps to meet and work as many VK's as possible and at one of these gatherings we had the pleasure of 2YC's company. Quite a few of you fellows know 2YC's pre-war views on phone. Believe it or not, Jim now thinks there's something in it and is very seriously contemplating acquiring some modulation equipment. All that has to happen now is the conversion of "Jonesy," 3RJ. What a world-shaking event it would be for a fone QSO to take place between 2YC and 3RJ!

Members will be pleased to learn that our ex-P.O.W.'s are looking themselves again, particularly 2HZ, who is almost back to his pre-war weight. Jim Edwards also looks in the pink and his comments in the "P's" should make very interesting discussion in certain quarters. Not a great deal has been seen or heard of Gordon Brigden.

Negotiations are at present under way for the acquisition of permanent rooms for the Institute and it is hoped that by the time you read this a one-time pipe-dream will have become a reality.

The Australian Radio Propagation Committee of the Radio Research Board of the Council for Scientific and Industrial Research are at present contemplating the issue of a monthly Propagation Bulletin and a perusal of an advance copy makes very interesting reading. This publication, which was previously for the benefit of the Fighting Forces, will now be made available to the general public. When the lower frequencies are returned it should be possible to work DX at any time of the day or night by consulting the various charts.

Not much news this month, chaps, as copy must be in the Editor's hands before the January General Meeting takes place. **To remind you again. Monthly General Meeting of the Division now takes place in the Main Hall, Science House, on the FOURTH FRIDAY OF EACH MONTH. FEBRUARY MEETING WILL TAKE PLACE ON the 22nd Day of that Month.**

VICTORIA

At the January meeting held in the Wireless Institute (Victorian Division) Rooms, Law Court Chambers, 191 Queen Street, City, on the evening of January 8, there was standing room only, the muster even occupied breathing space in the passage.

VK3XD occupied the chair and welcomed visitors, new members and XU3GG ex-AC8TS, who operated CW and fone on 14 M/c from Shanghai, and was subsequently siezed by the J's for being suspected radio spy. He recounted some experiences which would make a DX fiend's log look green with envy. Other visitors were R. C. Harrie, VK5FL; A. J. Sutherland, VK5XB; P. T. Madlen, VK6MN. J. Squires, VK6JS; and Capt. Cadell, VU2EB, who is now VK3EE, and one of us. The following members were present an dsigned the book:— VK3's: WY, EE, XD, HX, CX, DH, KK, EA, FM, PQ, AI, AT, TU, TM, NY, RI, PW, XM, CT, VY, YQ, YL, WQ. FR, RN, IW, QV, MB, TZ, XE, HK, FS, ST, WO, ZJ. YJ, JI, DL, TF, LA, LX, HT, PG, IG, ZT, QA, OJ, HO, UJ, JO, CF, WF, DM, ED, JD, VH, IK, SZ, QP, XZ, CP, YP, BQ, UQ, QS, SQ, YS, NQ, XF, XT, CB, IF, XJ, CR; Messrs. H. D. Hanson, R. McDonald, J. S. Ware, M. Wilson, C. L. Coates, A. Dean, A. Simmons, C. M. Fraser, W. Dudman, L. Western, W. A. Shaw, B. Burdekin, T. House, R. Miller, H. M. Wald, K. Maroney, A. Camp, H. Waterman, R. Hodges, V. C. Seddon, C. P. Hill, J. Balfe, J. C. Belcher, H. Thompson, CPO. M. Hallows.

Bob Anderson, VK3WY, secretary, outlined an approach which had been made by FHQ re 54 M/c allocation. etc., for Frequency Modulation whereby a reply from the P.M.G.'s Dept. indicated that no information could be given yet as the Department was unable to cope with business in hand. This matter was the normal function of the Parliamentary Standing Committee on Broadcasting and the said Committee was still sitting.

Discussion took place re Federal Convention which is to take place in Melbourne during Easter, probable days being Friday, Saturday and Monday. It will be desirable to have everything ready for the accommodation of the delegates, also a little break. FHQ and all Divisions are said to be working at high pressure on the Agenda which should be in the hands of the Federal Secretary soon.

In order to explore the possibilities of holding a Dinner during the Federal Convention at Easter, members who are interested and would definitely attend are asked to contact the Divisional Secretary. The cost to any attending member cannot yet be fixed until such time as is known how many would be able to attend.

The November Amendment to the 1939 P.M.G. Regulations (published last month) were read, and various points explained to members ,and general discussion re new types and grades of licences ensued.

On the motion of VK3XZ it was agreed to published in the Magazine that "the Federal Constitution be printed for the information of all members and that the Constitution of W.I.A. in all other States be uniform in principle."

VK3WI has paid the £1 and the gear is nearing completion for a try out on the air when it is anticipated that skeds be made for continuous operation. Herb. Stevens, VK3JO, needs capable assistance in the Laboratory Committee Section and those who can spare an evening or so are asked to lobby with him.

It was decided to organise a 50 M/c gang and those reported active include VK's 3YD; 3JO; 3YP; 3SP; and 3EO, but the more the merrier, and any others intending or who are actually using this channel please contact the above fellows.

The following reported being active on 28 M/c 3LX cw on 28120; 3ZT cw on 28560; 3EO cw on 28555; 3XD cw on 28575; 3EE cw on 28022 and 28644 3SQ 3UQ cw

on 28240; 3NW on cw; 3BQ cw on 28022 and fone 28200; 3DH extra good fone; 3VM fone 28300 and 28200; 3XJ fone and cw 28040; 3SB fone 28070; 3YP fone and cw; 3CP cw.

These stations are among some of the very active and are desirous of co-operation from DX and locals.

During a discussion on fone v cw frequencies in the 28 M/c band and other bands not yet available whereby it was mooted "Keep fone on high frequency end and CW on the low frequency end of respective bands," VU2EB now VK3EE offered to loan his signal shifter. This piece of gear completely shifts all fone signals out of the band. Say, if this is as good as his auto sending gear, I will be pleased to borrow it. Hi. Technical Editor wants details please.

There seems to be some misunderstanding about the whole matter. When VK3YP moved the matter he was speaking from the CW man's angle. It appears that the majority of the meeting thought that he was speaking from the fone man's point of view.

The Instruction Staff of the A.O.C.P. Students has resulted in the appointment of Mr. Ken Ridgway, VK 3CR, and Mr. H. D. Hanson as joint Managers and Instructors. Mr. Hanson will deal with operating Code and Regulations; Mr. Edgar Treharne theory instructor, and Mr. George Thompson, VK3TH, as Advisory Consultant. (Now what did I tell you last month in these notes about the said George Thompson. Well done, OM, and glad to see you back working hard). Classes are to commence as soon as possible, and intending students should watch this magazine. Intending Students should notify the Divisional Secretary if they desire to attend the first class.

Another hard worker, whose services will be appreciated, has made a welcome return to the W.I.A. harness, is Group Captain Vaughan Marshall, VK3UK. He has commenced operations on Federal Executive, vice Billy Williams, VK3WE, who has reluctantly gone back to the mountains. Well done, Vaughan, anl thanks, Billy.

The following new members have been admitted as members of this Division: V. C. Taylor, A. C. Knight, J. R. Lancaster, W. McGrath, L. R. Ross, J S. Woodburn, D W. Tracey, A. L. Maclean, G. Wildman, K F. Maroney, H. Waterman, J. Smith, J. E. Moran, L. Western, D. McKersher, W. A. Shaw, J. C. Davies, C. J. Bennett, K. C. Sennon, R. V. Rowe, J. S. Teare.

The Membership Secretaryship has been taken over by Mr. Ray Jones, VK3RJ, whose address is 23 Landale Street, Box Hill, to whom inquiries should be made, or to the Institute Box number, Box 2611W, G.P.O.

The February meeting of the Division will be held at the Rooms on Tuesday, February 5, at 8 p.m. The March meeting will also be held on the first Tuesday, the date being March 5th. Members, intending members, visitors and friends are all welcome.

QUEENSLAND

The December meeting of the Institute was held a fortnight earlier than usual owing to the Xmas holidays, and as very little new business had come to hand the meeting resolved into an informal chinwag, which rather suited the holiday feeling which was taking possession of everyone. The main complaint of most members was the delay in the distribution of licence forms. Apparently those with like A. Appy will be the first on the air. But at the date of writing, the P.M.G.'s Dept. seems to be getting on with the job, more power to 'em. The parts position VK4 is rather acute, bleeder resistance being unobtainable to metion just one item.

The news of the month (or year) in VK4 is that H. Sholz, 4HR, has at long last succeeded in neutralizing his new 807 P.A. Keith Schleicher has also been getting ready for his return to the air and has been in a spot of bother with the same thing. Anyway as a result of their combined efforts we are happy to announce the early appearance of a treatise on the subject: "How to Neutralize your ——— 807". Under their combined authorship, this manual should be a worthy addition to the amateur's library. Congratulations, Professor Schleicher and Dr. Scholz, B.T. ("T" for Tube).

Although the writer, 4ZU, has not yet completed his receiving gear for 28 mc, we are told that there are some good VK2 and VK3 signals coming through and also some fair DX. It is to be regretted that our new bands are not in harmonic relationship with most of our old crystals ,and also with one another. That is one reason which will delay a few fellows' appearance on the air.

Several of our new members who intend to shortly sit for their tickets deserve every encouragement, particularly C. Reese and Wally Boulton. We had a visit from one of our country men over the holidays, the visitor being Frank Shannon, 4SN. Frank is of necessity a low power man, but has worked a tidy pile of DX with 7 watts and a Rhombic or shoull I say a Rhombic and 7 watts. Some of the fellows here are having trouble getting their receivers perking on 10 metres and were wondering if the Tech. Editor could not run an article on say "Improving Receiver Permformance on 10 metres."

We were rather distressed to hear via our old friend, Pat Kelly, last week that our late secretary, John Thorley. 4RT, had been having a bad time of it in a Sydney Hospital. John has been an inmate for 6 months or so, but we believe that the stay will not be much more prolonged and that you will be up and about soon. At all events, John, we extend our best wishes for a speedy and complete recovery.

To our country members who have recently joined up, glad to have you with us ,and how about letting me have some notes for the magazine. Even if its only your own activities in the way of building gear,let me have it from time to time, because otherwise "Amateur Radio" notes become purely a Brisbane affair.

Next month we shall probably run a section "DX Worked," but until then it's 73s es CUL.

SOUTH AUSTRALIA

The past month has again demonstrated the increasing interest in Amateur radio in this State. Membership is now 154 and there was an attendance of over seventy at the January General Meeting, some members making special journeys from the country.

At the meeting, Mr. A. M. Phillips, VK5ZU, gave a talk on "Getting Started on the New Bands." Mr. Phillips was enthusiastic on "Five" in the old days, and has had considerable experience during the War in building and operating V.H.F. transmitters and receivers. His remarks, therefore, were based on a vast amount of practical knowledge and were followed with great interest by those present.

Some of the points made were:—

Conditions on 28 m.c. are "patchy."

Short skip on 14 m.c. is a guide to conditions on 28 m.c.

Most DX on "Ten" is over the daylight path, e.g. America in the morning, Asia around mid-day, Africa in the afternoon and Europe in the evening.

In planning a receiver the **main consideration** is shortness of leads.

In transmitters, avoid capacity coupling of stages.

Antennas should be designed for low angle radiation. The simplest antenna, therefore, is the half-wave vertical, which can be two half-waves in phase with matching stub and non-resonant feeders.

A discussion took place at the conclusion of the talk and Mr. Merv. Brown, VK5MB, moved a vote of thanks to the lecturer.

During General Business, the request by "Amateur Radio" for articles was again mentioned, and the suggestion made that lecturers at meetings be asked to write up their talk in the form of an article or, alternatively, make their notes available to the Technical Committee of this Division, who would "lick them into shape." Since the meeting, Mr. Phillips' "notes" have been received. Though concise, they are so clearly expressed that they are being forwarded to "Amateur Radio" in their original form.

Recently returned from the Services and present at the meeting were R. G. Haskard, VK5RH; W. E. Lloyd, VK5HD; and Howard Stacey, VK5XA. Visitors were R. B. Monfries, VK9RM, and Eddie Jinks, VK2HX. Other old Hams it was good to see again included Hal Austin, F. E. Bentley, VK5MK; Phil Bested, VK5CS; Geoff and Jack Coombe; L. W. Finn, VK5SP and Jack Grivell, VK5BK.

Several Amateurs in this State have now received their Licences. These are high up in the alphabet. The writer of these notes, a "wubble-u", has, consequently, a very low "priority."

Student classes have been well attended and there is already a rush of applications for the next series, due to commence in March next.

The next General Meeting is to be held on Tuesday, 11th February, when the Lecturer will be Mr. Merv. Brown, VK5MB.

TASMANIA

This Division held its January meeting on the 9th (a week late owing to the New Year falling so close to the first Wednesday). Time, 8 p.m. as usual and preceded by the monthly Council Meeting.

Attendance this month was down, many being on holidays and others claimed by their work. Twelve members were present and the Council just managed a quorum.

Several apologies were received including President, VK7LJ, who is relaxing (we hope). Information was received from the P.M.G.'s Dept. re the Advisory Committee setting out the duties and notifying the desire for the Committee to function as from January 1st. W.I.A. enrolments are so good that it is believed the Department is finding it difficult to get the "non-Institute Member" half of the Committee—what other State boasts this position?

A copy of operating regulations were read and several variations from the old regulations noted and discussed, as was a copy of the letter reaching licence applicants in which the paragraph on Broadcast Receivers was particularly commented on.

One pleasing factor was the advice that the lower frequencies were to be made available later as the Services relaxed. This at least gives us hopes of the return of Interstate chinwagging with a little DX thrown in sometimes and should allay the worst fears.

Three more members were enrolled in the persons of VK7BQ, VK7CM and A. Morrisby. Rumour once had it that 7BQ, Len Crooks, would not be a starter, and as one VK7's Old Timers, it is pleasing to have him with us still. (Just in case readers are unaware of the fact, these notes are written by VK7PA—Ed.).

The meeting was rounded off by Chas. Oldham, VK 7XA ,with a talk on Frequency Checking, which proved to be most interesting, dealing with the ever popular simple absorption wave meter on to the heterodyne frequency meter combining both in determining the correct harmonic of the Meter.

Lecher Wire Calibration for the U.H.F. and V.H.F.'s raised much discussion, some of the technicalities remaining unanswered—at least for the time being.

The whole subject proved to be one that contained a wealth of interest to all from the discussion that followed the conclusion ,and could well be taken again at a later date.

Reports are to hand of an imposing antenna recently erected in preparation for "The Day," 66 feet of heavy

gauge GI piping duly assembled from 3 ft. lengths, well overlapped, riveted and soldered, electrically bonded from top to bottom with six equally spaced 7 strand copper insulators duly attached (soldered) every 18 inches throughout the entire length.

The finished job constitutes two works of art, one the assembling, the other the erecting. It now stands atop a high tension insulator at its location. To the many comments made, Bert's (ex-VK6AR) satisfied retort was "well we got it there."

If it repeats its receiving tests in transmitting it should be worth the effort, etc., from all accounts by Bert.

Several licence fees have already gone along following receipt of notification to applicants that their licences are available on receipt of the prescribed lucre, others still, are "waiting" restlessly.

The February meeting will take place on the normal day, the first Wednesday, the 6th, and the March meeting will also fall on the 6th. The address is as before 92 Liverpool Street, Hobart, upstairs.

RECEIVER DESIGN

(Continued from page 9)

Much could be written on the subject of high frequency stability, and it must be borne in mind that mechanical design and sensible layout contribute a large portion of the success to be achieved. Use good quality tuning condensers—the best that you can get. Make sure that there is no end or side play in the rotor shaft. See that the wiping contact to the rotor is a good one (for heaven's sake do not use pigtails). Make sure, if you are ganging two or more condensers, that they are perfectly in line.

Return all earth connections to a common point for each stage. A bus bar earth line at 28 mC can cause a lot of trouble. Mount the tubes in the most convenient position for short grid and plate leads, preferably horizontal on the shield partition. Coils wound with 14 gauge wire, self supporting, and soldered direct into circuit will give more efficiency than plug in coils. In short, care taken in the form of efficient layout will pay dividends in the form of increased efficiency.

A Midget Communication Receiver

Through the courtesy of Captain T. Cadell, VU2EB, we were privileged to view a midget communications type receiver developed for Military use in certain actions.

The receiver is a standard superheterodyne using the midget type tubes, operating from 230 volts AC or DC, or from a special battery pack.

Two units—counting the battery pack—three, comprise the whole setup. The first unit consists of the receiver which contains as a tube line-up, a 1R5 Mixer; 1T4 oscillator; 1T4 IF; 1T4 second detector; and another 1T4 in the output. Plug in coils are used, and they plug into one end of the receiver. These coils are actually one end of the receiver box, having pins which plug into corresponding sockets.

The frequency range is covered by four coils comprising 100-1600 KC; 2.5-5 MC; 4.5-8 MC; 8-15 MC. On the side of each coil unit is a calibrated scale, calibrated both in kilocycles and megacycles against dial readings, and which are extremely accurate.

Regeneration is introduced into the IF stage to provide oscillation for the reception of CW. An audio gain control is provided, which together with the tuning control, one has only three controls to play with. An antenna tuning device is also provided which makes it possible to match up practically any type of aerial. The output impedance from the audio is 800 ohms.

We stated at the beginning of this article that this was a midget receiver and to substantiate this statement, the actual measurements of the receiver case is 9¼ inches x 2¾ inches x 3¼ inches.

The second unit consists of the power supply. The physical size is the same as the receiver, and as we have stated operates from 230 volts AC or DC. Rectification is achieved by means of a dry metal rectifier; the filtered output of which is 97.5 volts. 90 volts is provided for the plate supply, and 7.5 volts for the filaments of the tubes which are connected in series.

The performance of this little receiver is outstanding.

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AMATEUR RADIO

MARCH 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

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

6D.

AMATEUR RADIO

VOL. 14 MARCH, 1946 No. 3

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

The Magazine Committee's faith in the Radio Trade has been justified.

Six months ago the Committee took the big step of switching from the roneod magazine to the present printed one. They realised that for a while the Magazine would be produced at a loss—a fact which was borne out by the first five months of publication. However, the tide has now turned, and the future is very bright, for from month to month the magazine will gradually contain more pages.

This is a direct result of the realisation of the Radio Manufacturers, Wholesalers, and Retailers that "Amateur Radio" offers an excellent advertising medium.

It is up to you—the reader—to carry on the good work. You can do this by supporting the firms who are advertising in the magazine.

At the time that the P.M.G. Department issued the frequencies that would immediately be available for Amateur occupation, we were told that the first of the lower frequency bands to be released would be 3.5 megacycles, in about three months time.

As the New Zealand Amateurs are already occupying the 3.5 megacycle band, Federal Headquarters requested some six weeks ago, the immediate release of this band.

It is confidently anticipated that the authorities will not forget their promise of the release of this band, and the higher frequency bands.

IN THIS ISSUE

RECTIFIERS

By F. P. DICKSON (VK2FB) *

PART 1
HIGH VACUUM RECTIFIERS

Rectifiers are used in enormous quantities and in a variety of types, but, while many amateurs are familiar with both theoretical and practical sides of their operation, there are many who have not had the opportunity to go very deeply into the subject. The writer has done a good deal of work in the last few years on the development and production of rectifiers, and with the feeling that both newcomers and old hands will find something of use and interest in the knowledge so gained, the following article has been written, particularly for the benefit of those who are just making their start in amateur radio.

Although the principles are the same we will confine ourselves to power rectifiers and not deal with those used for the detection of high frequency signals. We will further confine ourselves to hot cathode rectifiers of two kinds, high vacuum and gas-filled.

High vacuum rectifiers are among the simplest of valves, but not necessarily the easiest to make. Fundamentally, we have a hot cathode which may be directly heated in the form of a filament, or indirectly heated, and an anode which are mounted a suitable distance apart in an evacuated bulb. In practice, this vacuum is not perfect, nor is perfection even theoretically necessary, all that is required being that on the average, electrons moving from cathode to anode shall not come into collision with gas molecules. The distance which the average electron can travel without collision is called the "mean free path" and is a measure of the suitability of various degrees of vacuum for the purpose in view. In commercial H.V. rectifiers this distance is of the order of ten miles, so that there need be little fear of obstruction by the residual gas.

The cathode is heated to a sufficient temperature to cause electrons to be freed from its surface ,and they form a kind of cloud around it, known as the space charge. The quantity of electrons in the space charge is limited by the cathode temperature, as the electric field set up by them tends to repel other electrons escaping from the cathode. Some electrons from the space charge drift away, for they are all in a state of violent motion and those not obstructed by other electrons will inevitably move away from the space charge. If the anode be connected to the cathode via a current indicator it will collect some of these electrons and a small current will be observed. This is the Edison effect. If we now make the anode positive with respect to cathode electrons are attracted to it along its electric field and their random motion is given a general direction. As the anode voltage rises more electrons are attracted and arrive with greater velocities, both of which factors cause heating of the anode.

The field of the space charge is opposite in sign to that of the anode and largely neutralises it in the vicinity of the cathode so that only a portion of the applied anode voltage is effective in drawing over electrons. This is the reason for the considerable internal resistance of high vacuum rectifiers and accounts for the relatively high voltage drop. A very high voltage would be required to draw away all the electrons which the cathode will emit. When testing the emission an arbitrary convenient voltage is chosen and the saturation current then flowing, which is described as "space charge limited," is a satisfactory indication of what the cathode is capable of emitting.

The vast majority of rectifiers used by amateurs have oxide coated cathodes, the oxide being a mixture of barium and strontium oxides. These materials have exceedingly high emission as the comparative table (1) below reveals.

Material	Saturation Current in A/Cm² at at 1000°K	Temperature for 1 A/Cm² Saturation
Tungsten	1.3×10^{15}	2635°K
Thoriated Tungsten	5.5×10^{5}	1475°K
Barium Oxide	1.1×10^{1}	960°K

(Degrees K are degrees C reckoned from absolute zero—273°C.)

Operating as they do at relatively low temperatures, oxide cathodes which depend for their emission on a monatomic layer of metallic barium, or any one of a vast number of substances which can settle on the cathode and not be vapourised off at the operating temperature, will destroy the emission. The metallic barium diffuses through the coating to form the actual emitter, and failure of emission is ultimately brought about by progressive poisoning, by sintering (hardening of the coating with heat) and electrolysis which makes chemical changes. The effect of all these is that the layer can no longer be renewed. There is also a slight but continual evaporation of the material.

We noted that as the voltage and current are raised the temperature of the anode increases. If continued far enough a stage may be reached at which the anode itself is hot enough to have appreciable emission, particularly if some cathode material has settled on its surface.

When this happens the anode emits when it goes negative and electrons from it strike the cathode and raise its temperature, increasing its emission. This is a cumulative effect and very soon the valve no longer rectifies, but passes A.C. The whole valve is grossly overheated and gas is released which may have disastrous effects. The gas ionises, the ions neutralise the space charge and greatly increased currents flow until the valve is destroyed.

In practice, the anode is made of material or coated with substances having a high "work function" which means that it is difficult to dislodge electrons from them. One of the best of these is carbon, which is also an excellent radiator of heat, helping both ways.

If we can reduce the internal resistance of the valve we can draw much larger currents without danger because due to lower voltage drop the electron velocities and the heating are smaller. This can be done by bringing the anode closer to the cathode, and valves of this kind now on the market have anode to cathode spacing of 15 to 20 thousandths of an inch for 400 volts or so. In a good vacuum there is no risk of the anode voltage sparking across this gap, but we are faced with a different and much more difficult set of conditions. All such valves are indirectly heated as it would be impracticable to use a filament in such small spacing. A longer useful cathode area can also be used for the same heating power. The curves of voltage drop against current show clearly how the internal resistance is reduced by close spacing. Both valves use the same heating power.

*Transmitting Valve Department
Philips Electrical Industries of Australia.

(1) Ref. J. G. W. Mulder, "Development of Hot Cathode Rectifiers."

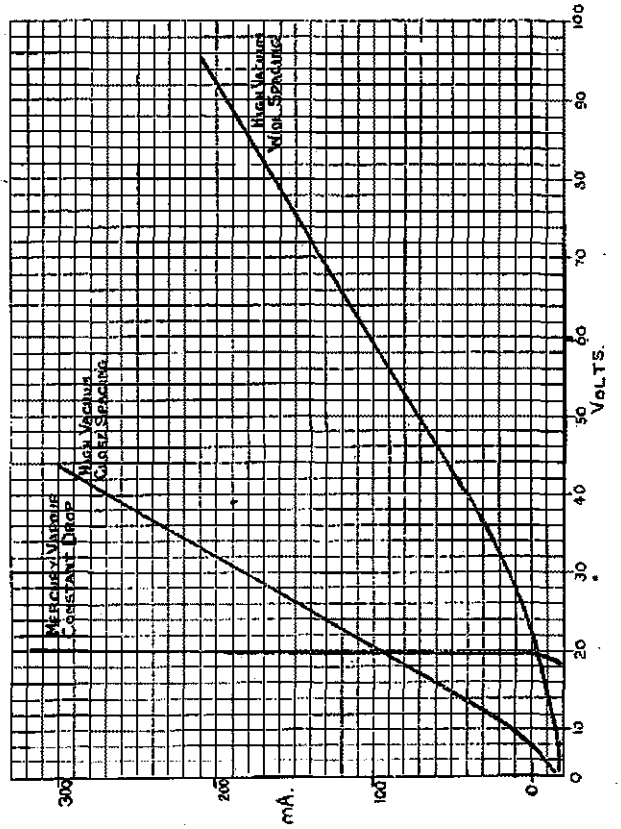


FIG. 1

In these close spaced valves any small projections on the surfaces are dangerous causes of local overheating and great care must be taken with the anode to prevent back emission. The cathode also calls for special treatment; the coating is made very fine and dense with a smooth surface, all of which factors tend to give lower emission. However, as the space charge limitation is not so severe due to proximity of the anode, and special pumping treatments are used, the emission is still entirely adequate.

We are now in a position to consider rectifiers in operation and as we are concerned with valves we will only mention the filtering arrangements insofar as they directly affect the valve. When the anode is fed with A.C. current is passed on the positive half cycles, rising and falling with the voltage above the zero line. At the crest of the cycle the peak voltage, 2 times the R.M.S. value, is distributed as voltage drop in the valve and in the load connected with it—Fig. 2 (a). As a filter normally contains some capacity and inductance its voltage does not fall instantly to zero but is still considerable when the anode is at its negative peak. As the valve is no longer conducting a large voltage appears across its elements, the transformer peak voltage, plus that remaining in the load circuit, as in Fig. 2 (b). The figures quoted are quite arbitrary, but entirely possible.

The peak inverse voltage across a rectifier is an important limit and exceeding it is asking for trouble, which will come, especially in close spaced valves, in the form of an arc-over. In those vaves we have an extremely concentrated field due to the high inverse voltage across the small spacing. Any back emission, or if there are enough of them, gas ions bombarding the cathode will start an arc which, if not suppressed by fuses will destroy the tube.

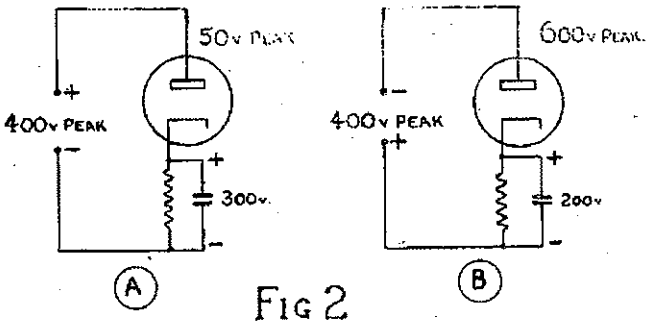


FIG 2

Arc-overs in close spaced tubes do not occur on the forward half cycle because of the low voltage drop, except when the valve is warming up. The cathode is then only partially heated, its emission is low and the voltage drop proportionately great. Under these conditions arcs may and frequently do occur, but usually they only damage a small portion of the cathode. A cathode which has suffered a bad arc-over shows a large patch where the coating is entirely removed, and perhaps even a hole burnt through the sleeve. Surrounding the bare patch is a large discoloured area from which there is no emission due to poisoning of the surface. Apart from this damage sufficient gas is frequently released to make the valve completely useless.

Let us now consider a rectifier with a condenser input filter. The condenser voltage rises with the anode voltage ,but does not fall to zero with it as it takes time for the charge to be dissipated in the load circuit. None the less the charging current is fairly heavy, increasing with higher condenser capacity and lower load resistance. At very light loads this condenser tends to remain charged to the peak voltage applied to the rectifier but falls rapidly as the load increases.

In practical operation the peak current may be many times the average current if the condenser is large, and this is another limit which must be observed if long valve life is desired. Without an oscillograph it is not easy to measure peak currents, but if the manufacturers' ratings are followed no trouble need be feared.

With choke input the surges of current into the condenser are limited by the impedance of the choke and the peak current is not much greater than the average value, while the voltage tends more to the R.M.S. than the peak value. The regulation is very much better; that is, there is less change of output voltage with load resistance, and the valve has a more favourable operating condition.

So far we have dealt with half wave rectifiers only. The full wave tube has two anodes working alternately. The condenser, whether preceded by a choke or not, has less chance to lose its charge so that the output voltage varies less over the A.C. cycle and the peak currents in the valve are proportionately lower.

In order to keep the peak plate currents of low impedance rectifiers within the makers' ratings, the circuit impedances specified should be strictly adhered to and the transformer impedance made up with resistors if it is insufficient.

When more current than one valve will handle is needed, rectifiers can be paralleled. Valves of high or medium impedance can be directly paralleled and the internal resistance will look after the differences of emission and plate current. The low impedance close spaced valves, however, are another matter. As seen in Fig. 1, two or three volts difference in tube drop make a very large difference in current and in the absence of limiting impedances one valve or one side of a valve may be greatly overloaded. Evening out of the currents can

(Continued on Page 10)

DIRECT DISC RECORDING

PART 1
INTRODUCTION

(Based on a series of Lectures delivered by Messrs. R. N. Kinley and L. T. Garrioch to the Sound Recording Institute of Australia, Melbourne).

FOREWORD.

The technique of recording sound waves on various media so that they may later be re-produced at will, finds many applications in our present day mode of life. One has only to consider the use made by the Broadcasting and Motion Picture Industries of this process to realise how large a part it plays in our individual existences, to say nothing of the huge fraternity of music lovers throughout the world who possess a gramaphone with which to bring the works of the masters into their own homes.

There are several ways in which sound recording may be carried out, and each has its own particular application. They differ widely in their choice of medium in which to enshrine the sounds, and in their method of so doing. Thus we find the motion picture industry using a photographic method of registering various patterns on the side of their film, which when passed through suitable equipment will cause the re-production of sounds bearing a close resemblance to the dialogue which was originally associated with the action being displayed on the screen. One of the most recent methods adopted by broadcasting is the use of a metallic tape or wire into which varying magnetic conditions are injected according to the nature of the sound waves being recorded. When the wire or tape is re-run through appropriate equipment, these sounds are re-generated and bear a considerable resemblance to the original.

A third method is to employ a disc or cylinder on which is engraved a shallow track of considerable length, the undulations of which are impressed according to the nature of the sounds being recorded. These are later used as a cam to produce mechanical motion of a needle ,and the subsequent production of sound waves. This method is historically the oldest of all, and despite the many claims put forward on behalf of other systems, it still retains certain advantages which are unique, and is therefore not likely to be readily displaced. It is with this method of recording that the following article will deal, having particular regard to the requirements of those who wish to undertake experimental work in this field.

SOUND-ON-DISC RECORDS.

The Gramaphone is such a familiar piece of equipment to-day that no attempt will be made to describe how it works, beyond indicating a few facts which might not readily be apparent. As mentioned above, the undulating channel which constitutes the sound track acts as a cam to import motion to a needle which in turn generates sound waves by either mechanical or electrical means. The undulations may take place from side to side, keeping the depth of the groove constant, or they may vary in depth only. The former method is termed "Lateral" Cutting, and the latter, "Vertical" Cutting. Certain advantages lie with Vertical Cutting, but the technique is very much more difficult, and for Amateur practice, Lateral methods are to be recommended. In either case, however, the dynamical conditions are similar ,and these will now be considered.

The motion given to the gramophone needle by the rotating disc is the foundation upon which the resulting sound waves will be built. The number of vibrations executed per second under the influence of the groove will determine the pitch of the resulting sound. The relative energy of the sound, however, will depend upon the **velocity** with which the needle is moved. In order to appreciate fully this particular fact, let us digress for a moment and consider a record on which has been impressed a pure tone of frequency 1000 cycles per second and amplitude (a) inches or cms. The groove will then have the appearance of Figure 1a, which is easily recognised as a sine wave, and its proportions will be such that at any given diameter, and when rotated at its correct speed, the time required for the length of track between points A and E to pass beneath the needle will be 0.001 seconds. During the passage of portion AB, the needle will have moved a distance (a) at right angles to to the axis AG of the curve. For portion BC it will move back a distance (a), and for portions CD, DE this process will be repeated on the opposite side of the axis AG. We thus see that the needle has moved a total distance of 4a during the passage of the portion AE of the groove ,and this has taken place in 0.001 seconds. The average needle velocity during this cycle is obtained by dividing the distance moved by the time, or 4a divided by 0.001, or 4000 a. This velocity may be specified in inches per second or in cms per second (usually the latter).

Now consider a similar 1000 cycle note of amplitude (a'), as shown in Fig 1b. By applying exactly the same reasoning, we find that the average needle velocity in this case will work out at 4000 a' inches (or cms) per second.

The interesting thing to note ,however, is that for any given frequency the needle velocity must increase proportionately to the amplitude of the groove. Experience or maybe intuition, tells us that louder sounds on a gramophone record must be associated with a larger amplitude, but the higher needle velocity which arises with louder sounds is a fact which is not normally called to mind when considering the probem.

In an electric pickup, the needle is connected to an armature which generates a small alternating electric voltage in a coil of wire. In an acoustic gramophone it is coupled to a diaphragm which sets up an alternating air pressure within the tone-arm and sound conduit. In both cases the effect depends upon the speed at which the needle moves. (This may be more readily appreciated by electrical devotees when it is remembered that the magnitude of the voltage induced in the pick-up coil is governed by the number of magnetic lines of force cut **per second**). Thus we see that the velocity of the needle is all important in the relative energy level which is produced in the pick-up, and is indeed a direct measure of the loudness of the resulting sound.

NOTE.—Critical readers will no doubt take issue with the authors over the use of this purely arithmetical average velocity. Mathematicians employ R.M.S. values for velocities in exactly the same way as electrical workers use R.M.S. values of voltages and currents, but the treatment of the subject in the above simplified form has been adopted for ease of explanation. In any case it makes no difference to the facts which we wish to elucidate.

This phenomenon is true for any one frequency, but when we come to consider different frequencies we meet another interesting fact, namely that sounds of equal loudness do not spring from grooves of equal amplitudes. In Figure 2 we see grooves for frequencies of 1000 and 2000 cycles per second which have been superimposed on each other for convenience. If they are to yield sounds of equal loudness, they must produce the same needle velocity ,and it will be evident that in order to do so they must have different amplitudes (a_1) and (a_2). A moment's consideration on the lines outlined above will show that amplitude (a_1) for the 1000 cycle groove will be exactly twice that for the 2000 cycle groove.

(Continued on Page 23)

CENTIMETER WAVE MAGNETRONS

THE TUBES THAT MADE MICRO-WAVE RADAR POSSIBLE

Taken from an article by Henry F. Argento in Q.S.T.

Although Radar has emerged from the war as a startling new discovery, its principles are not as new as they might appear to be at first hand. Radar was known and developed simultaneously in America, England, France and Germany during the early 1930's. Like every other electronic device, its development and improvement was predicated on the development and availability of tubes. The heart of any electronic device is a tube, whether it be a radio set, a Radar, or an electronic device.

Very early Radars were low frequency devices which used enormous dual antennnas and large bulky transmitters and receivers. It was known at the time that radars capable of greater resolution and accuracy, as well as much smaller and lighter in weight, could be developed if tubes could be made available to generate power at the super high frequencies. Accordingly, the British Admiralty assigned the problem of developing a generator of microwaves to a research group at the University of Birmingham. The Birmingham group developed a practical form of cavity magnetron which, along with other developments, opened the possibilities of obtaining satisfactory power output at extremely short wavelengths. In the latter part of 1940, a British technical mission headed by Sir Henry Tizard, demonstrated the cavity magnetron to American Scientists.

In the Autumn of 1940, Raytheon assigned its best research and engineering talent and facilities to work with the Massachusetts Institute of Technology in the making of experimental micro-wave type tubes. The art at that time was completely new—about as far advanced as radio was in the old spark gap days of 1916. The theory of generation of micro waves was not understood, equipment for experimentation was not available, and methods of producing useful tubes were unborn.

As is well known, Radar operates on the principle of sending out extremely short bursts or pulses of high frequency energy and measuring the time interval required for the small package of energy to reach its objective and to be reflected back to its source. When the length of time required for the energy to travel back and forth is known, the distance to the object can be accurately ascertained. By concentrating the energy into a very narrow ray, the beam can be used to scan different objects and the orientation of the beam antenna system or "Director" gives the direction. Thus the position as well as the distance of a given object can be gauged.

The two basic requirements for the generator are that it be capable of producing an extremely large amount of energy for short period of time, and that its frequency be as high as possible so that the narrowest possible beam can be produced with a given size of reflector in the radiating system. It is further required that the generated frequency be quite stable. The Magnetron is essentially a device which can be pulsed rapidly for intervals in order of micro seconds and which is capable of delivering hundreds, thousands and millions of watts of power at wave lengths in the centi-meter range.

MAGNETRON CONCTRUCTION.

To achieve frequencies, conventional ideas of tuned circuits containing lumped inductance and capacitance had to be discarded. Even the shortest lead lengths are too long to allow satisfactory operation at these frequencies. For this reason the circuits are built directly into the anode of the tube. Essentially, the Magnetron is the thick walled hollow cylinder of copper with a series of identical longitudinal "keyholes" in the wall around the inner diameter, the keyholes being cut so that the narrow slots open into the centre hole. Each of the keyholes represent a transmitter circuit, with the hole itself making up the inductance and the slot providing the capacity. Conventional oscillators use just one tank circuit, but in order to obtain workable sizes of tubes the Magnetron uses a series of multiple keyhole circuits all tuned to exactly the same frequency. In the centre of the cylinder is placed an emitting cylinder usually in the form of a nickel sleeve coated with active barium and strontium oxides which, upon being heated, produce a copious flow of electrons. Energy is removed from one of the cavities either by using a coupling loop or by having the cavity open into a wave guide window.

In the operation of the Magnetron a magnetic field is applied axially to the tube, causing the electrons to describe circular paths about the cathode when a high voltage pulse is applied between anode and cathode. The electron motion can be looked upon as air stream passing a slot, which, when the stream acquires the correct velocity, causes the cavity to resonate. The critical velocity of the electron stream is reached when one cavity represents a negative portion of the output wave while the next cavity is positive. The problem of the growth of oscillations is too complex to be adequately covered by such a simple anology, but space does not permit dealing with it more completely at the present time.

BUILDING THE TUBES.

The manufacture of Magnetrons is difficult, in as much as the tube requires a very high degree of vacuum, must be capable of delivering extremely high power at high voltage, and requires the utmost in mechanical precision in a metal—oxygen-free copper—which is very difficult to machine. The original magnetrons were made by taking a solid cylinder of copper and drilling, machining and broaching the desired configuration from the solid chunk. Approximately one hundred man hours of expert machine work were required to accomplish this, and the results were not always too satisfactory because for full efficiency each of the cavity resonators has to be the identical counterpart of its neighbour, moreover after being machined the tubes require hours of processing, ageing and testing. Their production was slow and costly.

Foreseeing the need for large quantities of microwave equipment the navy, in December of 1941, made funds available to Raytheon for the erection of a factory and the establishment of facilities for the production of micro-wave tubes. A building providing one hundred and twenty thousand feet of floor space was hurriedly erected. Equipment was designed, machines were ordered, and in May of 1942 Raytheon moved into this heavily guarded tube plant and produced the first magnetron in its new location. At the time these facilities were planned they were laid out for a maximum production of one hundred magnetrons per day. No sooner had the plant begun operating than the demand for the tubes increased from the hundred to the tens of thousands. Sufficient machine tool capacity did not appear to be available to meet this demand, and the magnetron loomed as the bottle neck item in the whole radar picture.

At this juncture, Percy L. Spencer, W1GBE, Raytheon Director of Research, developed a mass production system known as the "Lamination" Method, that eliminated precision machine work and over night expanded plant capacity from one hundred per day to over one thousand per day. In this method the desired anode configuration is stamped out in thin sheets of copper. Half of the cop-

per punching are discs having a diameter of about two inches, while the other half are stamped to a three inch diameter. The two sizes are stacked alternatively on precision jigs and then brazed together into one solid mass in an automatic conveyor furnace. In this way the entire magnetron body can be made without any precision machine work. Not only is the desired anode configuration achieved by this method, but the large laminations form the cooling radiator a swell, making it an integral part of the tube body. This has the effect of providing much better cooling. To supplement the lamination method, twenty foot diameter automatic exhaust machines were built, making it possible for one operator to do work formerly requiring fifteen in processing the tubes. All manufacturing was converted over to mass production technique, with magnetrons being produced on a series of a hundred and twenty foot production lines.

How well these methods worked is attested by the fact that magnetrons, the item which originally had been figured as a crucial bottle neck never once held up the manufacture or shipment of a piece of Radar equipment. Furthermore, these mass production methods were such that over half of all the magnetrons produced in the world flowed out of this one Raytheon plant.

VERSATILITY PLUS.

As the war progressed, different technical requirements dictated needs for different types of magnetrons. Special tubes were required to direct the guns of the big battle waggons, to search the skies for planes, to direct anti-aircraft searchlights; to track down fast flying buzz-bombs, to make light weight portable beacons, to direct precision bombing from the skies, and to land planes. The number and variety of tubes grew until there were fifty or sixty different types.

As usual, the first demand was for greater efficiency. Twenty per cent. was about the best that could be obtained with the earlier tubes. By designing for better ratios of inductance to capacity, and, principally, by discovering "Strapping," tube efficiencies were increased to well over fifty per cent.. The alternate solid sections between the cavities are electrically connected together. This forces alternate cavities to lock together to produce a single frequency, thus overcoming minor frequency differences between individual cavities.

The second requirement was for tunable magnetrons. At the rate new equipment was being designed, it looked as though there would have to be innumerable magnetron types if each one had to be a fixed frequency device. To meet this need, several different types of tuning mechanisms were developed at Raytheon. The one that has probably had the widest use in the field is that employed in the 2J61A. In this tube the small capacity ring is mounted above the anode block opposite the ends of the cavities. By varying the distance between the ring and the anode body the capacity of each individual oscillator is readily changed. Varying the spacing between the ring and block imposed a rather serious problem, in as much as mechanical motion had to be transmitted through a vacuum type body. It was solved by using a sterling silver diaphragm on one side of the anode and transmitting the motion to the capacity ring through this diaphragm.

In every piece of aircraft equipment weight and size are the dominating factors. Magnetrons require a strong external magnetic field, usually produced by a separate permanent magnet weighing anywhere from ten to forty pounds. To overcome this weight difficulty, the newer "package type" tubes were designed. In these tubes the air gap is reduced to a minimum by inserting the magnet pole pieces directly into the tube and by making the external magnet actually part of the tube. External magnet tube which previously had an overall weight of seventeen pounds were reduced in weight to three and a half pounds in the comparable package type —without sacrificing any efficiency or mechanical characteristics.

Characteristic of any new development the cry soon was for more and more power. The early tubes were capable of delivering powers of eighty to one hundred kilowatts. This was soon increased to two hundred, three hundred and five hundred kilowatt peaks. However, even these powers did not satisfy the services. They demanded peak powers of at least one million watts. It can be readily understood what a difficult problem was presented in as much as cathodes for such tubes had to be able to deliver one hundred amperes and the tubes had to be capable of operating at thirty thousand volts. Oxide coated cathodes able to met these requirements were unknown. Intensive work and considerable ingenuity were required to develop tubes to meet these specifications.

These figures may sound fantastic to those whose experience with power tubes has been confined to ordinary operation where the output is continuous, particularly when the tube that does the job, magnet and all is no bigger than a five hundred watt tube built for lower frequencies. The explanation is the fact that with pulsing the tube in the non-operating position a far greater part of the time than it is working; the "duty cycle" is such that the tube is "off" more than a thousand times longer than it is "ON". But the capacity to produce the power must be there, nevertheless; the only "saving" is in the fact that the AVERAGE power the anode must dissipate is not large.

SOME MAGNETRON TYPES

It may be of interest to look at some of the characteristics which illustrate the various functions magnetrons were made to perform. One of the more common tubes is the type 2J61A, an eight cavity tunable magnetron capable of delivering peak power of a hundred kilowatts over a range of 3000-31000 megacycles when operated at 14 kilovolts. The magnet field necessary for its operation is about 17 hundred gauss.

An example of a light weight low powered tube is the type 2J39. The 2J39 is an integral magnet 10 centi metre oscillator weighing less than two pounds and is capable of delivering nine kilowatts when pulsed at five kilovolts.

A tube which is fairly representative of the high powered class of magnetrons is the type 4J31. This tube delivers 1,000,000 watts (that's right—Ed.) when operated at 30,000 volts and 70 amps. Provided sufficiently antenna is used, enormous ranges can be scanned with a radar build with such a high powered tube.

The type 3J55 represents the ultimate to-day in the design of a three centimetre magnetron. This tube which operates at 9375 megacycles is a package type magentron having an integral magnet. Its overall weight including magnet is a bit over two pounds. At 12 kilovolts and 12 amperes the 2J55 delivers 50 kilowatts of peak power.

The super high frequency radar required several types of special micro-wave tubes other than magnetrons. Of considerable interest are the velocity modulated types such as the 707 and the 2K28 at ten centimetres, and the 2K25 at three centimetres. These tubes are used as local oscillators in superheterodyne receivers. Their operation is essentially the same as that of a common toy whistle. In a whistle a stream of air is blown past a resontaing chamber, and if the air velocity is correct a sound whose pitch is determined by the volume of the resonator will be produced. In velocity modulated oscillators a stream of electrons is shot out of a gun through a small cavity resonator. By properly designing the cavity and by controlling the speed of the electron Stream, oscillatons are produced having a frequency determined by the constants of the resonator cavity. The 2K28, a common type of such tube, puts out an average power of 150 milliwatts at 10 centimetres with the resonator held at 300 volts. Such a tube readily can be frequency modulated and it may be of considerable interest to the Ham who wants to experiment with short range directional communication at low power.

NEW TUBES

Although not available in this country, the design data of two new tubes, the HD59 and 2E25 is published for the interest of readers. The tubes are products of the Hytron Radio and Electronics Corporation, Salem, Mass., U.S.A.

HYTRON DEVELOPMENT TYPE HD59
Miniature Instant-Heating Beam Tetrode.

The Hytone development type HD59 is a filamentary type of beam tetrode designed for use in higher frequency mobile equipment as an audio frequency amplifier, Class C oscillator ,and frequency multiplier in those applications where it is desired to eliminate filament drain during standby periods. The oxide coated filament of the HD59 comes to operating temperature in less than one second.

GENERAL CHARACTERISTICS.

Filament	Oxide coated
Patential a-c or d-c	6.0± 10% volts*
Current	0.7 amperes
Transconductance	3000 umhos
Amplification factor (average)	70
Plate resistance	27,000 ohms
Direct interelectrode capacitances (without external shield)—	
Grid to plate (maximum)	0.3 uuf
Input	10.0 uuf
Output	7.0 uuf
Maximum overall length	2⅝ inches
Maximum diameter	¾ inch
Seated hold-down height	2±3/32 inhes
Bulb	T5½
Base	Miniature button 7-pin
Mounting position	Filament plane must be vertical

Beam plates should be connected directly to ground. In V.H.F. cidcuits the filament leads and center-tap should be by-passed to or grounded to a common point to provide lowest effective filament inductance.

A.F. POWER AMPLIFIER—CLASS A1

Maximum Ratings, Design-Centre Values.

D.C. plate potential	250 max. volts
D.C. screen grid potential	250 max. volts
D.C. plate input power*	7.5 max. watts
D.C. screen grid input power	1.5 max. watts
Plate dissipation	7.5 watts

Typical Operation—Average Characteristics

A.C. filament potential	6.0 volts
D.C. plate potential	250 volts
D.C. screen grid potential	250 volts
D.C. control grid potential§	(a) —20 volts (b) —— (c) 450 ohms
Peak a-f control grid potential	20 volts
Zero signal d-c plate current	40 ma
Max. signal d-c plate current	42 ma
Zero signal d-c screen grid current	2.5 ma
Load resistance	4500 ohms
Max. signal plate power output	3.5 watts

R.F. POWER AMPLIFIER AND OSCILLATOR CLASS C TELEGRAPHY AND FREQUENCY MODULATION

Key down conditions per tube without amplitude modulation.

Maximum Ratings, Absolute Values

D.C. plate potential	250 max. volts
D.C. screen grid potential	180 max. volts
D.C. control grid potential	—150 max volts
D.C. plate current	50 max. ma
D.C. control grid current	3 max. ma
D.C. plate input power	12.5 max. watts
D.C. screen grid input power	1.5 max. watts
Plate dissipation	7.5 max. watts

Typical Operation—Class C Osoillator—Average Characteristics—

D.C. plate potential	250 volts
D.C. screen grid potential	150 volts
D.C. control grid potential§	(a) —75 volts (b) 2700 ohms (c) 1500 ohms
Peak r-f control grid potential	100 volts
D.C. plate current	37 ma
D.C. screen grid current	9 ma
D.C. control grid current	2.8 ma
Control grid driving power	.35 approx. watts
Plate power output	6.0 approx. watts

Class C Doubler—(40 to 80 mC).

D.C. plate potential	250 volts
D.C. screen grid potential	150 volts
D.C. control grid potential	—150 volts
Peak r-f control grid potential	175 volts
D.C. plate current	39 ma
D.C. screen grid current	7 ma
D.C. control grid current	3 ma
Control grid driving power	0.55 approx. watts
Plate power output	4 approx. watts

NOTE:

* Switching of the filament with plate and screen potentials applied may result in damage to the HD59. Circuits should be designed to remove high voltage prior to or simultaneously with the filament voltage.

§ Obtained from (a) fixed supply, (b) control grid resistor, (c) cathode resistor, or by combination of methods.

HYTRON 2E25
(Tentative Data)

The 2E25 is a 15 watt tetrode with an instant heating filament for use in r-f and modulator service. In portable and mobile applications, the filament can be shut off

during standby periods with tremendous saving in battery drain, as compared to cathode type tubes when transmitting time is a small percentage of the total time. Under these conditions, the plate supply must be turned off before or simultaneously with the filament. When heated from a transformer with a normal 6.3 volt output the connections may be made with small wire in order to introduce a potential drop of 0.3 volts. This tube requires no neutralization up to frequencies of 100 megacycles and can be used at full ratings to that frequency.

GENERAL CHARACTERISTICS.

Filament	Thoriated Tungsten
Voltage a-c or d-c	6.0± 5% volts
Current	0.8 amperes
Transconductance	2500 umhos
Amplification factor (average) (G_1 to G_2)	6
Direct interelectrode capacitaices—	
Grid to plate (maximum)	0.15 uuf
Input	8.5 uuf
Output	6.0 uuf
Maximum overall length	4-3/16 inches
Maximum diameter	1-7/16 inches
Bulb	ST-11
Cap	Small metal
Base	7-pin medium shell short octal phenolic
Mounting position	Filament plane must be vertical

A.F. POWER AMPLIFIER AND MODULATOR CLASS A1

Maximum Ratings, Design-Center Values

D.C. plate potential	400 max. volts
D.C. Screen grid potential	250 max. volts
D.C. plate input power*	10.5 max. watts
D.C. screen grid input power	2.5 max. watts
Plate dissipation*	10.5 max. watts

Typical Operation—Average Characteristics

A.C. filament potential**		6.0	6.0 volts
D.C. plate potential		300	250 volts
D.C. screen grid potential		250	250 volts
D.C. control grid potential**§	(a)	—25	—22.5 volts
	(b)	——	——
	(c)	600	500 ohms
Peak a-f control grid potential		25	22.5 volts
Zero signal d-c plate current		34.5	38.5 ma
Max. signal d-c plate current		37	40 ma
Zero signal d-c screen grid current		3	4 ma
Max. signal d-c screen grid current		8.4	9.6 ma
Load resistance		7000	6000 ohms
Total harmonic distortion		11	7 per cent.
Max. signal plate power output		6	4½ watts

A.F. POWER AMPLIFIER—Class AB2

Maximum Ratings, Absolute Values

D.C. plate potential	450 max. volts
D.C. screen grid potential	250 max. volts
Peak positive a-f control grid potential	60 max. volts
Max signal d-c plate current§§	75 max. ma
Max signal plate input power§§	33 max. watts
Max. signal screen input power§§	5 max. watts
Plate dissipation§§	15 max. watts

Typical Operation—Average Characteristics

Unless otherwise specified, values are for two tubes

A.C. filament potential**	6.0 volts
D.C. plate potential	450 volts
D.C. screen grid potential	250 volts
D.C. control grid potential **§ (a)	—30 volts
Peak a-f control grid to control grid potential	142 volts
Zero signal d-c plate current	44 ma
Max. signal d-c plate current	150 ma

(Continued on Page 22)

IN REVIEW

TECHNICAL BOOKS - - - - - - - RECORDINGS - - - - - - - - - - - - - PRODUCTS

BOOKS

PRINCIPLES OF RADIO FOR OPERATORS

Ralph Atherton.

This book was apparently produced by Professor Atherton to be used in the course of a training programme for Navy operators at Miami University. The complete course took 16 weeks and the book is set out on a chapter a week basis.

The need for such text books as this has, of course, now passed, but it is to be hoped that this one and a few others remain in print, as their usefulness for the training of candidates for civilian operator's certificates is readily apparent.

This is an elementary book, and it would not serve as a complete guide to the study necessary for the A.O.C.P. examinations, but in conjunction with the generally accepted "standards" manuals it may be very helpful to the student.

The first part of the book treats the nature of electric currents, batteries, Ohm's Law, simple circuits, magnetism, inductance, capacitance, and alternating currents. The aplication of these basic principles to the operation of radio is pointed out as they are introduced. The remainder of the book deals directly with radio—sound and sound waves, vacuum tubes, power supplies, receivers, transmitters, antennas and their operation and maintenance.

The only query one might raise in connection with this book concerns the title—it would seem to pander to the old idea, more prevalent in the Services than elsewhere, that an operator is one who can send and receive like a machine under all sorts of difficult conditions, but who need not know much about his equipment. Nothing could be more fallacious. Let us hope that the disturbing tendency in that direction noticeable in the U.S.A. in the immediate pre-war years, due very largely to the ready availability of factory made transmitters and other gear, will not manifest itself in Australia.

PRINCIPLES OF RADIO FOR OPERATORS—Ralph Atherton (Macmillan, N.Y. 1945) 331 pages 5 x 7 and index, 426 diagrams, 23/6).

U.H.F. RADIO SIMPLIFIED—Milton S. Kives.

There seems to be a certain amount of competition these days among technical writers to see who can present U.H.F. technique in the simplest form. At first sight it was thought that Milton S. was an entrant in the race, but perusal of his book shows that he has not been rash enough to sacrifice usefulness for over-simplification in the presentation of his subject.

While it is true that Maxwell's equations and Fourrier's Analysis are not to be found in this book (these two gentlemen have been well and truly immortalised elsewhere, anyhow!) sufficient matter are included to help out.

The arrangement of the text is logical and orderly, following an introductory chapter which sets out the fundamental differences between H.F. and U.H.F., Magnetrons and Klystrons are dealt with. Having, as it were, penerated sufficient U.H.F., the author passes to a discussion of Transmission Lines, Wave Guides, Resonators and U.H.F. Antennas. Chapters on U.H.F. Measurements and Wave Propagation are used to complete the review of the subject. The treatment of wave propagation is particularly good.

Useful both for the beginner and the established amateur who is about to make his first attack on the U.H.F.'s and for that matter the V.H.F.'s.

U.H.F. RADIO SIMPLIFIED—Milton S. Kives (Van Nostrand, N.Y. 1945) 235 pages, 5 x 7 and index, 157 illustrations, 26/-).

OUR FRONT COVER

——AN INTERESTING MEASURING INSTRUMENT.

The Philoscope Type T.A. 160, now available to "Hams" is an extremely versatile measuring instrument manufactured by Philips Electrical Industries.

Constructed around the well known A.C. bridge principle the instrument includes built in standards for measuring a wide range of impedance values. Instead of the usual phones or delicate meters for balancing the bridge however, it makes use of a sensitive "magic eye" indicator. This gives an accurate sharp null completely unaffected by vibration or shock. Use of the magic eye also has permitted the incorporation of a variable sensitivity control by means of which the response at balance can be broadened to any desired degree when searching for the approximate value of the impedance being measured.

The measuring range covers 0.01 ohm to 10 megohms on resistance and 10 M.M.F. to 10 M.F. on capacity ranges. In addition, the Philoscope can be used for external comparative measurements of resistance, capacitance or inductance either as a ratio over a range of 0.1 to 10 or as a close percentage of —20% to + 25%. All measurements are read directly from the main dial and range switch. Accuracy on all ranges is ± 5% and provision is made for checking calibration at any time.

The instrument is completely self contained and is mains operated by a 220, 240, 260 volt + 10%, 50 cycles supply. The maximum voltage applied to components under test is 3 volts or in the case of a low resistance the maximum current is 500 m.A. so that there is no danger of damage to components by incorrect connection.

The next few months will show much rebuilding and experimental work in amateur circles. Without adequate test gear however, efficient construction and adjustment of radio equipment is impossible. When it comes to checking circuit impedance values the T.A. 160 Philoscope is outstanding. Everything from oscillator grid resistors or high tension filter condensers to the station earth resistance may be accurately and quickly tested with this compact and robust instrument.

RECTIFIERS.

easil be done with small resistors in series with each anode. As only two or three volts drop are needed, the ohmage is low and the effect on output voltage and efficiency is negligible.

The automobile type of rectifiers and those used in A.C./D.C. equipment have the cathode insulated from the heater. Actually all heaters are insulated by a coating of pure sintered alundum, baked at temperatures higher than normal. In the case of these rectifiers there is a large voltage between heater and cathode which calls for special care and testing. Life tests are made under very stringent conditions which maintain a large voltage between heater and cathode. In the field the insulation leakage is not likely to amount to more than a few micro-amps.

In the absence of actual breaking away of the alundum permitting the heater to touch the cathode, no trouble need be feared. Such breakdowns are not common, but it is obviously good practice to insert a protective fuse. This should be done with indirectly heated rectifiers for another reason; because of the low impedance in the event of a short somewhere else in the equipment the current may rise enough to damage the cathode or to burn out its pigtail connection and the fuse will prevent this untimely decease of the rectifier.

FEDERAL HEADQUARTERS

HANDBOOK.—The long awaited "Handbook for the Guidance of Operators of Experimental Wireless Stations," is now available from offices of the Wireless Branch in each State, price 1/6. Every Ham and intending Ham should have one.

CALENDAR.—We have just received the I.A.R.U. Calendar for December, 1945, and this month we are devoting the remainder of our space in these notes to extracts from it.

"This Calendar, the first since December, 1941, goes to a Union membership struggling to reconstitute itself after the effects of nearly six years of war. We should like to be able to report a complete return to normal, but unfortunately we cannot. Conditions in our various countries are widely different. In some, where the member-society has been fortunate enough to continue operations during the war period, activities and enthusiasm are reaching all-time highs. In several countries where organizational activities were suspended or existed only on a skeleton basis, officers and key personnel are still engaged in rapidly guiding their societies back to peacetime status. From some countries, of couse, there is no word of any kind.

As a means of informing each of us about the individual situations of the others, we list below a brief summary of conditions in the countries from which we have recent reports, the latest received to the date of this Calendar:

Argentina.—Back on all pre-war bands. Society very active during wartime, amateurs being permitted to operate on 5— and 2½ metres.

Australia.—Impounded apparatus being returned, and new regulations being drafted. Society maintained skeleton activity during wartime.

Belgium.—Amateur licenses cancelled and ownership of equipment still prohibited, but much hope is held for eventual restoration of ham radio. Status of F.E.B. uncertain, but both French and Flemish-speaking societies still active.

Brazil.—Back on all pre-war bands. Society very active.

Burma.—No word.

Canada.—Back on bands above 28 Mc. (See United States).

Colombia.—Back on. Society active.

Cuba.—Back on all bands, subject to issuance of new licences. Society active.

Czechoslovakia.—No word on reactivation, but society resuming activity.

Denmark.—No amateur operation, but society active.

Egypt.—Believed back on air, but no word from the society.

Eire.—Society has resumed activity, negotiating the return of impounded gear. No amateur authorization yet.

Estonia.—No word.

Finland.—Society resuming activity, but no authorization for amateur operation as yet.

France.— Society maintained activities underground during wartime; now being reorganised. Amateur operation not yet authorized.

Germany.—No word. Amateur radio of course prohibited.

Great Britain.—Society very active. Amateurs being reactivated on 28 Mc. and above under new regulations.
Hungary.—No word.
Italy.—Some society activity, but no amateur operation.
Japan.—No word. Amateur radio of course prohibited.
Lithuania.—No word.
Luxemburg.—Society suffered greatly during war; now resuming activities. No amateur operation.
Manchukuo.—No word.
Mexico.—Back on all bands. Society very active.
Netherlands.—No amateur operation. One new association formed to absorb several previous ones, including our member-society.
Netherlands Indies.—No word.
Newfoundland.—Back on all bands. Society active.
New Zealand.—Society active, awaiting authorization for amateur operation.
Norway.—Society active. No amateur operation.
Poland.—Society reported disbanded, headquarters destroyed. No amateur operation.
Portugal.—No word.
Rumania.—No word.
South Agrica.—Society again active. No amateur authorization as yet.
Spain.—No word.
Sweden.—Society resuming activity. No word on amateur authorization.
Switzerland.—Back on all pre-war bands. Society very active.
United States.—Society very active. Amateur operation authorized on 28 Mc. and above.
Uruguay.—No word.
Venezuela.—No word.

There are many administrative membership problems facing the headquarters: Will there again be a society in Germany or Japan able to qualify under the Union's constitution? What is the official political status of Manchukuo? What is the status of the Axis "satellite" countries in Europe? What is the status of certain occupied countries which may be annexed or absorbed into others? The Headquarters finds itself unable to answer these and other comprehensive questions and feels that only the passage of time and future decisions of the United Nations Organization will it be possible to attain a solution.

Further, it is easily apparent from the above tabulation of activity that there are disrupted conditions in many of our member-societies, so that it will be impossible to conduct successfully even the normal, routine business of the Union. The Headquarters therefore feels obliged to announce that it is unable to transact business within the Union, including the acceptance of formal Proposals requiring voting, until such time as a reasonable majority of member-societies are found to be currently active and able to participate in the Union's affairs. This Calendar will remain purely informative temporarily, its prime purpose being to facilitate the reactivation of our member-societies and provide a common working ground for our objectives.

One of the most important tasks of our Union is to prepare now for the next world conference on radio, expected in late 1946 or early 1947. Nearly ten years have elapsed since the last one in Cairo, 1938. During that time radio technique had made many strides forward, resulting in new and expanded services and consequently greatly increased pressure for frequency assignments. Because of the widespread political changes which have occurred as well, the next conference will not only revise the Cairo regulations but also the Madrid convention of 1932. It will therefore be an event of great import to us all.

A preparatory five-power meeting between China, France, U.S.S.R., the United Kingdom and the United States is planned to be held during March or April, 1946, in or near Washington, D.C. This meeting will act as a "steering committee," not only setting the actual time and place for a world conference but also attempting to come to preliminary arrangement on various matters which will certainly be brought up at the international conference itself. We shall have further information for the June Calendar.

For the information of members the Headquarters reports that the U.S.A. has already prepared its position for the coming world conference, providing for retention of the customary amateur bands between 3500 and 30,000 kc. (except that in the U.S. the 10-metre band is provided as 28,000-29, 700 kc.; it is hoped the full width will be available in other countries). The United States proposal has been agreed to, in substance, by the nations represented at the recent Inter-American Radio Conference at Rio de Janeiro. At that conference also it seemed the sentiment that our 160-metre band would be henceforth assigned in the American region for navigational aids and no amateur facilities would be available below 3500 kc.; however, it is hoped that in countries outside the Americas where low frequencies may have useful amateur application, the band may be retained.

The Headquarters particularly wants to call attention to a proposal that will be advanced at the proper time by the U.S.A., to allocate the amateurs a new band of frequencies 21,000-21,500 kc. Although only of marginal value commercially because of changing propagation characteristics and therefore not heavily occupied, these channels should be of great value to amateur radio. It will surely be well worth our while to exert our greatest efforts to secure this new band of frequencies. The location is good, being the third harmonic of 7 Mc. The Headquarters suggests that member-societies take such action as seems appropriate in mentioning the matter to their respective governments and endeavour to arrange for their approval of the proposal when it is put forward by the United States.

The member-societies of the Union have a great responsibility in the cementing of relations with government authorities, keeping our world-wide position as strong as is possible. It should be remembered that no matter how firmly entrenched amateur radio may be in several of the larger countries, it is the **combined** vote of all nations, large and small, which produces the final frequency allocations and regulations. The underlying theme of all our work over the next year must be the preparation for the coming world conference.

CORRESPONDENCE

Correspondents are requested to keep their letters short and to the point.. The Editor reserves the right to delete anything he may think fit. The views expressed by correspondents are not necessarily those of the proprietors.

C/o B.B.C.A.U.,
Labuan Island, North Borneo.

The Editor—

I wish to bring to your notice that this station, VS5 JH, is temporarily off the air, having had authority to operate withdrawn.

I wish to thank those members who reported on my signals, actually I have received numerous SWL reports from all over the world.

Until I ceased transmission I had WAC on 14 mC CW and worked just under 50 countries, so I am quite satisfied with the results. Of course, the transmitter here was using 200 watts so one should certainly put out a good signal. The line up was as follows—807 c.o. (tritet), 807 buffer-doubler, parallel 813's. The antenna was a delta matched dipole about 60 feet high, and the receiver an R.C.A. AR88.

Ten metres seems to be quite good up here, although few U.S. stations have been heard, numerous Ws on service in the Pacific area are active and put in an R9 signal.

I am awaiting permission to operate on Ten, but can only manage about ten watts.

In conclusion, let me wish the W.I.A. the best of luck for the new year and hope that 1946 will see us back on all bands.—Yours, etc.,

CPL. JOHN A. HUNT, VS5JH.

DIVISIONAL NOTES

NEW SOUTH WALES

The January Meeting of the Division was held in the Main Hall, Science House on Friday, 25th January. The attendance was a record one, 130 members being present. It had been anticipated that upon obtaining more accommodation the seating problem would have been overcome, but quite a few people had to stand. Sorry, chaps, looks as though we'll have to take the Town Hall soon.

This Meeting had been set down as the 36th Annual General Meeting, but several irregularities were pointed out, and it was found that it could not be held as such. The Annual General Meeting will be held in April.

The Chairman in declaring the meeting open, extended a welcome to Arthur Middleton, VQ2MI, Hank Koehler, VE4RL, and Earl Earle Williams, VK4ALE. Special welcome was extended to Bill Moore, VK2HZ, Jim Edwards, 2AKE, and Gordon Brigden, 2ACJ, who were until recently P.O.W.'s.

A very interesting lecture was given by Dr. Bowen Deputy Chief of Radio Physics Laboratory. The speaker had chosen for his subject "The Development of Radar," and the lecture was supplemented by moving pictures and lantern slides, Dr. Bowen being asisted in this respect by our old friend, "Bill" Stubbs, of the Australian Amateur Cine Society. It goes without saying that this was one of the most interesting talks ever given at an Institute meeting. The meeting expressed its aproval in a very enthusiastic manner.

Members were informed that the Australian Radio Propagation Committee intended making available to Amateurs, Monthly Bulletins setting out the Frequency to be used for any distance any time of the day. This information had been of untold value during the war to the Services, of course—and it is anticipated that the information would be of great value to Experimenters, with particular reference to the 50-54 mc. band.

With so much business to be transacted with reference to the forthcoming Convention to be held in Melbourne over Easter, General Meetings will be held as usual on the fourth Friday in the month, but in addition another night has been set aside for the Lecture. Thus in February the General Meeting will be held on the 22nd and on the 25th . F. P. Wood, B.Sc., Secretary to the Australian Radio Propagation Committee and Senuior Research Officer, Radio Physics Board will lecture on "The Ionosphere and its Effects of H.F. Communication." At the time of writing it is not possible to give the title of the March lecture.

Quite a large number of VK2 Amateurs have now received their licences and naturally most activity is on "Ten," although we understand that quite a few of the boys are getting ready for "Six." 2LZ, at Wentworth Falls, is putting in a very nice signal here in Sydney on 52.8 mcs. 2WJ, 2ABZ and 2LS are also active.

Remember General Meetings of the Division are held at Science House, Gloucester Street, Sydney, on the Fourth Friday of the Month and all Amateurs are invited to attend.

N.S.W. ANNUAL REUNION

The Annual Dinner and Réunion of the New South Wales Division was held at the New Dungowan on Thursday, 5th February. The Reunion took the form of a Welcome Home to Messrs. Moore, Edwards and Brigden, who until recently were P.O.W.'s. Opportunity was also taken to say farewell to the retiring Superintendent of Wireless, W. T. S. Crawford, Esq.

Sixty members were present and the guests included the Deputy Director of Posts and Telegraphs, Mr. J. Malone, the Acting Superintendent of Wireless, John Wetherill, W. T. S. Crawford, Colonel F. Lorenzo, D.S.O., State Operational Controller, Department of N.E.S. The "Oldtimers" were represented by Joe Reed, Harry Stowe and Malcolm Perry, whilst Phil Renshaw sent his 73's and regretted his inability to attend.

The toast of the "Repatriates" was proposed by Vice-President, Harold Peterson, VK2HP, and each ex-P.O.W. said a few words in reply. "Silent Keys" was very nicely and ably proposed by our new Councillor and A.O.C.P. Class Manager, Jack Howes, VK2ABS. This was followed by the P.M.G.'s Department proposed by ex-Federal President, F. P. Dixson, VK2FB. Mr. Malone, in reply stretted the value of the Amateur to the community both in war and peace, the happy relations existing between the Institute and the Department. He also made a plea that Australians not to develop an inferiority complex, to be proud of their country and not to make excuses for it. "Guest of Honour, W. T. S. Crawford," was proposed by the Chairman, VK2TI. 2TI briefly covred W.T.S.C.'s fifty years in communications, stressing the fact that Radio in Australia grew up with Mr. Crawford and that he could be looked upon as one of Australia's grand old men of communications. A presentation in the form of a silver tray was then made. "Bill" in reply thanked the Institute and stated that the night's function would be a treasured memory. The toast of the W.I.A. was proposed by Colonel Lorenzo, D.S.O., who stated that he wished to thank publicly the Institute for the splendid work done by the Emergency Comunication Network. The Colonel stated that he was very proud of the fact that Australia, particularly New South Wales, was the only country in the world to have a Radio system linked with an A.R.P. organisation. Therefore he wished to thank the Deputy Controller of Wireless and all operators for their services. "The Press" was proposed by C. S. Higgins, 2LO, and ably responded to by our old friend, John Moyle, VK2JU, Editor of "Radio and Hobbies." "The Visitors" was proposed by Membership Secretary, Bill Dukes, 2WD. VQ2MI responded. The evening concluded with a toast to the chairman.

A good time was had by all. It was very pleasing to see so many old faces again. The "Black Diamonds," who included 2KZ, 2YL, 2MT, 2XT, 2PZ, 2YO travelled 120 miles. That's the real spirit, chaps, and we look forward to seeing you next year. A telegram was received from the Newcastle gang, and letters from Phil Renshaw, Elgar Treharne and Bill Zech.

VICTORIA

The February meeting which was held on the 5th at the Instute Rooms, 191 Queen Street, Melbourne, again demonstrates the increasing interest being taken in Amateur Radio. Membership still increasing in great leaps to such an extent that the new membership secretary, Ray Jones, VK3RJ, says he is "having it." There was a record attendance of 120 members and visitors. Overseas visitors welcomed by the chairman, Harry Kinnear, VK3KN, were GM4NV and ZL4CJ, who are remaining in this country for some time and will be operating VK when licenced.

Recently returned from active service and present at the meeting were P/O Telegraphist Syd Clark, VK3; L/Telegraphist Jack Coulter, VK3MV. The meeting received some great entertainment frorm some of their experiences (personal, of course), whilst in the Middle and Far East. It was evident that one of M.V.'s experiences caused some embarrassment to VK3EJ whilst on leave in J. It's a good job sailors don't care.

Others present a tthe meeting include:—VK3's—WY, KN, HX. UJ, EE, BQ, YJ, XD, TU, UJ, AP, SZ, PQ, KC UH, MR, QZ, RJ, UM, LX, YR, HK, IG, EX, MV, CF, MQ, NR, LF, ST, JI, ZT, OJ, GN, FJ, OZ, OC, WG, NU.

TQ, RI, PO, PU, WQ, ZC, MO, CR, CO, XJ, RN, IK, ML, BD, EK, ZG, DM, CT, JO, AG, IF, NW, QU, ED, MJ. JD, JD, SO, EV, IU, AJE, XA, TZ, XZ, TF, LA, QS, BS. HS, NY, VQ, DA, QN, FU, 3JT, AT, SB.

I. G. Groves, A. R. Herald, H. M. Walsh, A. Patterson, H. Waterman, S. I. House, D. W. Fryer, A B. Bunney, H. C. Seddon, G. M. A. Lahiff, K. Maroney, J. P. Lancaster, H. W. Oakes, J. Kirley, C. Arnold, W. A. Shaw, D. Kerr, L. Shurrier, J Bail, S. J. Chesterfield, S. T. Clark, G. W. Neilson, P J. Pollock, J. C. Belcher, J. S. Taylor, A. Knight, I. Burns, A. G. Smith, J. W. Hall.

We are pleased to announce the following new members:—T. P. Kirby, 3KI; H. J. W. Hall; R. G. Coppen, 3NU; F. L. Johnson; D. L. Coghlan, 3ST; H. H. McLeod; J. W. Emmel, 3AJE; G. W. Neilson; H. Jupp, ZL4CJ; R. J. Bollock; F. C. Kerr, 3EK; N. L. Storck; T. E. Mablestone, 3QN; W. H. Tetheradge; W T. S. Mitchell, 3UM; A. E. Henry; W. H. Fleming, 3HP; E. C. Barry; A. J. E, Shields, 3GP; A. R. Lee; L. B. Fisher.

In the course of general business, 3YP's motion of previous meeting concerning allotment of frequencies or divisions on 28 m/c band was clarified when he said: "He was speaking from the CW man's point of view. The suggestion is that 28 to 28.2 m/c be used by CW stations only, the remainder of the band for fone operation. During the discussion, Bill Gronow, 3WG, suggested "What about some letters in the magazine, short, hot sweet on this highly contentious matter. So, fellows, the tin is in the middle of the field. Anybody having a kick?

Interesting discussion centred around the different types of service equipment which would be disposed of soon, and in this regard there was to be some consideration for members in the country who were more out of touch with Disposal Commission activities.

The Institute had taken the initiative and a scheme will be in operation for purchase of certain types of transmitters and receivers by tender. Country members are hereby advised to contact the Hon. Secretary for further information should they desire to be in any of the tendering groups, which it is understood, will be of great benefit to members of this Institute.

When "Snow" Campbell said that he was unable to listen on the bands and was hungry for information on conditions and activities, quite a number of members came to the fore. Max Howden, 3BQ, explained some conditions on 28 m/cs. As yet no good. it was stated the alternate day cycle was working. Some W's on CW in mornings, evenings a few Europeans D4 U.S.A., etc. The conditions were the same in 1934 period and anyway there were lots more stations starting up on 28 m/c band. It was reported by VK3EE that he and VK3BQ were the first two stations in VK to have a QSO since the closing down of stations owing to war.

The six metre gang still remain at the same numerical strength, and 3MJ offers assistance to others interested in using that band. 3MV and 3TZ reported being active on 112 m/c band and want to know when others are coming down there.

Herb. Stevens, 3JO, reluctantly has to quit some of his activities with the Lab. Committee, but fortunately we can look forward to some assistance from Bill Mitchell, 3UM. Nice work, Bill, and thanks, Herb. Dave Medley, 3MJ, and others promise activity and interest in the work being done by the Laboratory Section.

Bob Anderson, 3WY, thinks it a bad joke to be kept talking on the telephone for long periods at home particularly when there are some good broadcast programmes coming through, or he has something important to do. No offence, fellers, just make your fone operating snappy.

Discussion at Council meeting on 12/2/46 indicates that the Magazine should justify its existence, and the following definition of "Ham-ad." was given. This is a section for Experimenters to advertise, For Sale, Wanted

to Buy or Exchange a personal article. Commercial Ad. Is to advertise gear produced commercially and is for sale, wholesale or retail. The foregoing is as a result of mixing this class of activity with general business at the monthly meeting. So consider the "Mag.", fellows. Why keep a dog and bark yourself?

The March meeting of this Division will be held at the rooms, 6th Floor, Law Courts Chambers, 191 Queen St., Melbourne, at 8 p.m. on 5th. Members, visitors and intending members, all welcome.

QUEENSLAND

The last monthly meeting held on Friday, 25th January, saw a fair roll up, and for the first time for six years the boys were able to boast of the DX they had been working. A committee was appointed to form a students class for theory instruction, under the guidance of Cedric Marley, 4CJ. Others in the committee include 4ES, 4RF, 4HU, 4HB, whilst Eric Neale, 4EN, offered his services as QSL Bureau Officer.

The main business of the forthcoming meeting will be the preparation of agenda items for the Convention to be held at Easter time. A delegate has yet to be selected, but as a couple of city men expect to be in the south at that time no difficulty is expected in this direction.

George Gray, VK4JP, has received a QSL card for VK1DF. If that gentleman cares to contact George, the card can be had for the asking, and George won't be the only one curious about his QTH! The card is from an HB9.

It is with regret that we announce the passing of Mrs. H. Brown, Snr., Mother of Mr. H. Brown, VK3NN, of Yanac. The late Mrs. Brown was well known to many Hams in the old 200 metre days. To Mr. Brown, Snr., and his family we offer our deepest sympathy.

—ADHESIVE TAPE FOR LABELS

Adhesive tape can be effectively used for labels and can be typed on with a typewriter. To do this the tape should be placed lightly and smoothly on a thin sheet of photographic film. This can be easily inserted in a typewriter, and the required details typed on the tape. The tape can now be stripped from the film and applied to the article for which the label has been prepared. To keep the tape clean after it has been applied to the article, it can be given a coat of colourless nail polish.

★

The Western Union Telegraph Company has received permission to build a chain of 22 experimental Class II microwave relay stations extending from New York City to Pittsburgh, Pa. Pittsburgh to Washington D.C., Washington to Philadelphia, Pa. and Philadelphia back to New York City.

The present authorisation is the second link in the continuation of the W.U. development programme, the ultimate object of which is to obtain a commercial radio relay system connecting all the principal traffic centres within the United States. Previous grant was made for a chain of similar stations at New York City, New Brunswick, Bordertown and Camden, N.J.

Various frequency bands, extending from 1853 to 11,858 megacycles will be used, with 15 watt power at each station and with types AO, A1 A2, A3, A4 and special emissions.

—"Communications."

After general business had been concluded at the last meeting, we had the pleasure of hearing a most interesting lecture by Mr. M. Gabriel, B.Sc., who took for his subject, "The Chemistry of the Atom Bomb," or if you are frightened by the title, "The Atom Bomb in words of one syllable." Those who were present and who absorbed what was explained to them doubtless went away much better informed on the subject. Fred Beech, 4FB, subsequently moved a vote of thanks to the lecturer.

Several of the city gang are shortly going to take a fling at the 166-170 Mc band, mainly to serve as a prelude to later operations on lower freq. bands. Among those who will be on are 4RY, 4AW, and 4ZU. Let's hear from onyone else interested, otherwise the band may tend to feel a little lonely! Hi!

The reunion which we had hoped to hold on or about the 8th February, had to be postpuned indefinitely because of booking difficulties. The latest information is that we may be able to hold it obout the 8th March, providing that no hitch arises in the arrangements with Anzac House, which is the probable location of the event. It is also expected that badges will be available by the time that this apears in print. Anyone wanting one please forward 4/- to the Secretary, and the badge will be forwarded pronto.

Amongst recent returns to Brisbane and civilian life have been Bill Chitham, 4UU, and Albert Carter, 4LT, both of whom served in the Army, in a radio capacity. 4UU will be remembered as our QSL officer and treasurer before the war. Both of these men are no longer the same as in pre-war years, however, as both have recently taken unto their respective selves a YF. Well, I suppose it eventually happens to even the best of us!

The Institute has decided, following a suggestion by Eric Lake, 4EL, to assist in the building of a transmitter and receiver for one of our number who has recently had the misfortune to almost completely lose his sight. As a result of a World War I injury, Arthur Tonge, recently suffered this misfortune and we feel sure that our efforts in the direction mentioned will be well rewarded.

A little gossip on local activity—4RF, the proud possessor of a very fb receiver which must have taken many man hours of hard work to construct. An exciter of rather flexible design is that recently built by 4AP. Alf is using a 6SN7 xtal oscillator, 6V6 doubler and an 807 P.A. It can hardly be called original, but to my mind is as good a line-up as any for 10 and 5 metres.

A rather unique experience recently befell 4FJ, about to be discharged from the Navy. After making an exhaustive survey of the best locations from a ham's point of view, Roy selected on a good spot, ideal for reception and freedom from man-made noises, etc. Also there were no prominent sky-wires in the vicinity. However, there is always a fly in the ointment, and in this case it happened to be Bill Petersen, 4FY, who had recently arrived at the same conclusion as 4FJ and was having a house built just across the street.

One of our best Fone signals before the war, 4VJ, has recently started a business of his own. Years of experience with a prominent radio firm here should ensure the success of the new venture. 4 AW is also back in harness getting his business ship-shape again, whilst to go to the other extreme 4FB and 4RY are going on a few weeks' holiday. So you're taking it at last, Fred!

4RC is starting to compile a list of countries worked. Some of these fellows must have been practising, methinks. 4EN recently became so engrossed in a QSO that he didn't notice the time slipping by and was eventually hauled off up to bed by the wife about 1.30 a.m. How do you find the receiver for stability, Eric

Mine stays put in no uncertain fashion.

4ZU busy with a power pack for the final, but has a great longing for a few acres of ground so as to permit the erection of a few Rhombics. Is in the position of being able to play around with a couple of Super-Pros and a dozen or so Rhombics at his place of employment, hence the desire expressed above.

4OK, 4CU and others. What's cooking my friends? You must be getting something done, so how about a little dope.

SOUTH AUSTRALIA

There was a record attendance of over 80 at the General Meeting held on Tuesday, 12th February at 17 Waymouth Street. Judging by the amount of chin wagging and rag chewing that went on it would appear that enthusiasm is being maintained at a high level.

An innovation was the issue to members of plaques inscribed with their name, call sign, "handle," etc. These are to be worn at all meetings.

The first item, as is usual here, was a lecture and on this occasion it was given by Mr. Merv. Brown, VK5MB, who took as his subject, "Early Experimenters." This title could mean almost anything. With the lecturer, the emphasis was decidedly on the "Early" as he traced the first mention of "Electrics" to the rubbing of amber with wool as far back as 600 B.C. (before cryst-als). From this point on, rapid progress was made through the centuries until, at the conclusion, we almost reached modern times. Altogether, an interesting and instructive talk, refreshingly off the beaten track.

A vote of thanks to Mr. Brown was proposed by Mr. Warwick Parsons and carried with acclamation.

Items of general business were next attended to and the Federal Convention Agenda also came under discussion.

The President then reported that the Constitution, which had been gone through with a fine tooth comb by Council had now been "vetted" by the Institute's Solicitors and would shortly be put before members. For this purpose a Special General Meeting would have to be called.

Identification cards were issued to financial members who hold a "ticket" which will identify them to the Radio trade, with whom special terms have been arranged for the purchase of gear.

At this stage, Mr. Les. Pearn, VK5PN, moved that members record their apreciation of the Council's efforts to date, adding a rider that it was hoped that the good work would continue. This was seconded by Mr. Doug. Whitburn, VK5BY, and carried unanimously.

Mr. Merv. Brown, VK5MB, suggested that a roster be prepared for members to take it in turn to tidy up the room after meetings. Our President welcomed the idea and promptly placed Mr. Brown at the head of the list; also remarking that Council had previously shouldered this burden.

The Institute of Radio Engineers has donated a trophy for competition among our members. Their generous gesture is much appreciated.

Many more VK5's are geting back on the air as their licences arrive and their rigs are completed (if ever a Ham rig is completed). VK5FM reports working eight countries in a row one day. Another active amateur is Bert Brooks, VK5KG, to whom a visit was recently paid. Bert was found hard at work on the rotary antenna, with the XYL taking field strength readings. An unsuspected ant's nest created quite a ticklish situation and interrupted proceedings for a while. However, all in the cause (of course) of science. The transmitter at 5KG uses a 59 tri-tet with 80 metre rock, a 6A6 "double" doubler to 20 and 10 and P.P. 807's in the final. The rig is grid modulated and a dynamic mike is used. The rx is a Three "Toober."

Our membership continues on the up grade and now exceeds 160.

At the next General Meeting to be held on Tuesday, 12th February, at 17 Waymouth Street, Mr. Reg. Davies, VK5LJ, will lecture on "Ten Metres."

TASMANIA

Our monthly meeting was held Wednesday, 6th February under the usual conditions: Council 7.30 p.m. with VK7LJ in the chair; VK7CJ, VK7BJ, VK7ML, VK7CW, and VK7PA. An apology was received from Doctor Kelly, VK7LL.

Correspondence, regulations, convention agenda, QSL Bureau, Social activities, etc., were amongst the business dealt with. Two applications for membership were received and recommended for the general meetings approval.

The General Meeting was started at 8.15 p.m. and present were VK7's GJ, CT, CM, AL, CL; Messrs. F. Gee, A. Morrisby, M. Koglin, J. Moore, as well as Council members mentioned above. Apologies received from Messrs. F. W. Medhurst, A. Russell, O. S. Dahl, J. Waters, E. Nichols and Watson

New members, L. G. Arnold, VK7AM, (full country), and R. S. Allenby (student) were elected unanimously. This brings our present membership to 33 ,consisting of 29 full members and the balance of four in students and associates.

The QSL Bureau is to be reorganised and the job was undertaken by VK7AL, T. A. Allen, and will come into operation as soon as needed. Note address: 6 Thirza Street, Newtown, for the present.

The previous practice of having a G.P.O. Box for official use is to be reverted to as soon as available, but it is understood that at present these are not to be had. (It was suggested we might share one with a love lorn or matrimonial bureau for a little variety).

Prospects of an organised outing were investigated, and the general opinion was in favour of a picnic to commence with as this should promote closer contact for all concerned to have something to which the whole family can be invited, YL, YF, OW, Junior ops and all.

Suitable gear and frequencnes are not yet available for a field day, which was the contributing factor for deferring an outing such as this. It was finally arranged to brave the elements in a river steamer to Possum Bay, one of our popular resorts on Sunday, February 24 (Expect a report of this for next issue—Ed.). Suitable gear will be toted along and the day being favourable, all attending should enjoy themselves — French swim suits are barred.

Several items for the coming Convention were discussed and resolutions for the agenda drafted. It is not possible, as yet, to decide as to whether a VK7 Delegate will be present or not, one or two of our members hope to be on the mainland for Easter, but are not yet certain of their business ties. In view of this it may be necessary to elect a proxy.

Further possible locations for a permanent Headquarters for the Division were discussed and are to be enquired into, no activities can be promoted until a suitable place can be procured.

With a display of souvenirs and a talk on his service experiences in lighter vein, VK7CJ brought a very busy evening to an interesting climax "Keeping them on the Air" seemed to be quite a handful at times, most all times, from Terry's very vivid descriptions backed by interjections from others present, who had seen somewhat similar conditions in one or another of the spheres of action.

Additional souvenirs were exhibited by VK7AL in the form of Jap gear to augment those of VK7CJ, and from what one could gleam from the general discussions afterwards it would appar that maybe they will see some further service in their respective shacks before being relegated to the Ham museum.

From VK7AL's experiences with souvenirs, tube filaments didn't appreciate the hard going they were subjected to and had expired by the time they finished their travels, much to his disgust.

Appreiation of VK7CJ's effort was shown in a hearty round of applause when he concluded his reminiscences.

VK7BJ is listed for a talk on Frequency Modulation for the meeting on March 6, and this should interest those who are anxious to try their skill when it is made available for Ham use.

Six VK7 licences are to hand to date: VK7GJ, VK7BJ, VK7LL, ex 3LL, VK7CW, VK7LJ, and VK7PA (maybe there are others not known to the W.I.A.), VK7's GJ, LJ, and CW are already in the 28 Mc band. VK7BJ says he has worked VK 2, 3, 4, 5, so far and is looking for further contacts as the band is open quite often at present. VK7GJ is also pretty active using phone, and landed a Yank portable the other day who was operating in Hawaii. Jack says the call sign was quite a mouthful, too. Seems the W's are being heard well here at present from all reports.

VK7BJ is operating CW only says he doesn't feel at all comfortable in front of a mike calling CQ to the four walls. He finds the key much more soothing. VK7LJ has set the pace for VK7 by taping the exam. for "A" Class Licence and from the congratulations heard has apparently "cracked it." Whose next?

Many of the new regs. are tough, and a lot of indigestion is anticipated; as if this world hasn't enough trials! Instance—as good as your Xtal might be your neighbours might put you off the air, if you interfere. What recording can I play that will not have entertainment value?—not that I want to play recordings, anyhow.

Watch your studio clock ere you indulge over 30 minutes on that test, no matter how important or maybe you could prepare a "stand in," third party in case of emergency and so save face. Watch your QRM; as a ham I always believed that QRM was one of our heritages and our own worry to overcome. Do we need a spoon feeding at this late hour.

Indignant? Why not!

And finally, the Editor must correct a misstatement made in these notes last month. In the description of Bert Russell's antenna reference was made to "7 strand copper insulators." This should read "7 strand copper conductors."

NEW TUBES.

Zero signal d-c screen grid current	10 ma
Max signal d-c screen grid current	40 ma
Max signal d-c control grid current	3 ma
Effective load resistance (plate to plate)	6000 ohms
Max. signal control grid driving power	0.9 watts
Max signal plate power output	40 watts

R.F. POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAHPY AND FREQUENCY MODULATION

Key-down conditions per tube without amplitude modulation.

Maximum Ratings, Absolute Values

D.C. plate potential	450 max. volts
D.C. screen grid potential	250 max. volts
D.C. control grid potential	—125 max. volts
D.C. plate current	75 max ma
D.C. control grid current	4.5 max. ma
Peak positive r-f control grid potential	60 max. volts
D.C. plate input power	33.5 max. watts
D.C. screen grid input power	4 max. watts
Plate dissipation	15 max. watts

Typical Operation—Average Characteristics.

D.C. plate potential	450	450 volts
D.C. screen grid potential	250	250 volts
	(a) —45	—70 volts
D.C. control grid potential§	(b) 15000	23000 ohms
	(c) 480	750 ohms
Peak r-f control grid potential	90	120 volts
D.C. plate current	75	75 ma
D.C. screen grid current	15	15 ma
D.C. control grid current	3	3 ma
Control grid driving power	0.27	0.36 watts
Plate power input	20	22 watts

PLATE AND SCREEN GRID AMPLITUDE MODULATED R.F. POWER AMPLIFIER CLASS C TELEPHONY

Carrier condition per tube for use with a max. modulation percentage of 100.

Maximum Rating, Absolute Values.

D.C. plate potential	400 max. volts
D.C. screen grid potential	250 max. volts
D.C. control grid potential	—125 max. volts
D.C. plate current	75 max. ma
D.C. control grid current	4.5 max ma
Peak positive r-f control grid potential	60 max. volts
D.C. plate input power§§§	24 max watts
D.C. screen grid input power§§§	2.7 max. watts
Plate dissipation§§§	10 max watts

Typical Operation, Average Characteristics.

D.C. plate potential		400 volts
D.C. screen grid potential		225 volts
	(a)	—70 volts
D.C. control grid potential§	(b)	23000 ohms
	(c)	1000 ohms
Peak r-f control grid potential		110 volts
D.C. plate current		60 ma
D.C. screen grid current		8.5 ma
Screen grid dropping resistor		20000 ohms
D.C. control grid current		3 ma
Control grid driving power		0.33 watts
Plate power output		15 watts

NOTES:

* Class A. dissipation rating based upon tubes having

average plate current. In the case of tubes having maximum acceptable plate current. dissipation will be 15 watts with somewhat higher power output.

** When d-c is used on the filament, the bias should be reduced approximately 3½ volts and the grid return made to negative leg of filament.

§ Obtained from (a) fixed supply, (b) control grid resistor, (c) cathode resistor, or by combination of methods.

§§ Average over any a-f cycle of sine wave form.

§§§ When modulated 100% with a sine wave the average power increase is 5%. With a complex wave form, such as speech o rmusic, the average power increases approximately 20% to 25%.

DIRECT DISC RECORDING.

This means that if we examined the grooves of a Constant Frequency Record whose output level was the same at al frequencies, we would find amplitudes which varied inversely with frequency ,as shown in Figure 3, where it will be readily seen that the amplitude is doubled whenever the frequency is halved.

This is the basis on which commercial gramophone records are made ,and it is brought about by the natural laws of science which are involved in the process of recording and reproducing records. It is known as the Constant Velocity System of Recording. In certain circumstances a deliberate interference to these laws is made by recording engineers in order to produce special characteristics in the recordings, and these will be mentioned later on in this series.

Refering again to Figure 3, however, it will be seen that the amplitudes associated with the lower frequencies tend to become very large, and this leads to com-

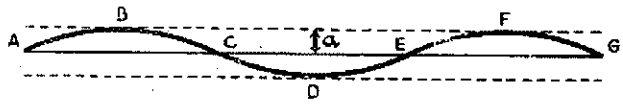


FIG. 1a: 1000-cycle Groove of Amplitude (a).

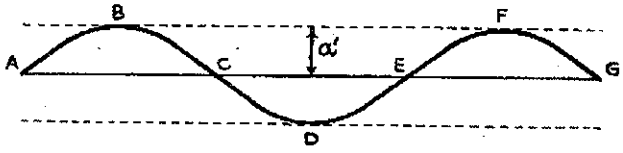


FIG. 1b: 1000-cycle Groove of Amplitude (a').

plications in practice. In the first place we have adjacent grooves pitched at a definite distance apart on a record, and large amplitudes of the type shown will tend to encroach on neighbouring grooves. In addition, such amplitudes would be difficult for normal pickups to negotiate, and there would be a tendency for them to be thrown off on all bass passages. In order to obviate this difficulty, it has been agreed by recordists throughout the world, that the constant-velocity characteristics should be terminated at some frequency where the amplitude has reached a workable maximum, and that below this frequency the amplitude should be maintained constant, as shown by the dotted line. The figure at which this transition is to occur has been agreed upon as about 250 cycles per second, although it tends to vary

slightly among the various recording studios. The range below the transition frequency as aptly named as the Constant-Amplitude Range.

The Constant-Amplitude Range will be deficient in its response because the needle velocity is not being maintained constant. To be exact, we find that this velocity now decreases proportionately to the frequency, or in other words, the energy level is halved every time the frequency is halved. Since needle velocities obey the same laws as alternating currents, we can expres this decrease in energy level in terms of Decibels, and for those who are adept at wrestling with these terms, it will be recognised that each time the frequency is halved, the energy level will fall by about 6 dB.

This deficiency in Bass response is normally not a serious bar to the enjoyment of music produced in a system with this modification on account of the wide accommodating power of the human ear. However when truly accurate reproduction is desired, it is a comparatively simple matter to introduce equalisers into the reproducing system which will retore the overall response to what it would have been without the Constant Amplitude modification. Means whereby this may be done will be discussed in a later article.

STILL MORE IDEAS

We have received several excellent ideas regarding station layouts this month. Perhaps the most interesting of these is one received from Doug. Norman, VK3UC. I think the best thing to do is to quote from Doug's letter. He writes:—

"Dear Editor.—Thinking that you might be interested in the ideas of yet another Ham, here's a sketch of the set up I'm planning for myself at the moment.

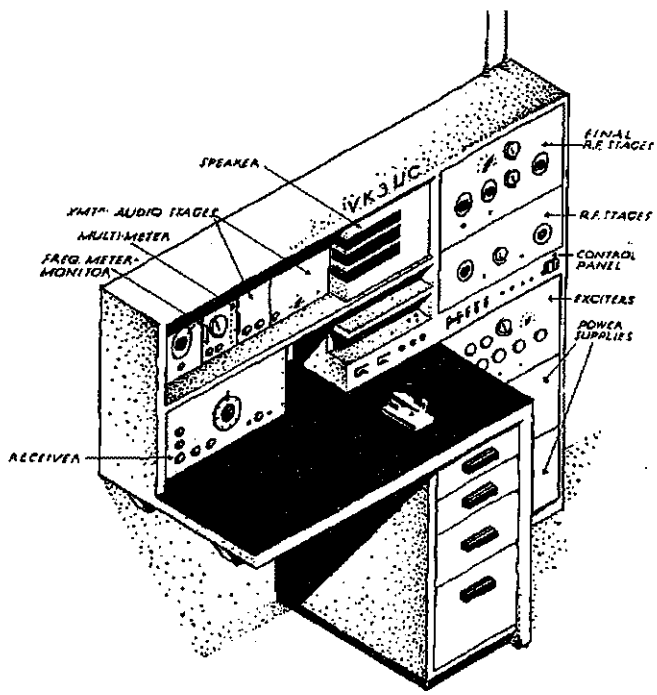
The arrangement is a combination desk and transmitter rack, all individual sections of the gear being removable—including the speaker box and the front panel. This control panel, incidently, is to include all mains switching, fusing, high tension switching and indicator lights—and, of course, send receive switches, aerial relay controls and what have you. The layout of controls, switches, etc., shown in the sketch is not final yet, but is merely included for the sake of completeness. However, it is hoped that the final layout will be pretty much as sketched.

Further rack space suitable for other power supplies or so, is to be provided behind the top two drawers of the desk.

I intend to finish up with crystal control and a pretty good E.C.O. exiter unit for 80, 40 and 20 driving a TZ20, which will eventually act as a driver for a possible 100 watter.

"Something in the V.H.F. line" will be added later, as will the speech amplifier and modulator gear, and anything else I hapen to get started on.

Incidently, the spaces above the desk section of the control panel are for log, Q.S.L.'s and similar junk."



FOR SALE — EXCHANGE — WANTED

9d. per line, minimum 2/-

?

This column is for your use.

Why not take advantage of it ?

AMATEUR RADIO

APRIL 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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

AMATEUR RADIO

VOL 14 APRIL, 1946 No. 4

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

With the restoration of the lower frequency bands in sight, it is the duty of the Wireless Institute of Australia in each State to press for establishment—in conjunction with some responsible authority—of a permanent Emergency Communications Network.

The need for such an Emergency Communications Network, has been proved recently by the disastrous floods in Victoria, Queensland, New South Wales and Tasmania, when telephone wires went out and many places were isolated.

The New South Wales Division were fortunate in establishing, during the war years, an Emergency Communications Network under the authority of the National Emergency Services, which operated in the Sydney suburban area, and laterly in conjunction with the Bush Fires Advisory Committee. Tasmania, South Australia and Western Australia were also given permission to establish such a Net during the War.

Surely the work put in by those States convinced the authorities of the value the Amateur, who in pursuit of his hobby, can be to the Community—and at no expense to the Community, too.

The Eoyal Australian Air Force Wireless Reserve was such an organisation, one which, at the outbreak of the war, if full credit were to be given, saved the R.A.A.F. Communications from chaos.

The Wireless Institute of Australia in each State can, and will, given the necessary authority establish Emergency Communication Networks which could cover any contingency where normal communications have failed.

IN THIS ISSUE

FREQUENCY MODULATION

By J. BROWN, VK7BJ*

PART 1—PRINCIPLES

Frequency Modulation is a topic that, to-day, is on the tongues, or should I say, in the hair of most of the population, both technical and otherwise. Many claims have been made for this system, so I am going to endeavour to outline the position as it is at the present time. Of necessity most of what follows is based on theory, and I would appreciate comments from those members who may have had practical experience of Frequency Modulation in the Services.

Despite the remarks of some of our political heads, F.M. is not likely to supplant A.M. in Australia, and its role will probably be to provide local services. As F.M. is practicable only when using UHF (40 mc or higher), this restricts the range to not much more than the visual horizon and so prevents the coverage of the vast thinly populated areas of Australia. In this respect, an interesting proposal has been made in U.S.A., to the effect that large aeroplanes flying in circles at 30,000 feet or so be equipped with powerful F.M. transmitters. These would be used to relay programmes originating from studio on the ground and, by reason of their height, would cover a very large area. Whilst the scheme is technically sound, it still remains to be seen whether it will be a commercial proposition. Probably the set-up in Australia will be a few high powered AM stations operating on clear channels in the existing Broadcasting band for national coverage, with local services provided by FM stations on channels above 100 mc/s. As the public would certainly insist on sets which could receive both types of transmission, difficulties with receiver design will crop up. The best solution appears to be the use of separate R.F. and, with a common AF end and power supply. The only extra parts of note required over a combination system would be a few valves and the receiver would be much easier to build and maintain. In any case a FM receiver, despite the dreams of some wishful thinkers, is much more complicated and expensive than the corresponding AM set.

Radio manufacturers, of course, are boosting FM as it provides them with new markets, and it is in such countries as the U.S.A., where sales saturation had just about been reached in the AM field, that FM is making its greatest headway. In fact, English engineers seem to regard it coldly, but the mixed use of FM and AM just mentioned seems very suitable for Australian conditions. As far as public demand is concerned, the High Fidelity aspect of FM seems to be over-estimated, as the average listener does not desire it. In fact, given a good receiver the usual listener complains about its shrillness and immediately applies the tone control to make it "nice and mellow." Also in Australian practice relays and recordings form a large part of the programme and, as most

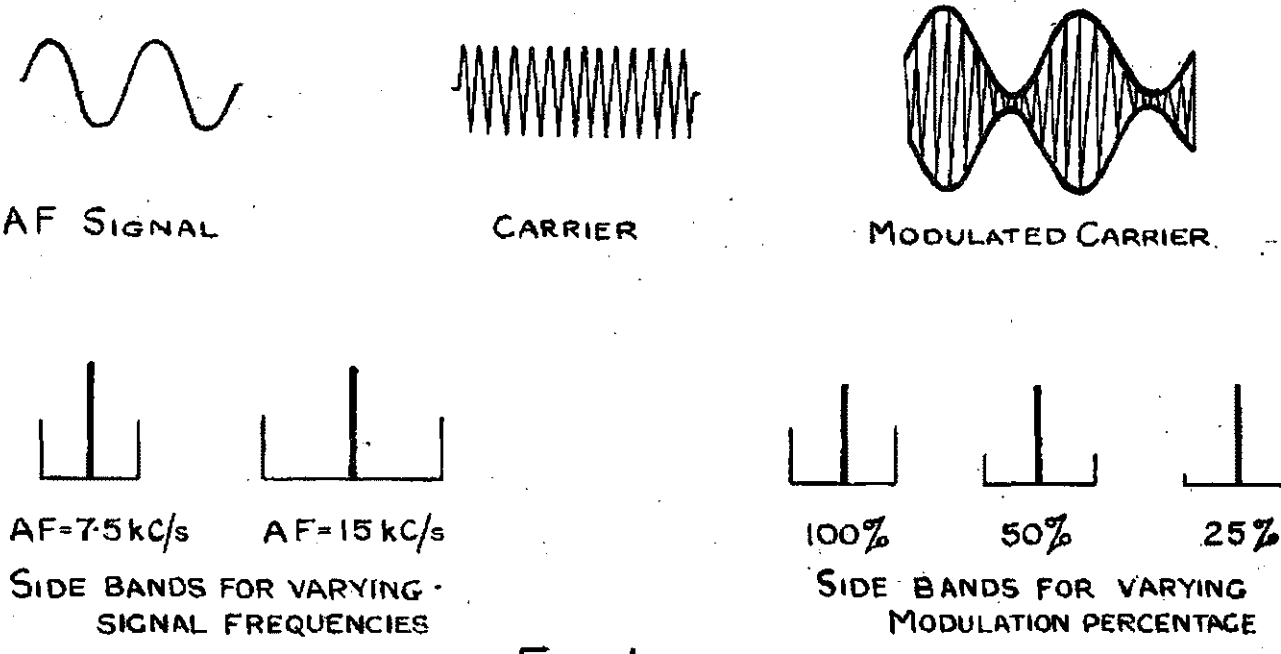


FIG 1.

AMPLITUDE MODULATION

*12 Thirza Street, Newtown, Hobart, Tasmania

Interstate relays cut off at about 7,500 c/s and commercil recordings about 5,000 c/s, there does not appear to be much advantage in the extended range to 15,000 c/s offered by FM.

Having neglected the old proverb about prophets, I now propose to deal with the features of a FM broadcasting system. Actually many Hams unknowingly had some experience of FM pre-war, even though it was unintentional. Do you remember the modulated oscillators on 5 metres where we sometimes had to tune the receiver off the carrier in order to receive the modulation properly This was caused by the fact that, in trying to modulate an unstable oscillator, actually more FM than AM was produced. In 1922, during a search for better methods of modulation, FM was investigated by J. R. Carson, but it was dropped when it was found that an enormous frequency band would be required, as this was impracticable on the low frequency band then in use. However, in 1936, Major Armstrong announced a FM system which, by reason of its location in the UHF band, was eminently practicable and it is this and allied systems which are to be dealt with.

There are three ways by which a Sine wave, such as the carrier wave of a broadcasting station, can be modulated. The first is the familiar amplitude modulation shown in Fig. 1. In this the frequency of the carrier is maintained constant and its amplitude varied in accordance with the amplitude of the modulating AF signal, and at a rate equal to its frequency. This gives rise to what is known as Sidebands which occur each side of the carrier frequency at distances equal to the AF signal frequency. Thus a 15 Kc/s signal would require a band width of 30 Kc/s for transmission. The maximum permissable variation of the carrier amplitude is from zero to twice normal value and this is called 100% modulation. Any variation less than this is also rated in %, i.e., 45%, but any increase over 100% causes the carrier to be be zero over a portion of the AF cycle, giving rise to severe distortion. This condition is known as overmodulation. At 100% modulation the power of the carrier is unchanged but the sidebands have a power equal to 50% of the carrier and, inorder to provide for this, the peak power capability of the transmitter must be 4 times its unmodulated output. In order to achieve AM it is also necessary either to run the radio-frequency amplifiers at a low efficiency (around 30%) or else to provide an amount of Audio frequency power equal to ½ the power input to the last RF amplifier. For these reasons the AM transmitter is costly both to build and to maintain.

The second method of modulation is to keep the carrier amplitude constant, but its frequency is varied in accordance with the amplitude of the AF signal. In pure frequency modulation, the variation of frequency is proportional only to the amplitude and sign of the AF signal, whilst the rate of variation equals the AF signal frequency.

In the third method the carrier amplitude is kept constant also, but its phase is varied, the variation being proportional to the AF signal's amplitude and sign, and the rate of variation equal to its frequency. The final result is similar to frequency modulation however, as varying the phase of a wave is equivalent to varying its frequency. (Take two waves of the same frequency and in phase with one another; then so long as the frequencies remain the same, the two waves must remain in phase. However, if the frequency of one of the waves changes, the phase will be continually changing giving rise to the familiar phenomenom of beats. The reverse is true, i.e., if the phase is changing there must be a corresponding difference of frequency to permit it to do so). There is one important difference between phase and frequency modulation however. In pure frequency modulation the variation of frequency depends only on the amplitude of the AF signal and is independent of its frequency, but in phase modulation the resultant frequency variation is proportional to both the amplitude and the frequency of the AF signal. This causes the variation of carrier frequency to be excessive when modulated by the higher frequencies. In practice, where phase modulation is used, the resultant modulation is made equivalent to pure frequency modulation by inserting a filter before the modulator which reduces the AF signals in proportion to their frequency. By this means as the frequency of the AF signal increases so does its amplitude decrease, thus making the carrier frequency variation the same for all AF signals. This method was that originally used by Major Armstrong.

Two terms which frequently occur in any discussion of FM are Deviation and Deviation Ratio. Deviation is the swing (in Kc/s) each side of the resting frequency, whilst Deviation Ratio (also called Modulation Index Mp.) corresponds to Modulation % in AM. However, in FM there is nothing corresponding to over-modulation and Mp. is defined as

$$\frac{\text{Deviation (Kc/s)}}{\text{AF signal frequency (Kc/s)}}$$

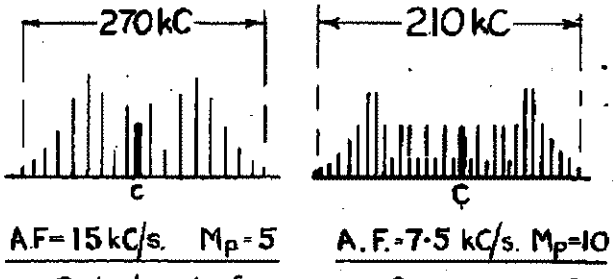
A deviation of 75 Kc/s is commonly used and AF signals from 30 to 15,000 c/s are transmitted, giving rise to Mps of from 5 at 15 Kc/s to 2,500 at 30 c/s. Because of this modulation by single AF frequencies will be considered in the following discussion. The only difference in practice when a complex AF signal is used is the greater complexity of the frequency spectrum.

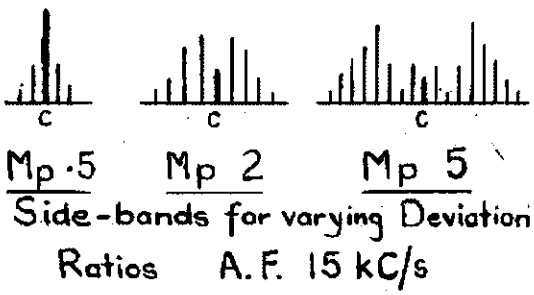
Sidebands are also produced in FM, theoretically exending from an infinite frequency on one side of the carrier to zero frequency on the other and are spaced at intervals equal to the frequency of the AF signal. This is in sharp contract to AM where there is only one pair of side bands to each AF signal frequency. In practice, however, after a number of sidebands each side of the carrier slightly greater than Mp + I the amplitude rapidly falls to zero (see Fig. 2). This gives rise to the interesting fact that the band width required for all Audio frequencies is approximately the same, e.g., at 30 c/s there are 2,501 sidebands spaced 30 c/s apart each side and at 15 Kc/s there are 6 each side spaced 15 Kc/s, both giving a bandwidth of approximately 150 Kc/s. This again contrasts with the case of AM where the bandwidth is twice the AF frequency. The total power of the FM signal does not increase as it does in the case of AM, the energy of the carrier being distributed over itself and the sidebands.

Having learnt something about the nature of FM we are now in a position to consider its pros and cons. The first outstanding feature is the wide frequency band required; 150 Kc/s for normal broadcasting. This makes the use of the UHF band necessary and so makes FM unsuited for nation-wide broadcasting, but this together with another of its features makes it very suitable for providing the very large number of channels required for local broadcasting. If there are two or more FM stations on the same channel and large deviations are used the strongest signal (providing it has at least a 2 : 1 majority) suppresses all the others and interference free reception will result. Sometimes there is a residual amount of hash due to random heterodynes and to eliminate this entirely the stronger station should be 20 Db. above the others. Thus the use of shared channels is quite practicable with FM provided the stations are separated by a moderate distance. Contrast this with the interference arising from the use of shared channels in the present AM band. However, some peculiar effects can be obtained when the stations are about the same strength and fading, the strongest station at the time will take charge and the listener may get a frequent change of programmes.

At the transmitter end FM has quite a few advantages over AM. Firstly as the carrier power does not change when modulated, highly efficient amplifiers running at full output may be used resulting in considerable savings in first cost, in subsequent maintenance, and in

power bills. As only a small amount of AF power is required for full modulation the Audio equipment is both cheap and easy to design for wide frequency response and low distortion. The modulating circuits used in FM are of considerable complexity and require a large number of valves and other parts. Whilst this is immaterial for high power broadcasters, where it is overbalanced by the larger savings above, it is a considerable drawback for the average Ham. Another advantage, although not due to FM directly, is that at the short wave lengths used very efficient radiating structures are possible at reasonable cost. On the present broadcasting band an efficient aerial may cost as much as the rest of the station.





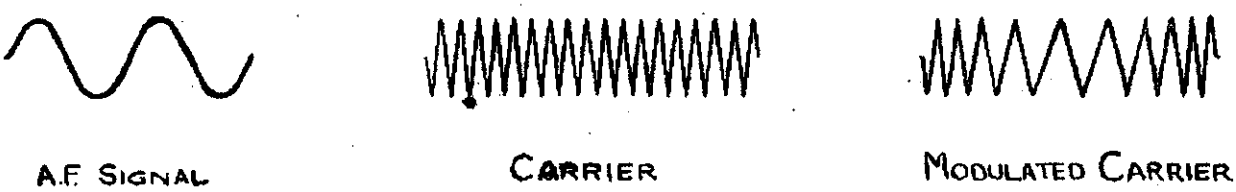


FIG 2
FREQUENCY MODULATION

The general public, however, is more interested in the advantages to be obtained at the receiving end. In order to secure the full benefit of these advantages the receiver will need to be fairly complicated and expensive, thus FM sets will never be as cheap as AM sets. The first advantage is that high fidelity can be more easily obtained when using FM. Present AM transmitters are far in advance of present AM receivers and this is mainly due to the necessarily close spacing of stations, requiring selectivity to be so high as to prevent the passing of even the 20 Kc/s band required to transmit an AF signal of 10 Kc/s. For FM wide spacing of stations can be employed owing to the space available at the UHF used, and the fact that the use of shared channels is entirely satisfactory. This together with the fact that interference from adjacent stations is very small, as a FM detector is not very responsive to frequencies outside its proper pass band, permits the selectivity to be such that the full pass band of 150 Kc/s can be accommodated. The spacing probably will be 200 Kc/s as compared with 10 Kc/s on the present broadcasting band. It should be noted that, as the deviation is proportional to the amplitude of the AF signals, the loss of the higher sidebands in FM causes amplitude distortion, not loss of the higher audio frequencies as in AM. Whilst the RF end will thus easily handle AF signals from 30 to 15,000 c/s., it is wasted unless the AF end and the loudspeaker system are also designed for this range.

It is doubtful, however, if this high fidelity would be of any use without another feature of FM, viz., reduction of noise. In the past high fidelity AM receivers have been marketed, but owing to the background of noise which is produced when the frequency response is extended the result may be rather unpleasant. Often the tone control has to be used to cut off the higher frequencies and so reduce the noise. In FM this reduction of noise is taken care of by the nature of the system itself. Most noises due to static and to man-made interference have both AM and FM components. The AM component is eliminated by the use of a limiter which chops off all peaks and signal above a certain value. The signal is then passed on to a special detector which, whilst it is very sensitive to changes of frequency is not much affected by any amplitude variations which may have escaped the limiter. The net result is that the AM component of the noise is eliminated. The FM components impresses an FM modulation on the signal, but this is very small compared to the large deviation of the signal itself and so the resultant noise is small. The actual noise reduction is proportional to

$$2\frac{\text{Max Deviation (Kc/s)}}{\text{Highest Audio Frequency (Kcls)}}$$

i.e., for the usual system it is about 10 : 1. In practice much greater reductions are achieved, up to 50 Db. reduction has been claimed. For a useful reduction to be accomplished the signal strength must be above a certain limiting value, known as the Threshold value and, if it is not, no reduction in noise may be achieved. In fact the noise may even suppress the signal. For Amateur work, where it is only necessary to transmit up to 5,000 c/s at the most, a deviation of 25 Kc/s would be adequate to reduce noise, but if the deviatlion is less than this the noise reduction would also be less. Very narrow band FM is sometimes used for long distance work for which wide band FM is not very suitable owing to the loss of essential sidebands due to selective fading. In

(Continued on Page 22)

PLASTICS FOR THE AMATEUR

By A. G. CHAMBERS, M.I.R.E., A.M. (Brit.) I.R.E. (G5NO)

This article has been taken from the R.S.G.B. Bulletin for the information of the Ham and others interested in the subject of plastic insulating materials. Many of the materials mentioned herein are under their British trade names, and it is possible that they are or will be marketed in his country under a different name. However, the information should prove of much value to the reader.

During the past five or six years, considerable progress has been made in the comparatively new science of plastics and the radio and electrical industries have been those mainly responsible for its development. Thermo-setting plastics are used extensively nowadays for many kinds of electrical fittings, such as switches, sockets, electric irons and hairdryers, clocks and radio cabinets.

The discovery of the new plastic materials was no accident. The chemists knew what they wanted, and continued their experiments until the desired result was obtained. Plastics are known to have been in existence many years ago. The Egyptians used a form of plastics, but Bakeland, in the latter half of the last century, was responsible for the discovery of the first modern plastic, the material now known as Bakelite being the result. Only recently, however, have intensive experiments been carried out with the bi-products of calcium carbide (the well known chemical used for lighting old fashioned bicycle lamps) which, after a number of complicated chemical reactions resolves itself into the new thermo-plastic materials which are now on the market. It is these new materials in which we are chiefly interested, since they possess excellent high frequency properties. The older plastics have been included in the data for the sake of completeness.

A large number of books have been written on the subject, but unfortunately some knowledge of chemistry is necessary for them to be understood; the object of this article, therefore, is to give to the amateur, in simple language, all the information he will require to know, without going into chemical details. The writer is "an amateur like yourself" and no chemist, with the exception that he has been fortunate in being able to compile information which, it is hoped, will be helpful when planning the post-war transmitter, or repairing some pre-war component extracted from the proverbial junk box.

CLASSES OF PLASTICS

Plastics are divided into two classes, namely, those which are Thermo-setting, and those which are Thermo-plastic. Thermo-setting plastics are of the hard brittle variety such as Bakelite, Paxolin, Beetle, Tufnol and Panilax. Ts the name implies, once heat has been applied (that is during moulding processes), they set. Any further applications of heat, either changes them immediately into a liquid form, or else they burn. Strictly speaking, they are not plastics.

Thermo-plastics such as Perspex, Alkathene, Distrene, etc., however, can be re-heated, formed into new shapes, and when cold will retain their new shapes. If heated beyond the plastic state they turn into liquid, but again, on cooling, they pass through the plastic state before finally hardening.

Naturally, according to which class they belong, plastics are used where they are best suited. For example, it would be useless having a radio cabinet which, when plared near the drawingroom fire wilted when it became warm! Alternatively, a cable which cannot be bent is of little value.

Unfortunately, plastics are known under many and varied trade names. The writer counted thirty-eight, but ther are many more; while in actual fact he is aware of only fifteen basic compositions.

THERMO-SETTING. RESINS

Now let us take them in order, commencing with the Thermo-setting resins.

Phenol—Formaldehyde Cresol—Formaldehyde.

(Trade names: Bakelite, Catalin, Elo, Epok, Mouldrite, Nestorite, Paxolin and Rockite).

Chiefly used for moulding. Brownish opaque material, which can be machined. It is insoluble, therefore cements of the solvent type, such as are used for Thermo-plastics, cannot be used. Bakelite cement, an accelerator, Q.11117, making it set at atmospheric G.11116, is a "cold setting" cement which is used with temperature. At 20 degrees C. joints should be clamped for twelve hours, after which they will not come apart; but the article should be left for five or six days to harden.

Specific gravity	1.28-1.52
Tensile strength	6,000-10,000 lbs./sq. in.
Maximum temperature for continuous Resistance to heat	250 degrees F.
Water absorption (Immersed for 24 hours)	1.2%
Burning rate	Very low
Dielectric constant at 1 Mc/s	7.3
Power factor at 1 Mc/s	0.24
Breakdown voltage (⅛ in. specimen)	300-500 volts/mil
Hardness (Brinell)	30-45

Uses—Has many well known uses which are too numerous to list.

Urea Formaldehyde.

(Trade names: Beetle and Mouldrite).

Chiefly used for moulding; basic colour is white, but opaque, and like Bakelite, can be machined. It is insoluble but can be cemented by Beetle Cement E, with hardening powder A at 40 degrees C. It can be identified by heating in a flame, whence a strong smell of Formaldehyde and Ammonia comes off. The material chars but it non-inflammable.

Specific gravity	1.45-1.50
Tensile strength	9,000-12,000 lbs./sq. in.
Maximum temperature, etc.	160 degrees F.
Water absorption, etc.	1.2%
Burning rate	Very low
Dielectric constant at 1 Mc/s	7.7
Power factor at 1 Mc/s	0.036-0.039
Breakdown voltage (⅛ in. specimen)	600-700 volts/mil
Hardness (Brinell)	48-54

Uses—Control knobs, coloured panels and radio cabinets.

Phenol—Cresol—Urea and Aniline Formaldehyde.

(Trade names: Tufnol, Panilax, Delaron, Fraffolite, Micarta).

Available in sheets, composed of alternate layers of paper and soluble resin which makes it very strong (note the higher tensile strength). Is yellow or brown in appearance and is also available in rods and tubes. It possesses excellent electrical properties with small water absorption. It can be machined in the same manner as bakelite and may be cemented by Ardux. The joint must be heated after application to at least 140 degrees C., and sets in 5 to 10 minutes. A useful cement is made by mixing one part Resorcinol with one part Paraformaldehyde and two parts Methylated Spirit. This mixture sets at 100 degrees C.

Specific gravity 1.30-1.40
Tensile strength ..... 10,000-20,0000 lbs./sq. in.
Maximum temperature, etc. ..... 250 degrees F.
Water absorption, etc. 0.3-0.9%
Burning rate ..... Very low
Dielectric constant at 1 Mc/s 6.0
Power factor at 1 Mc/s 0.03
Breakdown voltage ..... 400-600 volts/mil
Hardness (Brinell) 24-50
Uses—Instrument panels. Where installation is required in the open air this material is excellent, as it shows little shrinkage on prolonged exposure to climatic conditions.

THERMO-PLASTIC RESINS.

We can now turn to the more modern, and as far as the amateur is concerned, the more interesting, Thermo-plastic resins.

Methyl Methacrylate.

(Trade names: Perspex (I.C.I. Ltd.); Diakon, Lucite, Transpex (I.C.I. Ltd.); and Kallodent (I.C.I. Ltd.).

Available in powder, sheet, rod, tube or liquid. It is a water-white transparent plastic with a high refractive index, and is thus often used to replace glass. Resistance to weathering and extremes of temperature is another excellent property. Being thermo-plastic it can be shaped easily at 130 degrees C. retaining its new shape upon cooling. Can be identified by heating in a test tube. It does not melt or char, but decomposes and a liquid distils off. Material can be machined, moulded or shaped. The liquid gives clear castings, an example of which is an aerial insulator made by I.C.I. Plastics.

Unplasticised "Perspex" is harder and has a slightly greater tensile and sheer strength than platicised material, but is slightly less resistant to impact.

At low temperatures the tensile strength and modulus of elactisity of "Perspex" increase, whilst the impact strength remains the same (i.e. the material does not become brittle) down to temperatures of the order of minus 40 degrees C.

There are two cements for "Perspex," namely "Diakon" Cement No. 2 and "Perspex" Cement No. 6. As both are liable to become very viscous when exposed to the air, they should be kept in containers with well-fitted stoppers.

"Diakon" Cement No. 2 is a quick-hardening cement suitable for cementing "Perspex" to "Perspex" when the area of contact is relatively small. Joints made with this cement should be left undisturbed for about an hour, after which they will be sufficiently set to withstand handling.

"Perspex" Cement No. 6 is a slow hardening cement and its use is recommended for cementing "Perspex" to "Perspex" when the area of contact is large. Joints made with this cement should not be disturbed for about three hours after cementing.

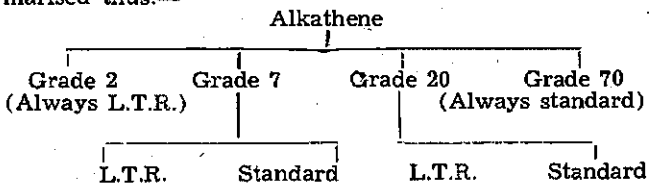
Specific gravity 1.18
Tensile strength ..... 7,000-9,000 lbs./sq. in.
Maximum temperature, etc. ..... 140-160 degrees F.
Water absorption, etc. 0.4%
Burning rate ..... Very slow
Dielectric constant at 5 x 10^7 c/s 2.8
Power factor at 5 x 10^7 c/s 0.02
Breakdown (¼ in. specimen) ..... 390 volts/mil
Softens at ..... 60-70 degrees C.
Refractive index (Transpex 1) 1,4900
Hardness (Brinell) 18-20
Uses—Has many uses. Opticians now use this material successfully for making unbreakable lenses. Dentists use the powder for moulding false teeth and dentures. Aircraft factories use it for gun turrets; in general is is replacing glass. The amateur will no doubt devise many other uses.

Polyethylene (Polyisobutylene, polythene).

(Trade names: Alkathene (I.C.I. Ltd.) and Polybutine).

Available in powder, sheet, rod, tube and film. It a wax-white translucent material, which can be moulded, machined or shaped. Is tough, strong or extremely flexible, according to grade, and has a low specific gravity. It resists all solvents when cold. At 60 to 70 degrees C. it dissolves in benzene, carbon tetrachloride, turpentine and medicinal paraffin.

Alkathene, made by I.C.I. Ltd. is available in a number of grades according to viscosity, which can be summarised thus:—



Material which is not brittle at minus 25 degrees C. is sold as "Low Temperature Resistant" (L.T.R.), whilst that which breaks at minus 25 degrees C., but not at 0 degrees C. is known as "Standard.". In general the lower grade number the harder the material, and the harder the grade the lower the temperature at which it becomes brittle.

Polythene tapes are also available for repairs of H.F. Cables.

Specific gravity 0.95
Tensile strength ..... 2,000 lbs./sq. in.
Maximum temperature, etc. ..... 180 degrees F.
Water absorption, etc ..... Nil
Burning rate ..... Slow
Power factor at 5 x 10^7 c/s 0.0003
Dielectric constant at 5 x 10^7 c/s 2.3
Breakdown voltage (after 10 minutes measured on a 0.020 specimen at 50 c/s ..... 1,000 volts/mil
Instantaneous breakdown ..... 50% higher
Effect of Ozone ..... Very slight
Softens at ..... 110 degrees C.
Hardness (Brinell) 1.0-2.0
Uses—Solid insulated and air-spaced H.F. Cables, where power loss must be small. "Telcothene" available in this country is a good example of low impedance cable using polythene as a solid dielectric. Other applications include moulded parts, such as cable ends, high voltage bushings, and condenser dielectrics. Its ease in working lends itself admirably to the home constructor.

N.B.—It is actually incorrect to couple together under the same classification Athathene and Polysobtylene (P.I.B.) as actually they are quite different although some properties and uses are very similar.

Polyvinal Chloride and Copolymers.

Trade names: Welvic Chlorovene, tenatube).

Is a basic powder which when highly placistised forms a rubber like material used for the outer covering of H.F. Cables. It is also available in thin sheets. It has excellent chemical resistance and is only slightly affected by water, and will withstand difficult atmospheric conditions. The thin sheets can be slit and wound into rolls of any width for insulation and other purposes. Identification: when heated in a test tube, it browns immediately, turns black with little melting, giving off hydrogen chloride. Solvents are Methylene Chloride and chlorbenzene.

Specific gravity 1.2-1.6
Tensile strength ..... 1,000-9,000 lbs./sq. in.
Maximum temperature, etc. ..... 150 degrees F.
Water absorption, etc. 0.2%
Burning rate ..... Nil
Dielectric constant at 1 Mc/s 4-3
Power factor at 1 Mc/s 4-3
Breakdown (¼ in. specimen) ..... 400-2,000 volts/mil
Hardness ..... 2-50 depending on type of material
Uses—Used for outer cable sheathing, and when made in the form of systoflex is known as "Tenatube."

Polystrene.

(Trade names: Distrene (B.X. Plastics), Transpex (I.C.I. Ltd.).

A hard transparent ,water-white material having a characteristic tinkle when lightly struck. Available in powder, rod, sheet, tube or liquid, which can be moulded, shaped, or machined. (Transpex 2 is only available in sheets). It has a very low power factor and dielectric constant, together with a very high resistivity, all of which remain fairly constant over a wide range of frequency. It is normally brittle, but when cold drawn changes to a tough product with unimpaired H.F. electrical properties. Its density is low and the material shows great resistance to acids. In liquid form it is used for casting. Identification: When heated in a test tube it melts to a clear liquid which boils with slight discolouration and he characerisic smell of monomer comes off. Solvents: Benzine, carbon tetrachloride and others. It is of interest to note that its power facor and dielecric constant is even better than quartz, steatite or mica.

Specific gravity 1.05-1.07
Tensile strength ..... 5,500-8,500 lbs./sq. in.
Maximum temperature, etc. ..... 140 degrees F.
Water absorption, etc..... Nil
Burning rate ..... Slow
Dielectric constant at 5 x 10^7 c/s 2:6
Power factor at 5 x 10^7 c/s..... 0.0003
Breakdown (⅛ in specimen) ..... 500 volts/mil
Softens at ..... 70 degrees C.
Refractive index (Transpex 2) 1.5900
Hardness (Brinell) 20-30

Uses—Used extensively in the making of low-loss coil formers. Available in lacquer form which is an H.F. Varnish with outstanding electrical properties. Also used for numerous H.F. insulated supports. In general is a stronger material than polythene but slightly more difficult to work.

Cellulose Nitrate (Celluloid).

(Trade name: Xylonite).

Available in rods or tubes in any colour from transparent to opaque and can be cast in the form of film (well known as "Cine-film"). It is suitable for compression or injection moulding from powder. It is easy to ignite and burns rapidly. Solvents are many, such as Acetone, Amyl Acetate, Ether Alcohol.

Specific gravity 1.35-1.60
Tensile strength ..... 5,000-10,000 lbs./sq. in.
Maximum temperature, etc. ..... 140 degrees F.
Water absorption, etc..... 1-3%
Burning rate ..... Very high
Dielectric constant at 1 Mc/s 6.5
Power factor at 1 Mc/s 0.06
Breakdown (⅛ in. specimen)..... 300-700
Hardness (Brinell) 8-11

Uses—Well known.

Cellulose Acetate.

(Trade names: Erinofort, Celastoid, Bexoid and Cellmold).

Resembles Cellulose Nitrate but is non-inflammable. It can be both compression and injection moulded. Identification: When heated in a flame it melts and chars, giving off a strong smell of cellulose and acetic acid. Solvents are many ,such as Acetone and Benzine.

Specific gravity 1.27-1.80
Tensile strength..... 3,000-5,000 lbs./sq. in.
Maximum temperature, etc. ..... 140-180 degrees F.
Water absorption, etc. 1.5-3.0%
Burning rate ..... Slow
Dielectric constant at 1 Mc/s..... 3.2-6.2
Power factor at 1 Mc/s 0.01-0.05
Breakdown (⅛ in. specimen) ..... 250-800 volts/mil
Hardness (Brinell)..... 8-15

Uses—Photographic film, recording discs.

Ethyl-Cellulose.

(Trade name: Ethyl Cellulose Plastic).

Similar to cellulose acetate, is tougher and is outstanding for its resistance to very low temperature. Identification: When heated in a flame it chars, and readily melts with a smell of burning cellulose. Solvents: benxine, methyl acetate.

Specific gravity..... 1.10-1.20
Tensile strength..... 4,000-8,000 lbs./sq. in.
Maximum temperature, etc. ..... 140-180 degrees F.
Water absorption, etc..... 1.5-2.5%
Burning rate ..... Slow
Dielectric constant at 1 Mc/s 2.0
Power factor at 1 Mc/s..... 0.0135
Breakdown (⅛ in. specimen) 400-750
Hardness..... 5-10

Uses—Often used for insulating sleeving.

THERMO-SETTING PLASTIC MATERIALS.

——(BAKELITE, PAXOLIN AND TUFNOL)

For the Thermo-setting plastics, the makers recommend that special tungsten carbide-tipped tools should be used, although this is not essential. Drill speeds should be about 1,700 r.p.m.; the included angle of "twist" slow, with wide flutes, and the cutting edges well "back off." For lathe work, a clearance angle of 12 degrees with a top rake of 25 degrees and a speed of 200 ft./min. is suggested for bakelite and paxolin, while for laminated materials, such as Tufnol, a clearance of 10 degrees degrees is recommended.

Thermo setting plastics cannot be welded, but a number of synthetic resin adhesives are available. These adhesives are primarily intended for bonding wood in the manufacture of ply-wood, furniture and decorative veneers, but other uses, such as bookbinding have been developed.

For applications where the surfaces do not afford good physical contact over their whole area, "Mouldrite" Gap-filling Cement is recommended. Other glues, based on aqueous thermo-setting resins prepared by the partial condensation of urea or phenolic materials with formaldhyde are supplied under the trade names of "Mouldrite,' U.F. Syrup 232, U.S. Syrup 235, Phenolic Glue 500 and Cresylic Glue 500/C. The action of Glueing is to bring the chemical reaction of the resin to completion by adding a specific amount of a hardening agent, by heating the resin, or by combination of both methods. The resin sets to a hard infusible solid, resistant to water and many chemical s,and so forms a strong, durable joint between the glued surfaces.

THERMO PLASTIC MATERIALS.

(PERSPEX, DISTRENE OR ALKATHENE)

Thermo-Plastics soften sufficiently for bending in boiling water. Drilling can be done cold with any type of drill. When turning tough thermo-plastic materials, a speed of 800 r.p.m. is advised, with an angle clearance of about 5 degrees. For celluloid this angle should be increased to about 30 degrees.

When working any thermo-plastic, water should be used freely on the cutting tool to keep down heat generated. Thin plastic materials can be cut like glass by scoring a line with a sharp knife, the sheet breaking easily along the line when the material is bent. Surfaces can be repolished by buffing, using pumice first, followed by buffing soap.

It is interesting to note that Polyvinal Chloride can be welded by using a jet of hot air in place of the usual welder's flame, or by clamping together and applying heat to the metal clamp. This system of welding might also be applied to other thermo-plastic materials such as "Perspex," "Distrene," and "Alkathene," although the latter can be worked by application of a soldering iron.

As the Amateur will be particularly interested in the thermo-plastic materials, due to their excellent electrical properties, information supplied by the manufacturers follows.

PERSPEX

"Perspex" or Methacrylate, manufactured by I.C.I. (Plastics) is supplied in sheets protected by paper stuck to the surface with gelatine. This paper should be left on, until all cutting and drilling is finished; after which it may be removed by easing one edge and pulling gently. The small remaining patches should be removed by washing in warm soapy water and wiped dry with cotton wool. The article should then be dipped completely in clean, cold water and left to dry.

"Perspex" can be cut by a high speed band-saw or failing this, an ordinary wood saw with fairly fine teeth and preferably having little "set." Water should be used as lubricant. The risk of cracking can be lessened if the material is first slightly warmed all over, local heating being avoided. The best means of accomplishing this is to immerse the material in water which has been heated previously to about 80 degrees C.; alternatively, it may be placed in an oven.

Drilling can be accomplished in the ordinary way, but the drills should be ground rather flat, to prevent cracking when the drill emerges from the other side. If the drill is ground so that the point is slightly off-centre, the resulting hole will be larger, but less binding results, which helps when drilling deep holes. The manufacturers recommend paraffin or water containing soluble oil as lubricant.

For hand-turning, standard wood-working tools with flat tops and ground to an angle of 55 degrees are suitable, and for slide rest turning a similar type of tool should be used, set at an angle of 60 dgrees with the spindle. A cutting speed of 65 ft./min. and a feed of 0.010 in. per revolution is advised.

"Perspex" can be shaped by heating to approximately 110-120 degrees in an oven ,an manipulated by hand or pressed into moulds. Moulds can be made of wood; if, however, iron is used, it should be heated to about 40 degrees C. first, otherwise it will chill the material. It is interesting to note in passing, that "Perspex" may be blown like glass, only the heat required is naturally very much less.

Prepared cements are now available and sold under the trade names of "Diakon Cement No. 2" and "Perspex Cement No. 6." The former is quick drying, requiring only three hours. Home-made cements can be made by dissolving flaked "Perspex" sheet in Amyl-acetate, but this is not as good as the manufactured article.

DISTRENE.

"Distrene" (or Polystrene) is slightly more difficult to work, but can be readily machined, milled and turned, provided that certain precautions are observed in methods and selection of materials.

"Distrene" softens at 70-80 degrees C. and it is therefore of the utmost importance to keep the material as cold as possible during working. In all machining and cutting operations a plentiful supply of cooling lubricating liquid must be available. A satisfactory solution is soluble oil diluted with about 20 parts of water.

Standard milling machines and cutters can be used, speeds up to 800 r.p.m. being employed. It will be found that materials vary somewhat in softness and the tool has to be varied accordingly. The top rake should be from 10-15 degrees and the side rake about 20 degrees increasing with softness. The clearance is from 5 to 10. If the material is rather soft and shows feed marks, this can be overcome by using a tool with a small radius at

Continued on Page 23

IN REVIEW

TECHNICAL BOOKS - - - - - - - RECORDINGS - - - - - - - - - - - - PRODUCTS

BOOKS

ELECTRONICS DICTIONARY—Nelson M. Cooke and John Markus.

President of the U.S.A., Andrew Jackson once said, on being ribbed about the variable nature of his own peculiar ideas on spelling: "Well, sir, its a damned poor mind that cannot think of more than one way to spell a word." The Bard of Avon, too, was noted for his originality in this direction, but that was before the days of dictionaries; nowadays, the vogue of correct spelling has almost assumed the importance of an Eleventh Commandment.

The book under review is a collection of nearly 6500 terms used in radio, television, industrial electronics, communications, facsimile, sound recording and other branches of the ever expanding electronic art.

Many of the definitions are accompanied by diagrams, such as that illustrating the natural form of a quartz crystal and showing the positions relative to the crystals axes of no less than 23 different cuts.

Some o fthe definitions are rather surprising, there is for instance, dog house, which, believe it or not, is the structure known to most broadcast station engineers in this country as the tuning hut, a small enclosure containing the antenna tuning equipment. And how many know what a "gobo" is According to Cooke and Marcus it is either a dark board used to shield a television camera lens from bright lights or an acoustic shield for a microphone to blanket sounds arriving from an unwanted direction As for such things as "idometers" and "pallesthesiombeters," not to mention "pancake tuners," I leave it to both my readers to buy a copy of this most interesting volume and find out for themselves.

The goal of the authors was to present the language of electronics in such a manner that the definitions would be of value to those who need an electronics dictionary —an dthey have succeeded, largely due to their wisdom in keeping the work to the characterd of a dictionary rather than an encyclopoedia. There is one thing they have omitted which would have been useful, and that is the pronounciation of certain of the less common terms, such as proper names. Altogether quite a useful book, even if you don't care for short stories.

Electronics Dictionary—Nelson M. Cooke and John Markus (McGraw-Hill, N.Y. 1945) 433 p. 9 x 6, over 600 diagrams, cloth bound, 35/-.

Our copy by courtesy of the Technical Book and Magazine Co.

TELEVISION TO-DAY AND TO-MORROW—Lee de Forest.

This is a truly remarkable book. The title is the sort of thing one would expect to see gracing the cover of a book intended purely for the BCL. And one would be right, yet wrong. Dr. De Forest says in his opening chapter, "Primarily this book is for the lay reader. But, in this forty-fifth year of the twentieth century, thanks largely to the interest in things scientific which radio has awakened, the average intelligent citizen is able to understand . . . such matters of science and technology as television is made of."

From the opening chapters on the general nature and the history of Television through the explanations of the technicalities of transmission and reception to the closing chapter on the future of Television, not a suspicion of mathematics disturbs the progress of the reader. Yet in the space of 120 odd pages he has been introduced quite gently to multivibrators, iconoscopes, vhf plumbing and a host of other things connected with the subject. This requires many and well-chosen words and Dr. De Forest has supplied them.

Although written in the U.S.A. the edition locally obtainable is printed in England and apparently edited there too for there is a foreword—"The American text of this book has been Anglicised as much as, but no more than, seemed necessary to ensure understanding by English readers. The word 'tube,' used sometimes to denote what we know as a valve an dsometimes what we know as a tube—e.g., cathode ray and vacuum tube—has been left as originally written—Ed."

Circuit diagrams are still right way up, though.

Television To-day and To-morrow—Lee De Forest (Hutchinson, London, 1945) 171 p. 9 x 6, index and numerous diagrams, cloth bound, 27/-.

Our copy by courtesy of Technical Book and Magazine Co.

ELECTRON TUBE DEVELOPMENTS

Special valves have been developed for carrier-system long-distance telephones, which have a high tranconductance, low input and output capicatance, and long life with low filament consumption. For radio telephone systems they have a small transit time, duplicate anode and grid leads, and short electrode leads. Thyratrons, with a mixture of mercury vapour and a rare gas, are used in regulated rectifiers for battery chargers. Cold cathode gas-filled valves giving many years of trouble-free service find many applications in telephone systems.

CORRESPONDENCE

Correspondents are requested to keep their letters short and to the point.. The Editor reserves the right to delete anything he may think fit. The views expressed by correspondents are not necessarily those of the proprietors.

Sydney.

Editor "Amateur Radio,"

I have to hand to-day a letter from Wing Commander Maurice Brown (old VK2OR) now stationed in England. He tells me has just received a G ham ticket and is operating as G2YP on 28005 Kcs. and is very anxious to contact any VK's, especially VK2's.

Mam operating times are 1400 hrs. to 1700 hrs. G.M.T. on Saturdays and Sundays.

He would appreciate it if you could put a short note in the next issue of "Amateur Radio" to this effect, and so spread the news.

Thanks and B/s.,

BRUCE GLASSOP, VK2BG.

Perth,
16th March, 1946.

The Editor "Amateur Radio,"

Dear Sir,

In connection with your comments in "A.R." on a circular issued on Transix letterhead, we should be pleased if you would insert the following:—

Transix was an organisation of licensed experimenters only, whose membership exceeded the number of licensed experimenters in all other amateur bodies in this State combined.

You will, therefore, concede that there should be no fears as to the bona fides of the circular.

The Western Australian division of the W.I.A. has recently amended its constitution to provide for licensed experimenters only, and many of our members will be joining the local division ,and will plug for the ideals for which Transix stood.

Yours faithfully,
6MU, 6LJ, 6BC, 6AG, 6MN, PPK. 6SA President
TRANSIX (in recess indefinitely)

THE HIGH FREQUENCY END OF 28 MEGS.

There has been some discussion lately about the phone CW angle on the 28 Mc band. From the current issue (February) of QST the following extract may tend to spread transmissions from the low frequency end.

"Have you noticed the scarcity of stations in the HF end of the 28 Mc Band? When the band is open, we observe a concentration of 'phone around the middle portion, with decreasing occupancy either side. On the LF end. the cw gang hold forth. But only occasionally is anyone. 'phone or cw, heard in the no-man's land on the end. It will take a comparatively few hardy souls to start the ball rolling. For most effective utilisation of the band and most efficient operating we should spread out through the entire band. Come on, you fellows with the pioneer spirit, let's do something about it."

FEDERAL HEADQUARTERS

CONVENTION.—Arrangements for the all-important 1946 Federal Convention have advanced a step further with the issue of the Convention Agenda, comprising 67 items, some of which will probably meet with unanimous approval ,and many which will undoubtedly cause considerable discussion at the next Divisional Meetings and later at the Convention. Getting out the Agenda was a big job, and your Fed. Sec. is somewhat of a wreck at the time of writing these notes—so if the notes this month are screwier than usual, you know why. (If they catch the press—Ed.). (Now, is that kind?—Fed. Sec.)

There is just one thing more worrying us about this Convention business now—and that is the possibility that some Divisions may have to rely on proxies. This forthcoming Convention is probably one of the most important events in the history of Amateur Radio in this country—it certainly will be the most important Federal Convention yet held—and every possible effort should be made therefore to have a truly representative gathering.

And while we are on the subject of delegates, we would like to suggest that each Division should, after instructing its delegate on the line he is to take on the various items, give him as much power of discretion as possible. In setting out the Agenda this year we have included explanatory notes which we asked the Divisions to submit with their items, these should help, but some degree of misrepresentation of the intention behind some of the items is bound to occur no matter what precautions are taken against it, hence the need for allowing your delegate to use his common sense when recording his vote. Also we suggest it would facilitate your delegate's task if he knows wher he can quickly contact the Divisional President, Secretary or some other officer should the need arise. Telephone facilities will be available to all delegates at the Convention, and with the cooperation of the lassies on Trunk Lines, it will be possible for any delegate to confer with his colleagues at at home should a knotty point require it.

F.M. AND ALL THAT.—Federal Headquarters, pursuing its customary policy of looking after your interests, recently made application to the P.M.G.'s Department on your behalf for the release of F.M., Television, Facsimile and Pulse Transmission privileges. We have been informed in reply to this application that the matter has been considered and that it was deemed unwise to release these privileges until our other bands were released, thus relieving the mounting congestion now prevalent on the V.H.F. bands. We believe that this is for the most part reasonable, but not applicable to F.M. We have, therefore, made a second application in respect of F.M., asking for permission to use it on all Amateur bands above 50 Mc/s, this to be reviewed later with a view to its possible use on the 28 Mc/s band, in line with American practice. Our second proposal is now under consideration.

FREQUENCIES.—Also under consideration is an application for the immediate release of the 3.5, 7.0 and 14 Mc/s bands. Rumour has it—well, many things just at present, but all we can say is that developments are expected very soon, perhaps this note will be stale before you read it. If so—don't.

HAM SPIRIT.—We were pleased to read in the VK4 notes in the last issue of "A.R." news of one of those gestures which do much to foster the Ham spirit and to make Amateur radio the fine thing that it is. We refer to the proposal by some of the members of the VK4 Division to build a station for one of their number, Arthur Tonge, who has suffered the misfortune of almost total blindness from war injuries. To the VK4 boys "we dips our lid," and to Arthur we offer the wish that this rig will bring him many happy hours. 73 OM es vy mny QSO.

FAREWELL AND THANKS

The February issue of "Amateur Radio" was the last edition of "Hams on Service" better known in the roneod magazine as "Slouch Hats and Forage Caps."

This feature was first included in the Magazine in November, 1941, and ran continuously until February, 1946, a total of four years and three months.

On many occasions the writer of the feature refused to take any credit for the effort, claiming that he only compiled the noes from letters received, and news told to him. Little did readers realise that on many (a good many too) occasions the pages were compiled and padded out from news which if published as it was, would only fill a fraction of the space it finally did.

The feature we have reason to believe was one of the most widely read ones of the magazine. The only reason for its discontinuance was due to the fact that demobilisation had so depleted correspondents to the page that finally there was not news from which to write the notes

To the person responsible for this magnificent effort, Jim Corbin, VK2YC, the Magazine Committee, on behalf of all Amateurs in Australia offer their sincerest thanks.

EDITOR.

FAST WORK

"Had a couple of souvenired Jerry u.h.f. receiving valves, and asked G6CL to put on a par in his "Bulletin." This appeared in November edition under heading "Can You Help?" and before my copy came to hand the airmail replies began arriving. Here is the list:—

British Control Commission, Hamburg—scared at first to open this one in case—contained data sheet in German.

F3XY, PAQZ, OZ4K, G2DU, G2UJ, GM8MQ.

Three BRS with B.A.O.R., Hamburg.

Four B.R.S. in England.

They all mention the valves are good to 200 mc/s. so perhaps the 10 metre restrictions at lowest frequency won't be such a drag after all!

★

During the war some very small capacitors were made using Lectrofilm, a synthetic dielectrical material developed during the war and used in applications for which only mica was previously considered suitable. These capacitors became known as "matchsticks" and will have many post-war applications in lightweight or compact equipment.

A new magnetic material known as Alnico V is two and a half times more powerful than the best available pre-war magnetic material. It makes possible lighter and more sensitive loudspeakers.

★

A new type of mixer potentiometer has been developed, consisting of five plug-in units of two mixer controls each. The mixer potentiometer controls move linearly, in parallel grooves, so that all ten can be handled simultaneously by one operator. Incoming channels attenuated as desired (over a range of 6-105 db) by the potentiometers are combined by special transformers in groups of four into an output having the same impedance as each (200 ohms). The potentiometeers are continuously wire wound, and themselves have approximately constant input and output impedances at 200 ohms. Internal cross talk between channels is less than —110 db.

DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: C. S. Higins, VK2LO,
Box 1734 JJ G.P.O., Sydney.
Meeting Place: Science House, Gloucester and Essex Streets.
Meeting Night: Fourth Friday of each month.

The February General Meeting of the Division was held at Science House, Gloucester Street, Sydney, on Friday, 22nd Febrauray, and a very representative gathering was in attendance. Quite a highlight of the evening was the manner in which Membership Secretary, Bill Dukes, 2WD, was "snowed under" with requests for Membership Forms. At the present, membership has never been higher, and this is in no small degree due to the very fine and able manner in which 2WD has carried out his work as Membership Secretary.

The evening was devoted to discussion on the forthcoming Federal Convention and Agenda items. Power was one of the main items discussed, and many and varied were the views expressed. One important topic was the present age limit of 18 years for the A.O.C.P, and the increase in code speed. The meeting, generally, was of the opinion that F.H.Q. had not taken a strong enough stand with the Department on these subjects. The Constitution was discussed and it was quite apparent that one speaker, Mr. John Moyle, VK2JU, had given the matter no little consideration. Unfortunately, space does not permit us to give any details, but a few more virile clear-thinking members like 2JU would do the Institute a lot of good.

On Monday, 25th February, a lecture was given by Mr. Frank Wood, B.Sc., Secretary of the Australian Radio Propagation Committee. The speaker chose for his subject, "The Ionosphere and its Effect on V.H.F. Communication." The lecture was well attended and the manner in which questions were asked at conclusion of the talk was ample evidence of the attention given the lecturer by the meeting. This lecture was an innovation and as such was highly successful, and members may look forward to other nights devoted entirely to some scientific topic.

Of course, the all important subject these days is DX, and with the present conditiosn prevailing on Ten, quite good hunting is to be had. The novelty of working the various Pacific Islands is fast wearing off. Nevertheless they were the means of quite a few of the boys working some new countries (we hope). The band is just alive with W.'s and K6's, presenting a splendid opportunity to obtain a 28 mc. W.A.S. A little bird told us that's what 2RA is going after in a quiet (?) sort of way! 2AHM with his low power is knocking them over and finding it very difficult to convince the Yanks that he's only using about 7 or 8 watts. 2AHP wants a European 2RA, a South American, and 2TI half a South American for W.A.C. Called CE1AH, but Ida—yes, she's still there—could not get the TI. Too bad.

Some of the DX heard and worked by the boys up here is VQ3TOM, ZS6DW, TG9BA, XE1FG, G5BJ, G6CJ, W9FSC/XZ, W6QJW/K7, VS5JH, VU2BG, VK4 LP/VK6 (Graham Moore Island), XU1YO. Who said Ten was no good?

2NO tells me that there is not a great deal of activity of Six as yet. VK2WJ, 2LS, 2ABZ, 2NO, and 2LZ are on quite a bit with 2LZ located at Wentworth Falls, putting in a very nice signal and as usual using something very "different." 2CP, 2AZ, 2EM, 2NP, and 2TI have been doing a bit of listening, and here's news. VK2NP has been heard on phone! Ahem! Well Chas. it's just about time you gave up talking with your fingers and became civilised.

March issue of the magazine was a remarkable one for the increase in size, and it must be gratifying to the Magazine Committee to know that it is now gaining the recognition it deserves by the Trade. But the Magazine must not be permitted to become an advertising medium only. An appeal is made to members of the VK2 Division for more Technical articles. During the war years is was reasonably easy to obtain articles, so much so that on more than one occasion the Magazine was an all VK2 issue. Surely there are many more subjects one can write about these days now that we are back on the air. How about an article on Antennas, preferably of the rotary type or for that matter any type of beam Antenna, for methinks you are going to be on ten for quite a long time yet. Again, how about a Receiver, designed particularly for 28 mc. and higher, or a Transmitter. Quite a few chaps are using Power Doublers with the usual sad results. What about it, chaps?

March issue of the Magazine was also an epic as we saw the passing of "Slouch Hats and Forage Caps," latterly known as "Hams on Service." Without a doubt this feature was more widely read than any other section of the magazine during the past six years, and this Division would like to thank 2YC for his efforts in providing a means of communication for hams on service, wherever they were, and I feel certain that Institute members who were on Service will join in saying "Thanks a lot, Jim."

The 36th Annual General Meeting of the Division previously set down for 25th January, will now take place on Friday, 26th April. This meeting will be held at

Science House, and will commence at 7.45 p.m. You are reminded that the Annual Election of Council will also take place on that date. Ballot Papers to be valid must be returned not later than noon of the day preceeding the Annual General Meeting. Also, when obtaining nominations, remember it is necessary to get the written consent of the nominee.

Don't forget on and after the March General Meeting, supper will be served at 10.15 p.m. Remember to wear your call sign.

A.O.C.P. CLASS.

After many set backs brought about by industrial trouble, lack of accommodation and departure of original Class Manager to another State, the VK2 A.O.C.P. Classes commenced on Monday night, 21st January, at the Rooms of the W.E.S.C., 10 Clarence Street, Sydney. This night marked a milestone in the history of the Wireless Institute of Australia in New South Wales. Not since 1929 has this Division had an A.O.C.P. Class.

The Institute was very fortunate in securing the services of Mr. Jack Howes, VK2ABS, as Class Manager. After serving five years with the R.A.A.F., and attaining the rank of Fl. Lt., 2ABS was only a civilian for about twenty-four hours,when he was "interviewed," and as a result, the Division gained the very man it had been looking for. 2ABS brings a wealth of technical and administrative ability with him and has proved himself a well-liked and popular instructor. He had been assisted by Neil Pieremont, 2NQ, and Mac Hicks, 2ADV.

The Classes are held in the rooms of the Women's Emergency Signal Corps, 10 Clarence Street, Sydney, an dthe Institute was particularly fortunate in obtaining accommodation here as we have an area all set up with every signalling device from blinker to Bendix transmitter. Here we certainly must not forget Mrs. F. V. MacKenzie and her band of helpers, who have had no little share in making the class a success.

Classes are held twice a week, Mondays and Wednesdays, commencing with Morse Practice at 6.45 p.m. and a lecture at 8 p.m. The Morse practice is divided into four groups depending upon the speed attained by the students. As time marches on, these groups are gradually reduced until there are only two—the fast and the very fast. Many students when commencing the Class had no knowledge of the code whatsoever, but soon began to make progress. At 8 p.m., the lecture begins and is usually given by the Class Manager, Mr. Jack Howes, and this concludes about 9.15 p.m.

Approximately thirty students will sit for the A.O.C.P. on 9th April, and opportunity is taken to wish them every success.

The next class will commence on Monday. 9th May, and it has been decided to extend the period of this class to five months, which will mean that Students will sit for the October A.O.C.P. Early application for enrolment is essential and all enquiries should be addressed to Class Manager, Box 1734, G.P.O. Sydney.

Applications are called for the position of Morse Instructors. These positions are not Honorary and any member interested may obtain particulars by ringing FF 1705.

Many thanks 2ABS for the fb job that you are doing.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne.
Meeting Place: Law Court Chambers, 191 Queen St.
Meeting Night: First Tuesday of each month.

The monthly meeting of this Division was held at the W.I.A. Rooms, 6th Floor, Law Courts Chambers, 191 Queen Street, Melbourne, on Tuesday, 5th March. Harry Kinnear, 3KN, was in the chair. This meeting broke all records for attendance, there being so many members

and visitors present that all could not be accommodated and the attendance book in being passed round was not available to many who missed out, entering their names to record presence.

There was a very entertaining demonstration of service transmitting and receiving gear, which took up most of the evening.

A special meeting of those interested in 200 Metre Band Transmissions is to take place at 8 p.m. on 6th April, at the W.I.A. Rooms. This meeting is sponsored by the old 200 gang. All welcome.

Those present at the March meeting and who signed the attendance book are: GM4MV, 2AHY, 5FL, VK3's: KN, XD, WY, YJ, MJ, SK, ZS, UR, YF, XJ, ED, CT, DM, ZG, ZT, FR, SQ, UJ, LX, MN, IK, QE, EN, TE, ZC, XU, QC, KB, RI, FS, NW, JI, CO, HE, QU, IG, VX, RX, BQ, YP, KP, PG, HK, SB, AP, XG, QN, YII, XA, ET, HS, CF. TJ, ZJ, UM, NY, YL, KK, NU, JO, AG, OJ, FT, PW, NR, PO, CR, UK, BM, LN, UH, EE, DH, HX, OE, AFQ, AKL, AHY.

The following have submitted applications for membership:—R. L. West, W. A. McLeod, J. Qutty, J. K. K. Cosgriff, A. L. Wilson, 3JF, S. J. Wilcox, 3KS, F. Mills, E. Einsidel 3QE, J. D. Doyle, O. C. Benning, R. Morrison, H. J.Ashmus, 3ET, B. Slutzkin, 3SK, D. V. Hope, 3XA, D. A. Brooke, I. Sherer, G I. Morris, 3VZ, S. C. Broadbent, T. E. Paige

The following stations report strong activity on 6 MX: JD, MW, MJ, BQ.

The next meeting of this Division will be held at the Institue Rooms, 6th Floor, Law Courts Chambers, 191 Queen Street, Melbourne. on April 2, at 8 p.m. All welcome. To those intending to join, come along and do it.

QUEENSLAND

Secretary: H. MacGregor, VK4ZU,
"Mouquet," Eildon Road, Windsor, N.3.
Meeting Place: State Service Building, Elizabeth St., City.
Meeting Night: First Friday of each month.

A modest roll-up at the February General Meeting had the task of preparing agenda items for the forthcoming Federal Convention. One item that should meet with Australia-wide appeal is the proposal that in future QSL cards for WAC Certificates, etc., should be verified at F.H.Q., and so obviate the necessity of sending cards overseas with the ever-present possibility of loss in transit. Six other items were also tabulated.

A generous gesture was made by George Gray, 4JP, who offered to donate an 809 to the member responsible for the most new members during the next twelve months. Needless to say the offer was gratefully accepted.

As from the 12th March, our meeting place will be the State Service Building, Elizabeth Street, City, at the rear of Barry and Roberts. The situation is a much better one from the point of view of outside noise level, and the facilities for lectures, etc., are a big improvement on the Diggers' Association Rooms. The general meeting will in future be held on the first Friday in the month, and Student Classes will run on the 2nd, 3rd, 4th and sometimes 5th Tuesday in the month. Everyone please note the change of place and times.

A few of the local gang with their respective families had a day out at Redcliffe on Sunday, the 3rd of March. The weather was well-nigh perfect, and a good time was had by all. Owing to work I could not attend, but I believe that's the story.

I can't think of a better use for the remainder of our space than a brief account of the very FB reunion which was staged at Anzac House on the evening of Friday, the 8th. My memory is a little hazy as to the latter half of the evening, but I think the lines which follow give a pretty good outline of events. We had as our guests three members of the R.I.'s Dept., with Mr. Conry, the Senior R.I. of this State as head of the party. The Radio trade was well represented, both in the way of visitors and prizes donated for the numerous competitions held during the evening.

After the usual toast to the King, and a minutes silence for those hams who had pulled the big switch for the last time, we really settled down to have a good time, i.e., to drink, be merry, and eat. Running over the competitions, Fred Lubach proved to be the best judge of the number of peas in a bottle, the number being 1,270; 4RF's guess was only 40 short of that number.

For sheer honest-to-goodness ability to quaff a glass of beer, blow up a paper bag and burst same, we take our hats off to Arthur Burton, 4FE. It really seems a shame to see good ale disappear so quickly! Arthur later obliged with a turn on the piano, so the 809, and TCO/35, which he got for his effort, was well deserved.

Mr. Joe Foster, the well-known Albert Street Radio Dealer, voted the evening a great success. He didn't actually tell me this, but it was apparent that our friend enjoyed himself, which pleased us rather, for Mr. Foster has very kindly presented us with an Ellipsoid Microphone, to be presented to the beginner making the most progress in Morse during the first three months of his probationary period. If any of the new hams are finding the period of CW operation irksome, this should be some compensation.

Those DX merchants, 4EL and 4RF, found plenty to talk about during the evening, and we observe 4ES and 4AW using glasses for punctuation marks during their conversation. Frank, 4FL won a 5Z3 for something or other, although I don't know whether Frank knew just what sort of a tube it was at the time. I think it was a 5Z3, anyway! And then Vince Jeffs had to count up the number of correct answers to a Quiz we had, and which was too complicated a job for his next door neighbour. The simple addition of the answers I mean, of course.

Our treasurer, 4RC, worked his head and went around collecting the necessary contributions from every one while everyone was still sober enough to see that they weren't robbed. Our thanks, Bob. And then there was the little floor show which Tibby, 4HR, put on towards the end of the evening, or was it early morning? But our space is running out, so I'm afraid we will have to forget that one.

Before closing, I omitted to mention that at the conclusion of general business at our last G.M., we were treated to a lecture by Mr. Ellis on that most topical subject—"Radar." The lecturer obviously knew his sublect inside out, and it was a treat to listen to him.

Another small point. As Secretary, I shall very shortly be resigning, owing to business committments, but I hope these notes will continue to bear the signature, 4ZU.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.
Meeting Place: 17 Waymouth Street, Adelaide.
Meeting Night: Second Tuesday of each month.

The monthly General Meeting was held on Tuesday, 12th March. Again there was a record attendance. One wonders how long this sort of thing will continue. It was thought that last month's figures of 80 odd would take some beating. However, on this occasion a "Bradman" was scored, there being exactly 100 present.

In the absence of the President on holiday ,the chair was take nby the vice-president, Mr. Kilgariff, VK5JT, who introduced the lecturer, Mr. Reg. Davies, VK5LJ, whose subject was the very topical one of "Ten Metres." The lecturer was an enthusiast on 28 m.c. before the War and his talk, though mixed with theory, was of a very practical nature and was listened to with very close attention. Dealing with Receivers first, he acknowledged the advantages of Acorn tubes, but for those not in possession of this series, the 6K8 and 1852 were preferred as Mixers. As a seperate oscillator the 955, if available, and the 6J5 were recommended, with control grid injection to the mixer, whose fault is lack of sufficient oscillator power. This type of injection tends to aggavate "pulling" but the effect may be avoided by using a high I.F. frequency of the order of 3.5 m.c., which also reduces image interference. A good case was made out for the construction of a special 28 m.c. Converter to be fed into the ordinary short wave super, which would be tuned to 3.5 m.c. to act as the I.F. amp., etc. This scheme would help the designer in keeping leads very short, the necessity for which was stressed. Each "return" should be to the cathode itself and by separate and single paths. The cathode circuit can cause a big loss and battery bias instead of the usual cathode resistor effects a big improvement. A good R.F. stage, free from regeneration, is highly desirable. Regarding the Transmitter, the lecturer said that high power was not needed. The main trouble usually experienced was in neutralizing the final and a useful tip given that, in addition to the usual grid-plate neutralizing, the plate-filament capacity also be neutralized. Earthing one side of the filament was considered better than the filament centre tap method. The antenna is more important than transmitter power in working d.x. The usual 66 feet flat top aerial is not good enough; some form of directional antenna is needed and of these the "Lazy H" is perhaps the pick. Arrays with director and reflector are apt to be critical in tuning and not suitable for covering the entire band.

The vote of thanks to the lecturer was proposed by Mr. Cook, VK5AC, and caried with acclamation.

It was with very deep regret that members learned of the passing of Alwyn Reimann, VK5JO, after a short illness. He was a member of the Institute from 1928, worked on low power on the old 32 metre band, and was prominent in interstate 80 metre contests; was one of the first to instal crystal control, ground his own crystals and made them work. He took a prominent part in Institute affairs and held many of its offices (Chairman B.P.S., Asst. Secretary, Council member, etc.). His funeral was attended by Directors and fellow-workmates of Harris Scarfe Ltd., and representatives of other firms and broadcasting stations. The W.I.A. was represented by Messrs. Barbier, Brown, Kilgariff, Luxon and Whitburn. At the meeting, members stood in silence for two minutes as a tribute to his memory.

The Q.S.L. Officer, Mr. Geo. Luxon, VK5RX, advises that the Q.S.L. service is again in operation, and he is "open for business"—at ½d. a card.

It was announced that Mr. F. D. Askins(late of the R.A.A.F. Signals Training School) would be the lecturer

in Theory for the next series of Student Classes, due to commence on 16th April. There will be approximately 20 weekly lectures.

During the past month 19 new members have been enrolled. They are Messrs. H. L. Austin, E. L. Beck, R. G. Bishop, A. E. Brown, G. S. Coombe, L. E. Coombe, L. H. Duncan, D. E. Hosking, T. C. Hosking, W. A. S. Jolly, R. T. Manuel, R. T. Mills, J. W. Pitcher, A. J. Ross, R. G. Scott, J. P. Sullivan, A. W. Taylor, L. W. Wallbridge, and C. R. Williams. A hearty welcome is extended to each and all. Total membership is now 176.

At the next General Meeting to be held at 17 Waymouth Street, on Tuesday, 9th April, Mr. John Allan will give a talk on "Radar."

WESTERN AUSTRALIA

Secretary: H. B. Lang, VK6HL,
Box N 1002, G.P.O., Perth.

On January 21 a general meeting of the Division was held, and at that meeting a new Council was appointed consisting of:—Messrs. C. Brown, VK6CB; W. Schofield, VK6WS; H. Lang, VK6HL; W. Peterson, VK6LW; E. Doddy, VK6WH; F. Lambert, VK6FL; C. Moss, VK6GM; J. Morris, VK6TX, and R. Hugo, VK6KW.

From this Council the executive officers were elected and are: President, Mr. G. A. Moss, VK6GM; vice-president, Mr. W. Schofield, VK6WS; Secretary, Mr. H. B. Lang, VK6HL; and Treasurer, Mr. F. Lambert, VK6FL.

At the meeting it was unanimously agreed that the annual subscription be raised to £1/1/-, this subscription to include "Amateur Radio." It was further agreed that after frequent meetings with the executives of the local radio clubs, the Division accept as members, only the holders of the A.O.C.P. or higher qualifications. By this move it is hoped to enroll all VK6 amateurs as members, and in consequence the Division will then be able to devote all its attention to the requirements of the active experimenter.

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, Newtown.
Meeting Place: Photographic Society's Rooms, Liverpool Street, Hobart.
Meeting Night: First Wednesday of each month.

At the monthly meeting held at the usual quarters, Liverpool Street on the 6th of March, the attendance was good, present being VK7LJ in the chair; VK7BJ, VK7LL, VK7ML, VK7AH, VK7CL, VK7CT, VK7AL, VK7GJ; Messrs. A. Morrisby, F. Gee, — Neilson, — Koglin, and Les Reardon. Apologies were received from VK7CW, VK7PA, VK7CJ, VK7RV, and A. Russell, ex-VK5AR.

Council business was attended to immediately before the general meeting.

Correspondence from the CSIR re charts on Frequency Prediction, etc., was received, and the secretary, VK7BJ, said that the 28 Mc predictions for February were correct in Tasmania.

Seven new members were proposed and accepted, these constituted four full and three associate members.

The outcome of the decision at the last meeting in connection of the procuring of a P.O. Box was the report that the Division could be placed on a "waiting list" with 60 others.

Kelly, VK7LL, and Conway, VK7CL, were elected as a sub-committee to interview the Forestry Department and the Hobart Fire Brigade re assistance in case of bush fire and other emergencies.

No details of Convention agenda items from the other States have, as yet, been received, and so far no VK7 delegates is forthcoming, but high hopes are held.

A Jap. Frequency Meter was presented by Mr. R. A. Anderson for the use of members of this Division, and a hearty vote of thanks was tendered Mr. Anderson for his gift.

VK7BJ's scheduled lecture on Frequency Modulation went off very well, and many of the technicalities must be better understood by all not too conversant with its application. The Council's action to provide one of these lectures or talks at each meeting is to be comended, and all members are asked to co-operate to their fullest extent; Joe's effort met with heartly acclamation.

It was very pleasing to see our G.O.M., VK7AH, again present, his health has been playing up a bit lately, and his enthusiasm at 78 is to be commended, not to mention his vitality.

H.M.A. Ships "Shropshire" and "Bataan" visited Hobart during February, and P.O. Syd Clark, of the "Shropshire's' Radio Section, was entertained on several occasions, one of which constituted an evening "Around the shacks with the VK7's" and wound up at 7LJ's with an exhibition of movies in colour of some of Tasmania's beauty spots, and then supper graciously provided by Mrs. LJ, and greatly appreciated by those present.

Syd is a prospective VK2 awaiting his licence, having recently taken the "A" class exam. On his visit he was accompanied by another shipmate. By the way, Syd, congratulations on the new arrivals, let's hope there will be a boy next time.

It was regretted that other Hams from the Bataan were not able to be present as was intended.

VK7CW reports that the 28 Mc band "opened up" on Sunday, 3rd of March. He says that thousands of Yanks were heard like locals and were working a contest.

VK7AL is another about ready for the air and has been concentrating on making a super perk properly on the 28 Mc band.

The picnic scheduled for Sunday, 24th February, was conducted in perfect weather, and the time available to many was all too short. Amongst those present were: VK7's—LJ, BJ, CW, CT, CL, WR, ML, CJ, AL, PA, and Bert Russell, ex-5AR, all accompanied by their families and/or friends, and a most enjoyable time was had, all voted it to have been FB.

Some of the earlier arrivals were by boat, and when the later arrivals turned up they were found diligently baling a cavity in the rocky part of the beach and catching fish trapped therein—some a full four inches long—and they were last seen swimming in a beach bucket full of salt water—yes—the fish, of course. Imagine seeing BJ or CL in a beach bucket!

Water was boiled and lunch partaken of and then some of the gang engaged in a spot of cricket, while others enjoyed a dip in the briny. Many, particularly the womenfolk, just sat in the sunshine and did the usual!—no offence—as Hams can't talk—never learned to, Hi. As usual when Hams gather, the talk always gets around to receivers, transmitters, service disposals antennas and the like.

A couple of very ambitious Hams sallied forth complete with lines, etc., in hopes of excelling the previous catch—those in the pool— and 7ML was seen about 3 p.m. landing a nice-sized rock cod, which was greeted with much applause, in fact, for a moment it sounded like some popular favourite romping home. Bert, fisherman No. 2, was looking very dejected at one stage when he was perched on a rocky spit almost water encircled with only the flies to annoy him.

To recount the many varied scnes and happenings of the day would almost fill up the magazine, so I'll just end the notes by reminding you that the General Meeting is always held on the first Wednesday of each month at the Photographic Society's Rooms, Liverpool Street, Hobart.

Frequency Modula ion

(Continued from page 4)

this case not much reduction of noise can be expected. Generally speaking FM is not suitable for long distance involving ionospheric transmission.

Whilst FM owing owing to its suppression of interference from other Ham stations (FM, AM and CW) and its reduction of noise should be very attractive to the Ham who is prepared for the complexity and expense involved, it is likely that some Hams may consider its greatest advantage to be that, until FM BCL sets become common the BCL will not be able to track down Ham interference.

In the second talk I will be dealing with the equipment and circuits necessary to produce, radiate and reproduce FM signals.

Plastics

(Continued from page 9)

the top. Owing to the rather brittle nature of "Distrene" only light cuts should be taken in order to avoid chipping. It is important to note that for machining purposes "Distrene" rods and sheets require to be SUPPLIED IN A "STAIN FREE" CONDITION to avoid cracking.

When threading and tapping the chief point to be observed is that the principle of variation of rake with softness of material holds. The softer the material the greater should be the backing-off of a cutting edge. In general, pitches should be coarse and threads not too sharp.

Aagin home-made cement can be made by dissolving flaked "Distrene" in benzene. The writer has found this a very useful H.F. varnish which can be used on H.F. coils without causing any noticeable loss. Several samples were measured at 60 Mc/s using a standard commercial "Q" Metre, and while other cements caused a noticeable change in "Q" none was noticed with this varnish.

ALKATHENE

"Alkathene" or Polyethyline, being a softer material, is comparatively easy to handle, although the manufactureres state that a harder material known as Grade 2 is now available. Unfortunately, the writer was not supplied with a sample, so no information can be supplied.

It is important to note that heating must be carried out with great care. The material becomes soft at 115 degrees C., and can be shaped easily, bu this temperature should not exceed 120 degrees C. in air. Degomposition occurs about this temperature and increases as the temperature is increased. The rate of oxidization is also dependent on the ease of access of air. Not only does this oxidization give rise to an increase of the power factor, but the material becomes stiffer, and after a time "sets up." The time of heating should be kept down, and the lowest possible temperature used.

The writer endeavoured to make an "Alkathene" cement by dissolving small pieces of the material in hot carbon tetrachloride. The varnish so obtained was not, however, satisfaltory as it held no adhesive properties, and therefore cannot be recommended.

The writer acknowledges his indebtedness to Mr. E. C. Couzens for permission to utilize information con- Industry" (Electronic Eng., price 2/6); and to Messrs. tained in his monograph entitled "Plastics in the Radio I.C./. Ltd. and B.X. Plastics, for additional information.

QUARTZ CRYSTALS

Radio communication might have been impaired and the work of producing quartz crystals materially increased had not an accidental fracture of a crystal revealed the usefulness of small siz e crystals. A South African amateur, after dropping his precious "rock" reported his accident to the American crystal manufacturer when ordering a replacement, stating that his crystal was now in tiny fragments which still worked!

From this chance remark grew the design changes that produced millions of military crystals at an enormous saving in quartz and expense. The former one-inch square crystals were replaced by tiny bits of quartz averaging less than three-tenths of a square inch in area. The thickness of the new crystals runs from fifteen to eighteen thousandths of an inch. Reduction in crystal size resulted in the production of more plates per pound of raw quartz and also in the use of quartz of a size and quality formerly considered non-adaptable to radio use. The saving in quartz is estimated at 1200 tons.

—Q.S.T.

TIME SIGNALS

Several systems of signalling time, controlled by the local observatory, are in use. Most commony used are Onogo, Modified Onogo, U.S. New System and Modified Rhythmic. (Incidentally, Sydney has a system all its own.)

Onogo and Modified Onogo are similar, the transmission being as fololws:—

1st Minute: A series of the letter X sent every five seconds from 0 to 49 seconds, six seconds silence, followed by the letter O (- - -) each dash being of one second's duration commencing at 55th, 57th and 59th second.

2nd Minute: A series of the letter N sent once every 10 seconds . . . the dot being made at the tenth second: five seconds silence followed by the letter O as in the first minute.

3rd Minute: A series of the letter G sent once every 10 seconds . . . the dot being made on the tenth seconds.

In the modified Onogo system six dots are substituted for the three dashes of the letter O. The dots are made at 55th, 57th, 58th, 59th and 60th seconds of each minute.

U.S. New System is made over a period of five minutes and incorporates a feature which makes possible the identification of each minute. This feature is particularly handy when copying through QRM or QRN.

The signals commence 5 minutes before the hour and an examination of the diagram will make the system quite clear.

Mins.	Seconds										
	50	51	52	53	54	55	56	57	58	59	60
55	—		—	—	—	—					—
56	—	—		—	—	—					—
57	—	—	—		—	—					—
58	—	—	—	—		—					—
59	—										—

Time Signal

The writer has had nothing to do with the Modified Rhythmic System so a brief outline only, will be given of this method.

It is very accurate and is generally used only for survey purposes where the high degree, point O1 second accuracy is required

Three hundred and six signals are emitted in three hundred seconds of mean time, the concluding signal being the exact minute

In each series, signals No. 1, 62, 123, 184 245 and 306 are single dashes of point 4 second duration and commence at the exact minute. Each dash is followed by 60 dots of point one second duration.

Checking the chronomter: Count the number of intervals from the first dash until coincidence occurs between one of the rhythmic signals and the beat of the chronomter (with the chronomter beating ½ seconds there are two such coincidences 29½ and 30½ seconds apart every minute.

It is not neceassary to actually count the signals.

Write down:—

(1) The chronometer time of the tick (whole or half second) immediately preceding the first dash.

(2) The chronometer time of coincidences (seconds only need be written down).

The difference between (the elapsed time) increased by point 5 second when it is not a whole number gives the rhythmic interval number from which the correction can be obtained on the chart.

—From Admiralty List of Signals.

FOR SALE, EXCHANGE, WANTED

9d. per line, minimum 2/-.

FOR SALE.—8 tube super; 1, TRF, Separate HF Osc., Coils for all bands to 28 Mc.; Xtal filter, 3 position selectivity ,2 stages of I.F., CW Osc., Penthode output, noise limiter, speaker. Really works on 28 Mc. Price £33. Ring WL 2614—VK3CP.

9 tube commercial communications receiver; also assorted transformers for exchange or sale. Phone Win. 3104—VK3SK—Handle "Bob."

AMATEURS NOTE:—Ex Ham disposing of equipment. Power supplies Crystal Oscillator, Keys, Valves, Condensers, odds and ends. Ring U 2135, or call 1256 High Street, Malvern.

FOR SALE—A large quantity of miscellaneous radio equipment belonging to the late Norman Gunther, VK3 NG. Information may be had from Bright Star Radio, 1839 Lower Malvern Road, Glen Iris. Phone UL 5510, where catalogues may be inspected.

AMATEUR RADIO

MAY 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

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

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AMATEUR RADIO

VOL. 14 MAY, 1946 No. 5

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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W. J. LEWIS
20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

There is no doubt that personal contact is the only sure means of promoting a full understanding of one another's problems.

The Federal Convention of the Wireless Institute of Australia held in Melbourne during Easter proved this fact. Delegates from all States were present and in spite of the diversified opinions held by the various Divisions, the atmosphere which dominated the Convention was one of friendliness.

Not only did friendliness prevail, but what was more important, each Delegate came to the conference table with a spirit of give and take—each Delegate was prepared to see the others point of view, and endeavour to modify his, so that an unanimous decision could be reached.

This is the true Ham attitude, of what we are proud—for it was apparent that all Delegates had come to the Convention with the obvious intention of reaching decisions for the improvement, not only of our own organisation, but that of Amateur Radio generally.

It is evident from the discussions and decisions that the Convention has been the most important in the history of the Wireless Institute of Australia, for the Convention proved beyond doubt that the Institute to-day stands united.

IN THIS ISSUE

IN THIS ISSUE.

DIVISIONAL NOTES.—

RECTIFIERS

By F. P. Dickson (VK2FB)*

PART II.§

Gasfilled Rectifiers.

We noticed that in high vacuum rectifiers the presence of gas is fatal. That is because of the nature of the gases released by overheating, whereas in gasfilled rectifiers we use inert gases, such as argon, helium or mercury vapour. These do not attack the cathode chemically and the emission is not destroyed. Moreover, we choose advantageous gas pressures.

In order to understand clearly the nature of the arc discharge in gasfilled tubes we must first have some idea of the various kinds of discharge in gases at low pressure. Let us consider a bulb filled with inert gas at a suitable presure, say 5 mm. of mercury (atmospheric pressure is 760 mm. mercury) with two electrodes connected to a source of voltage. This is essentially the same set-up as a neon tube.

When an increasing voltage is applied a series of phenomena takes place. At a voltage called the "breakdown" voltage the gas becomes ionised. An ion is an atom, which has had an electron removed and so is positively charged.

In the gas a few ions and electrons are always to be found and the applied voltage attracts these to negative and positive plates respectively. When the voltage is high enough they move at sufficient velocities to ionise the atoms by collison, whereupon the number of ions and electrons increases rapidly. Once ionisation has started, it can be maintained at a lower voltage because of secondary ionisation. The cathode glows with a colour depending on the nature of the gas and its purity.

This stage is called glow discharge and in the region where its characteristic is horizontal is the condition of operation of voltage regulator tubes, which persists until the electrode is completely covered with glow. See Fig. 3. (2).

Both when the characteristic is negative and horizontal, a stable current can only be maintained by external impedance.

Once the glow entirely covers the cathode a new set of conditions follow and the current voltage characteristic is again positive, the voltage having to be increased to cause greater current flow.

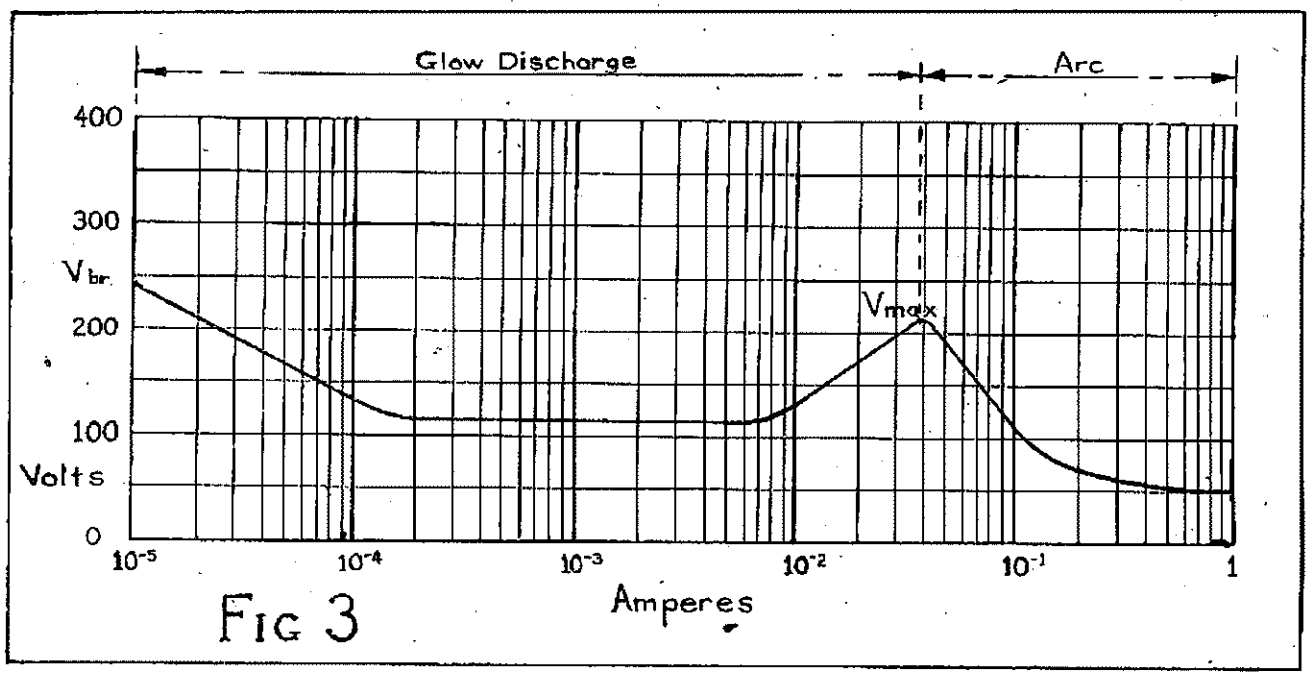


FIG 3

In the same way as the anode is heated by the electrons it collects, the cathode is heated by the positive ions attracted to it and there neutralised. With sufficient ion speed, due to the applied voltage, the cathode becomes hot enough to emit electrons. Once a copious supply of electrons is obtained an arc discharge takes place. The characteristic becomes again sharply negative and in the absence of current limiting impedance, the tube will be destroyed by excessive current. A fraction of the electrons emitted collide with gas atoms and produce ions, which keep the cathode hot by bombardment and prevent the formation of a space charge by largely neutralising

*Transmitting Valve Department
Philips Electrical Industries of Australia.

§Part I. see "Amateur Radio," March 1st, 1946,

(2) Ref. Mulder loc. cit.

the electron cloud. In the absence of space charge, substantially the whole of the anode voltage is effective in attracting the electrons and thus the internal impedance of the tube is very low and only sufficient voltage need be applied to maintain ionisation of the particular gas used.

Ions arriving at the cathode with sufficient velocity will knock atoms out of its surface. This process is called "cathode sputtering" and the cathode is gradually eaten away. A good example of this is the gradual darkening of neon lamp bulbs, the glass becoming coated with material dislodged from the cathode. This process also causes cleaning up of the gas, molecules of which are bound down by absorption in the deposited material. This, rather than loss of cathode substance, is what determines the life of a tube filled with a permanent gas. The so-called rare gases are used, since these are chemically inert to the substances in the tube, but none the less by absorption the supply ultimately fails. We can in certain cases escape this by using mercury vapour, which at normal temperatures is evaporated from liquid mercury at a suitable pressure for arc discharges, and sufficient of the liquid can easily be used to last the life of the tube.

To make a rectifier, we must arrange matters so that the arc takes place in the one direction only. It is clear that with the tube described, if A.C. were applied the two elements would be alternately anode and cathode and there would be no rectification.

If we make one of our electrodes a cathode externally heated and with large emission, while the other is an anode kept relatively cool, there will, with positive anode, be no glow discharge, but as soon as the striking voltage is reached, at which the gas ionises, the arc sets in.

In practical rectifiers, with very few exceptions, oxide cathodes are used because of their large emission and consequent economy of heating power. In a gas atmosphere more heat is lost than in vacuum because of the gas, the molecules of which conduct it away. Extra heating, however, is derived from the arc by bombardment. Actually, once started a mercury vapour tube will run with the filament current shut off, but this is very bad practice as the arc which maintains the heat keeps only a small part of the cathode hot and this is consequently overloaded, which shortens its life.

Since there is no space charge to repel electrons seeking to come out of the cathode, we can have our cathode in a complicated shape, such as a close coiled spiral to conserve heat without any difficulties about emitting surface facing the anode. The portions inside the spiral contribute their share to the emisssion. In this way we obtain far higher emission per watt of filament power than in high vacuum tubes. The figure may be as high as 1 amp. per watt. Expressed in another way, we are able greatly to increase the ratio of emitting to radiating surface, which in high vacuum valves is substantially unity. Also shields are fitted around the cathode to reflect back the heat which is radiated.

The value of our study of gas discharges becomes apparent when we come to consider the inverse ratings of gas-filled rectifiers; when the anode becomes negative it is then the cathode for a glow discharge. If it becomes so hot that the critical temperature is reached at which the glow changes into an arc, we can no longer have rectification and by the passage of much A.C. our valve will be destroyed.

The use of special test anode enables this process to be observed and it takes place precisely according to the curve of Fig. 3. (3). In practice it is not possible to make a practically uniform anode in which there will not be local hot spots, nor to keep it perfectly free of material of low work function. The best results are obtained with anodes of graphite or metal anodes with carbon coating.

(3) Ref. J. M. Dniyvesteyn. Z.S.f. Phys. 73/727/1932.

Because of the non- homogeneity of practical anodes we cannot accurately specify an inverse voltage at which an arc back will take place. Arc back voltage is, in fact, a very complicated function of electrodes, gas pressure, proximity and condition of the bulb walls, etc. We can, however, on a statistical basis, assign an inverse voltage such that the probability of an arc back is small compared with the life of the valve. If a portion of the anode can reach the critical temperature, the occurence of an arc back is only a question of time. Over a wide range arc back voltage rises as the gas pressure falls, which is the reason why the inverse ratings of mercury rectifiers must be reduced at higher temperatures when the mercury vapour pressure increases. We cannot make the pressure too low, however, as the forward striking and operating voltages as well as the cathode life will suffer and the matter becomes one of compromise. In rectifiers for very high voltages various other precautions can be taken to hinder the formation of glow discharge and to delay its change into an arc, such as the development of special bulb forms and shielding pieces. These, however, are hardly the concern of amateur stations who do not require 10 to 20 thousand volt supplies.

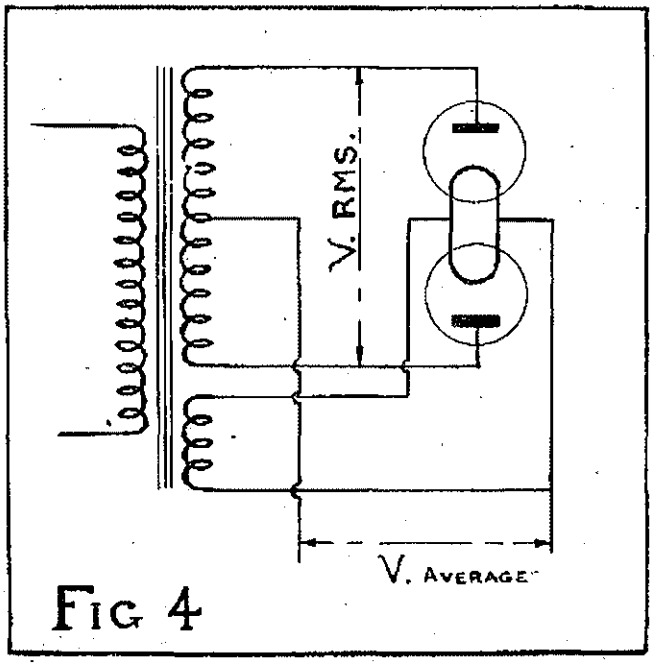


FIG 4

V average	=	0.450 x V RMS	
	=	0.318 x V peak	
V inverse	=	3.14 x V average	
I average	=	0.636 x I peak	
Ripple frequency	=	2 x mains frequency	
Ripple voltage	=	48.3%	
Ratio $\frac{\text{Secondary volt amperes}}{\text{D.C. output watts.}}$	=	1.57	Asuming constant output current.
Ratio $\frac{\text{Primary volt amperes}}{\text{D.C. output watts.}}$	=	1.11	

These figures are also applicable to high vacuum rectifiers, but the voltage drop in the valve is quite a different matter.

(Continued on Page 20.)

"CLEARING THE ETHER, SERIES II"

By G. Glover, VK3AG*

This series of articles is intended to serve as a guide for Prospective, New and Old Hams alike.

INTRODUCTION.

Some years ago the present author published a series of articles in "Q.T.C." under the title of "CLEARING THE ETHER," in which he dealt with the problems confronting—Prospective, New and Old Experimenters. It seems appropriate therefore, to name this series of articles "CLEARING THE ETHER SERIES II," for it covers the same ground as the original series; but is equipped with 1946 technique.

During the War many men and women answered the call to arms and many of them were trained to maintain the vast communication network necessary to keep contact with ships at sea, forces in the field and aircraft in flight. To-day these men and women represent potential "Hams"; because like the call of the sea, the "Key" or "Natter" bug has found its way into their blood stream.

We extend to them a cordial invitation to join us in "Hamdom," and the author personally hopes that these articles will help them through the transition period from "Pounders of the King's Brass" and "Operators of Doovahs," to the exalted ranks of "Ham Ear-Bashers."

In preparing this treatize the author has taken into consideration human psychology; for instance, it would be inhuman to expect the enthusiastic beginner, whose thoughts and ambitions are concentrated on Transmitters, to wade through the Section on Frequency Meters first; so should the cart appear before the horse occasionally the reader will appreciate the reason.

Every branch of the subject touched will be dealt with under an appropriate heading, commencing with the Prospective Amateur or Student.

The author sincerely hopes that this treatize will meet with the same degree of success as its predecessor, which judging by readers comments was favourably received, and useful to at least some of his readers. He wishes to thank all those good people who have assisted in the compilation of matter for this treatize.

ADVICE TO THE PROSPECTIVE AMATEUR.

This subject will be dealt with under four headings, namely, (a) Theory; (b) Sending; (c) Receiving; (d) Code Practice Devices.

(a) LEARNING THEORY.—To commence with, the student could not do better than obtain a copy of the "Radio Amateur's Handbook," an instructive publication issued by the A.R.R.L. If the student does not fully comprehend all the explanations given, he should get in touch with someone who does, and obtain a satisfactory explanation. Never leave one single point undeciphered.

The student who is within easy reach of the Capital City in his State should contact the W.I.A. and enquire about the schedule for A.O.P.C. Classes being conducted. Perhaps if the number of inquiries from the Country warranted it, the Technical Committee of the W.I.A. would undertake the preparation of a "Correspondence Course." Just a suggestion fellows, think it over.

Just one word of warning to students before leaving the subject of theory—Never skip over a book. Firstly, read through the book quickly to get an insight into the subject being covered, and then re-read slowly. Peruse each page very carefully and give due consideration to each point. This is essential, for without laying a good foundation one can hardly expect the structure to withstand the pressure of additional floors. The moral is—look after the little points and the big ones will take care of themselves.

(b) LEARNING TO SEND.—It should be the aim of every student to become a perfect sender and as the great majority have no knowledge of this art, it is essential that they should exercise the greatest care and patience in the initial stages.

Wrist Action.—One of the greatest assets a sender can possess is a flexible wrist, since, upon the flexibility of his wrist depends his ultimate success as a sender. One great authority advocates the following method of obtaining the desired flexibility of the wrist, "Maintain the forearm in a limp position, waving the hand upwards and downwards with a movement similar to that usually employed when waving 'Goodbye.' After a few days of such practice, night and morning, the student will be agreeably surprised at the marked improvement in his wrist action." Having tried this method with great success, the writer recommends it to both student and old timer alike.

Holding the Key.—The correct method of gripping the key is one of the biggest factors controlling the ultimate quality of the student's sending. The sender should grasp the key lightly, but firmly. Sit squarely in front of the key, placing index and second fingers (curved) on top of the knob, the thumb maintaining an even pressure on the side of the knob in order to give the required balance. The student must, under all conditions, endeavor to maintain this attitude.

Operating the Key.—The arm should form a continuation of the key bar, with elbow reasonably close to the side and upper arm and shoulder practically rigid (flexed naturally). The elbow should be used for a pivot for the upward and downward movement, and should not sway to and fro. Make all the muscles of the arm and hand co-operate and co-ordinate, thereby doing their fair share of the work. Remember—Unless full muscular co-ordination is attained, perfect and tireless sending is impossible.

Memorizing the Code.—Before attempting to send, it is naturally essential that the characters of the code should be thoroughly committed to memory, therefore, the student must learn each and every letter, figure, punctuation and other sign.

Summary of rules to be observed is:—

SEND SLOWLY.

Listen carefully to your sending.

Always strive for accuracy, not speed.

Take care of spacing.

Do not send when the wrist is tired, as by so doing you will develop a heavy, sluggish style.

Be at all times a harsh critic of your own sending.

If the above rules are properly observed the student will soon become a first class sender. As regards slow sending, it must be remembered that it will be some time before the wrist becomes properly accustomed to the peculiar movements necessary in telegraphy, and that in trying to force the pace, a very poor style will be developed. SEND SLOWLY at first, speed will come naturally.

Two types of apparatus, which will enable the student or sender to listen to his own sending, will be described later when discussing "Code Practice Devices." The remainder of the rules are self-explanatory, although it would not be out of place to mention in connection with spacing, that the duration of one dash is equal to that of three dots. The dot is the unit of sending, and all spaces and dashes are based upon it's length. The space between symbols forming part of a letter or character

* Glo-Rad Engineering Services.

is equal to one dot. The spacing between letters or figures, and words or groups, should represent the duration of three and five dots respectively.

The learner is strongly advised to leave the "Bug" or automatic key severely alone, until he has mastered the art of sending with the manual key. The sending speed, using the former type of key, is definitely fixed by the adjustment of weight on the dot making mechanism, and until the student is thoroughly familiar with sending technique and able to accurately judge spacing, he is liable to develop bad habits, which may prove to be beyond rectification at a later stage.

Listen to clean cut signals emitted by an automatic sending machine, then try to imitate it—above all, try assiduously to avoid slovenly style adopted by many Amateurs.

(b) LEARNING TO RECEIVE.—The usual method adopted in the classroom, is to enforce the rule "Learn to Receive before Attempting to Send"—under these conditions the Instructor is able to impress upon the student correct timing procedure and style; However, conditions are somewhat different when attempting to learn at home as an individual. The writer's experience has been that under these circumstances, it is better to reverse the procedure and learn to send properly before attempting to receive. The reason being, that while the student is sending, he is familiarizing himself with the characteristic cadence associated with each letter, and then, when he comes to receive he finds it much easier; because instead of listening to an unintelligible jumble of dots and dashes—he is able to recognise those letters and words which are frequently encountered. This demonstrates quite clearly how absolutely imperative it is for students to send correctly, otherwise they will have, as their first impressions, a wrong idea of the sound of a letter or word.

From the foregoing, it is apparent that it is necessary to seek the advice of a competent critic in the early stages of learning to send, or where such advice is not available, to try and faithfully interpret the timing of signals emitted by the automatic machine.

A summary of the rules to be observed is:—
RECEIVE AS FAST AS YOU CAN.
Study your writing—write freely—produce clean copy.
Keep behind the sender, and watch punctuation marks.

"Receive as fast you can" is the golden rule when learning to receive—the converse of the rule "Send as slow as you can." The reason for this is that by listening to signals, which are just TOO fast for him, the student will find that by jotting down all the letters he can decipher, he will, by constant practice and concentration obtain solid copy at that speed. Note particularly that one should never wait to obtain a complete word before jotting anything down. As soon as the student finds himselfself capable of obtaining solid copy at a certain speed, he should immediately try to read higher speeds and so on, until he attains at least 20 to 25 words per minute. He is then able to negotiate the examination with confidence. The standards being 18 W.P.M. and 14 W.P.M. for First and Second Class Certificates respectively. The extra few words, per minute, suggested are necessary, for under the stress of examination conditions, when very few of us are really at our best, the 18 W.P.M. sent by the examiner will sound like twenty-five or more. Something must be left as a safety margin.

In regard to writing, it is pointed out that good writing is most essential and the student must see that each word or group he writes is legible. The more flourishes the student introduces into his writing, the greater the distance his hand must travel, and the slower will be the actual progress; therefore write clearly and without flourishes or ornamentation. Cross "t's" and dot "i's."

By keeping a few words behind the sender it will be found easier to write freely, since by keeping right on top of the sender one must write ever so much faster and make the same pauses between words, etc., as the sender; Whereas by keeping behind one can write steadily and so reduce the actual speed of writing and yet achieve the same result. One is also able by this means, to insert punctuation marks and guard against any errors made by the sender, thereby achieving our last objective, that of clean copy.

Obtaining practice is most important, and the student should seek the assistance of an Amateur or Commercial Operator with a good "fist." Should this not be practicable, then resort to the high frequency channels, where good practice may be obtained from both Amateurs and Commercials, particularly the Automatic Commercial Stations. Even though this be at twenty words per minute or more. At first it will be too fast for the learner, but by concentration it will soon be found to be within his capabilities. It is advisable to concentrate on those stations which send cipher and code, for since the matter cannot be deciphered there is not the same tendency to "guess" ahead of the sender, which is a bad practice and one which actually reduces the effective receiving speed. Remember above all, RECEIVE AS FAST AS YOU CAN, concentrate hard and practice often. There is no short cut and only constant practice brings the desired result.

(d) CODE PRACTICE DEVICES.—This section would not be complete without a short description of some type of apparatus suitable for code reception and sending practice. Figures 1a and 1b depict two types of apparatus which meet these requirements. They are:—(a) Thermionic Audio Frequency Oscillator and (b) Buzzer A.F. Oscillator.

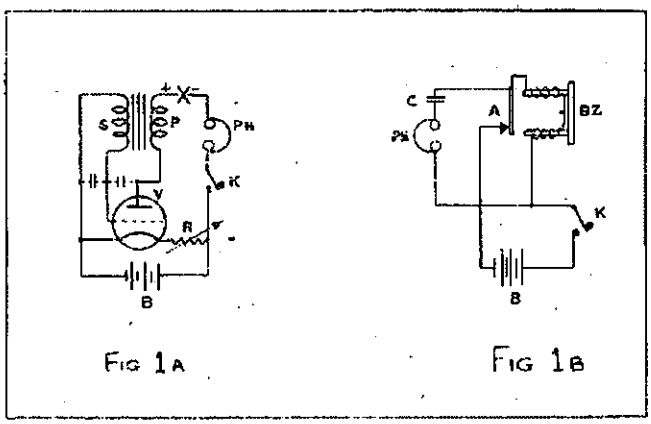


FIG 1A FIG 1B

The Thermionic A.F. Oscillator.—As shown in the diagram, consists of a tube, A.F. Transformer, battery, phones and key. Its operation is as follows. When the key (K) is pressed a surge of current through the primary (P) of the A.F. Transformer induces a current in the secondary (S) of the transformer, thus setting up a state of continuous oscillation in the whole circuit, which owing to the large inductance of the transformer, occurs at low frequency and is audible in the phones (PH). Thus,

(Continued on Page 21.)

DIRECT DISC RECORDING

*Part II.: The Turntable and Driving Gear

GEAR.

(Based on a lecture recently delivered to the Sound Recording Institute of Australia, by Mr. R. Kinley.)

One of the first selections which will need to be made by the prospective recordist, is that of a motor-driven turntable and the associated gear, which will cause the cutting or recording head to move across the recording disc and generate the well-known spiral track. These items together form what is essentially an engineer's lathe with a few modifications, and the future success of the machine is obviously bound up with the care with which the selection of the units is made. The purpose of this article is to outline some of the more important characteristics which should be met when choosing such equipment.

Generally speaking, the average gramaphone motor, which is normally available for reproduction purposes, is quite unsuited for the purpose of recording. Their construction is rarely robust enough to withstand the additional strains and loads imposed by the cutting head and traversing gear, and they are not as a rule designed for long and continuous service such as may be demanded by the recording of a lengthy radio programme. Furthermore, the important feature of constancy of speed under varying line voltage and changing loads is unlikely to be met.

The latter criterion is most important in both the recording and reproducing of records, and a few remarks on the subject might not be out of place. Speed variations will result in a change of pitch as compared with the original sounds, and if these are of a fluctuating nature, a condition known to recordists as "wow" is set up, with disastrous results to the quality of the recording. A good musical ear can detect a change of pitch of about 0.3 per cent., so that in designing equipment it is usual to strive for a variation which is less than this amount.

Stability of speed can be largely ensured by the use of a massive turntable, and it is interesting to note that some of the commercial machines err on the side of safety, by incorporating tables weighing up to 110 lbs. Such a figure need not be sought for amateur recording purposes, and something in the range of 10 to 15 lbs. for a 12 in. diameter table should prove to be sufficient. In considering this question of weight, it must be borne in mind that it is not mass alone which is important, but moment of inertia, so that a turntable having its mass largely concentrated at its rim, is far more efficient as a constant-speed device, than one having the same mass, but of uniform thickness throughout.

It is not out of place at this juncture to mention the need for the turntable to run true, both in the vertical and horizontal directions. Eccentricity in either case can be readily detected if viewed relative to some point fixed to the baseboard on which the unit is mounted, or by the use of a dial indicator. Vertical movement will cause trouble by promoting alternate deep and shallow grooves when recording, and a further effect is to cause changes in pitch, even though the speed of rotation may be constant. Eccentricity in the horizontal plane will throw heavy lateral loads on the bearings, and will also bring about speed variations unless careful balancing is carried out before assembly. To check the balance of a turntable, it is necessary to remove it from the remainder of the motor, complete with spindle and any gearing, etc., which may be integral with it, and lay it with its axis horizontal on a pair of carefully-levelled knife edges. A well balanced assembly will exhibit no tendency to return to its original position, after being displaced slightly by rolling along the knife edges. If there is any out of balance, however, the excess weight will seek the lowest level, and a plumb-line hung from the spindle will show where it is located. The excess can be progressively removed by judicious drilling away of metal, with frequent rechecking to ensure that too much is not removed. When truly balanced, the assembly will remain stationary on the knife edges in any position it may be placed.

Bearings in which the system turns are also of importance, as these must be sufficiently tight to prevent any horizontal movement, and at the same time sufficiently loose to avoid imposing any undue retarding force on the motor, Since the speeds of rotation are low, plain brass or bronze bearings are quite satisfactory, and no recourse to ball or roller bearings is necessary. Indeed, a faulty ball or roller bearing can produce serious trouble in the form of vibration. Plain journal bearings, however, should be adequately proportioned to carry the side thrust imposed by the weight of the cutting head, when at the outer edge of the disc. In like manner, means should be provided for taking the vertical weight of the system by a suitable thrust bearing. A common method of so doing, is to sit the vertical spindle on a steel ball, as this sets up less friction than would machined thrust faces, and is less easily damaged.

Having thus reviewed the turntable requirements, the next question to consider is the provision of motive power to it. A variety of ways of doing this has been developed by different maunfacturers, and each has to be considered on its merits. They fall into two broad classes, viz., those which drive from the spindle, and those which drive from the rim; although one intermediate type is known to the writer in which the drive is imparted midway between the two. In all instances except the last, it is usual for the electric motor itself to operate at a speed considerably higher than that of the turntable, and some form of speed reduction is therefore necessary.

Dealing with the first class, in which the drive is through the centre spindle, we find the use of gear reduction is largely adopted in one way or another. A feature of gear reduction, however, is that unless extremely fine precision is applied to the manufacture of the various parts, there is likelihood of minute variations in speed being imparted to the turntable by small irregularities of the various gear teeth. This results in what is often spoken of as "gear hum," and its presence is likely to be found in the final recording unless means are provided to filter it out. One method of so doing, is to introduce some form of resilience in the mechanism which can serve to absorb the variations, such as a felt or rubber coupling to the turntable. Another method of a more refined nature might be the use of an oil-damped resilient coupling, or a "fluid flywheel," although price considerations usually place these beyond the means of the amateur recordist.

Since the likelihood of developing "gear hum" increases with the number of gears used, it is usual to obtain the desired speed reduction with the minimum number of gears. One scheme is to introduce a Planetary drive where steel balls transmit the motion between shafts of different diameters. Such an arrangement is capable of giving satisfactory reduction ratios, but must be well-constructed to give good results, since poor workmanship or materials will soon give rise to trouble of a similar

*Part 1 of this article appeared in "Amateur Radio," March 1st, 1946.

nature to "gear hum," through the development of slackness of the component parts.

A more common method is to use a worm-gear reduction, which can practically reach the desired speed in one stage, but here again precise workmanship must be incorporated if satisfactory operation is to be obtained. Adjustment must be provided between the worm wheel and driven pinion to reduce the slackness to a minimum, and there should be no end-play of the worm shaft. The tangential velocity of the worm past the pinion teeth is likely to be high, and any small surface irregularities will give rise to "gear hum." For this reason, the driven gear is often made of fibre or some soft material, which will readily become lapped to a smooth finish, but this may introduce a further difficulty in that rapid wear will take place, and considerable slackness or "backlash" will become apparent after some use. It is essential that good lubrication be provided for worm-gear reduction units, preferably by housing in an oil-bath.

Although the foregoing remarks appear pessimistic towards gear reduction units, it must be emphasized that they are intended to point out likely faults only. There are in service to-day many units of this type, which are proving entirely satisfactory. The enquiring recordist is urged to examine any such unit for quality in design and workmanship, using the above remarks as a guide in framing his opinion.

The second type of drive in which the turntable is driven from the rim is becoming increasingly popular because of its greater simplicity and fewer sources of trouble. The first of these uses an endless silk or cotton belt running in a groove cut in the turntable rim and a V-pulley on the motor drive. The belt is usually specially woven so that no join is apparent, as this would produce a "whip" in passing round the pulleys. It is similar in character to the cord employed on modern dental drills. Owing to the need for the belt to be in contact with a sufficient length of each pulley so that slipping will not occur, the amount of speed reduction is limited, and it is usual therefore to have two such reduction stages in series, or to provide some auxiliary form of gear reduction. Provided that the belt tension is not too great and the turntable mass is sufficiently large, there is little chance of gear hum being transmitted. The use of belt drives of any great length between pulley centres, should be confined to the slower moving portions of the reduction system, as they tend to "flap" and introduce speed irregularities if running too fast. Provision for adjusting the belt tension should be made, and where possible, guards should be placed to prevent contact with objects likely to cause stretching or abrasion of the belts.

A form of rim drive which is enjoying increased popularity of recent years is the use of a rubber-faced idler wheel in contact with both the motor spindle and the turntable rim. It should be noted that the size of the idler wheel does not effect the reduction ratio unless it is deformed by contact with one or other of the moving elements. The reduction ratio is governed entirely by the diameters of motor spindle and turntable rim, and in inverse proportion thereto. The idler wheel must run true on its bush, and should be spring-loaded in contact with the turntable rim and motor spindle. For dual-speed units, an alternate idler wheel is arranged to bear on a larger diameter of the motor spindle for the higher speed. It is essential that the motor be resiliently mounted on springs or rubber to reduce vibrations being transmitted to the turntable. Provision should also be made to release the idler wheels from contact with the spindle and rim when not in use, to prevent the formation of "flats" on its circumference. A variation of this design is to arrange for the motor spindle to bear directly on the turntable rim, without any intermediate "idler" wheel. The rim has a ribber face inset on its periphery. The general considerations, however, are the same as outlined above.

Mention should now be made of the electric motors to be used in any of the above applications. These are usually of the 6 or 4-pole type, having speeds between 950 and 1500 r.p.m., and power ratings from 50 to 100 watts. The need for constant speed under varying leads, rules out most of the types which are available. Strictly speaking, the synchronous motor is the only choice which will guarantee the fulfilment of this requirement, although many successful units have been making use of the squirrel-cage type of induction motor. The two are very alike in many respects, and it is interesting to note that the squirrel-cage type can be made to run synchronously by grinding the rotor circumference so that salient poles are formed to match the stator poles. The overload characteristic of the motor are reduced somewhat by this method if synchronous speed is to be maintained, but this can be overcome by using a motor of somewhat larger size in the first place.

The use of series motors, even if governor-controlled is not recommended, as they are too sensitive to both load and voltage fluctuations. Governors are rarely capable of exerting sufficient control of speed for recording purposes, and in any case require some change of speed to take place before they can operate. It is best to depend on a heavy turntable and a fairly constant-speed motor.

If a squirrel-cage or synchronous motor is to be used, care must be taken that the speed reduction ratio is correct to give the desired turntable speed. It is not sufficient to run a turntable at approximately 78 r.p.m., because on playback, the record must rotate at exactly the same speed as when it was cut. The majority of home-recording enthusiasts will probably use the same turntable for playback as for recording, in which case no great trouble is likely, but if discs are to be played elsewhere, it is necessary that this requirement be fulfilled. The use of a stroboscope is a convenient method of ensuing that the speed is correct.

It was mentioned earlier that a recording motor of a third type was known to the writer, in which the driving power was imparted to the turntable midway along its radius. It is of overseas manufacture and available in either the recording or playback types, and its design fulfils many of the desirable qualities mentioned earlier. It consists of two main parts—a stator carrying the windings, and a motor which is integral with the turntable itself. The stator is so constructed that alternate "teeth" are formed from the upper and lower cheeks of a steel bobbin in which the windings lie, and these are bent at right angles at the outer edge. This arrangement results in the formation of alternate north and south poles when the windings are energised. The rotor carries a number of permanent magnets laid radially with alternate north and south poles projecting inwards, and in close proximity to the stator "teeth." The unit requires starting by hand, but thenceforth continues to turn at such a speed that any given magnet passes from one stator tooth to the next in 0.01 seconds, or the time for the reverse alternation of current in the stator windings. The unit is therefore truly synchronous in character, and the turntable being made massive, it maintains a high degree of speed uniformity. The stator is resiliently-mounted to the motor board, and can rotate about the axis to a small degree, and this provides a means of absorbing any tendency towards vibration as the poles pass each other. The compact nature of the unit makes it eminently suited for outfits intended for portable use.

PROPAGATION PREDICTIONS FOR MAY

(See Book Review on page 10)

Zone E. Latitude 10 deg. South.—(Northern Queensland, Northern Territory, Northern West Australia.) For the 28mC band.

Conditions show that 28mC becomes effective for skip distance is increased to 2500 miles. (Point of reflection of reflection, after which from 0900 to 1800, the skip distance is increased to 250 miles. (Point of reflection must be in E zone between 5 deg. S. and 15 deg. S.)

Zone E. Latitude 20 deg. South.—(Southern Queensland, New South Wales, South Australia, Western Australia.) For the 28mC band.

28mC usable for skip distances of 2500 miles between hours 0900 and 1600 local time, at point of reflection, which must be in zone E between latitudes 15 deg. S. and 25 deg. S.

Zone E. Latitude 30 deg. South.—(Victoria, Southern New South Wales, Southern South Australia, Southern West Australia.) For the 28mC band.

28mC is given here as the maximum useable frequency, and not, as in the previous two cases the optium working frequency. Under these conditions it seems that communications on this frequency may not be reliable, and may be dependant on local conditions. 28mC is given as the maximum useable frequency between the hours of 0930 and 1600 local time, at point of reflection, which must be between latitude 25 deg. S. and 35 deg. S.

Zone E. Latitude 40 deg. South.—(Tasmania).

28mC does not appear to be suitable for long distance work in this zone, as the maximum useable frequency is given as 25mC and even then this condition is sharply peaked between the hours of 1100 and 1400 local time. However, it is pointed out that these conditions may be varied from day to day.

PHILIPS, BRISBANE, CHANGE ADDRESS

It is almost four years since the R.A.A.F. and Philips Brisbane Office passed each other, so to speak, on the steps of Reid House, 148 Edward Street, the Air Force was moving in, and Philips were moving out to temporary quarters.

However, we now learn that the situation is reversed, and when renovations are complete, the Philips Branch will be functioning in its familiar pre-war premises at Reid House.

A.O.C.P. CLASSES

The Victorian Division A.O.C.P. Classes commenced on Monday, April 29. Lectures are held Monday and Thursday Nights, 8-10 p.m.

The Course runs for a period of 5 months and Tuition is given in radio theory, morse code and regulations. A limited number of vacancies still exist in the first class. Contact Class manager on either of above nights at FJ 6997.

IN REVIEW

TECHNICAL BOOKS - - - - - - - - RECORDINGS - - - - - - - - - - - - - PRODUCTS

BOOKS

RADIO PROPAGATION BULLETINS.

Published by the Australian Radio Propagation Committee of the Radio Research Board of the Council for Scientific and Industrial Research, and prepared at the Laboratory of the Radio Research Board, University of Sydney.

In an endeavor to make a scientific study of Ionospheric conditions and their effects upon radio communications, and to co-ordinate all available data for the general use of all bodies interested in the science of radio communications, the Radio Research Board of the Council for Scientific and Industrial Research has been set up.

Working in co-operation with similar bodies throughout the world, the Board is able to issue monthly it's Radio Propagation Bulletins.

From its long range study of Ionospheric conditions, the Board is able to predict with some degree of accuracy, just what conditions are likely to influence radio communications for a considerable period ahead, and to recommend the most suitable frequencies for reliable communication over specified distances.

The monthly "Radio Propagation Bulletins" are issued on the 15th of the month prior to that for which the predictions are made. These Bulletins contain the following information:—

(a) World map divided into zones E, I and W.

(b) Great circle chart of world centered on the equator.

(c) Charts showing world contours of maximum useable frequencies.

(d) Charts of Maximum useable frequencies for the three zones for the following month.

(e) Conversion scale for obtaining Optimum working frequency from maximum useable frequency.

(f) A transparent working sheet for use in calculating multi-hop paths.

(g) Skip distance working sheet.

(h) An analysis of conditions and accuracy of forecasts for the period prior to the issue of the Bulletin.

A handbook for use with the bulletins, ARPC-H1 is available and full information for the interpretation of monthly predictions is contained therein.

It is not practicable to publish any concise form of the contents of the bulletins, as much would be lost by so doing, but it may be possible to give a monthly review of conditions on the amateur bands.

For the serious minded Amateur, the study of these Bulletins is to be recommended as a means of obtaining reliable information about the conditions which govern his hobby. By so doing he will be ensuring reliability of operation, by choosing the most satisfactory operating frequency for the type of communication he is engaged upon. (When all Amateur frequencies are returned to their rightful owners).

The Handbook, for use with Raido Propagation Bulletins (ARPC-H1), price 1/- and the monthly Radio Propagation Bulletins (May 1946 ARPC-AI7), price 2/-, are available from all newsagents and booksellers. Wholesale Distributors Gordon and Gotch (Australasia Limited).

Our copies by courtesy of the Radio Research Board.

TUBES.

PHILIPS TO RELEASE NEW VALVE TYPE.

News of a further addition to their range of valve types is announced by the Philips Organisation. The type is known as the ECH-35, and the following details have been made available pending the release of the valve in about two months time.

Type ECH-35, is a frequency changer valve comprising a triode oscillator and hexode modulator on a common cathode—the triode being mounted vertically below the hexode part.

The signal is applied to thhe innermost grid of the hexode, which has variable mu properties and is connected to the top cap of the valve. The Oscillator grid is internally connected to the third (injector) grid of the hexode, which is isolated from signal grid and anode by the second and fourth grids, which are connected together and comprise the screen.

Type ECH-35 is particularly well suited for short wave operation, because of its high conversion conductance of 650 uA/V at full gain and remarkably low frequency drift; the latter remaining low when the valve is under A.V.C. control. Mains voltage fluctuations have also a small effect only, and when the oscillator tuned circuit is connected in the triode anode lead, a mains fluctuation of 10% will produce a frequency drift of less than 1 K.C. at 20 m.c's. The change in oscillator frequency on biassing the hexode to cut-off, is less than 3 K.C.'s at 20 m.c's. with a tuned circuit capacity of 50 uuF.

In the hexode there is no electron coupling between the signal grid and the third grid, but there is, of course, a small capacity between them. The effect of this is, that at about 25 m.c's. an A.C. voltage of oscillator frequency and having an amplitude approximately 0.5V will appear at the signal grid. This, however, has but a small effect on the conversion slope, and as will be seen later, need not be detrimental.

The high conversion slope is obtained from the high slope of the hexode, from grid 1 to anode, and the sharp fall of this slope with increasing negative voltage on grid 3. This also means that only a low oscillator A.C. voltage is required, amounting to 8V R.M.S. for optimun performance. The conversion slope remains high over a wide range of oscillator voltage; at 5V. it is approximately 580 uA/V and falls but slightly from the maximum value at double the optimum voltage. This wide tolerance simplifies the design for wide wave ranges, since a considerable change of oscillator output has little effect on the conversion slope and amplification.

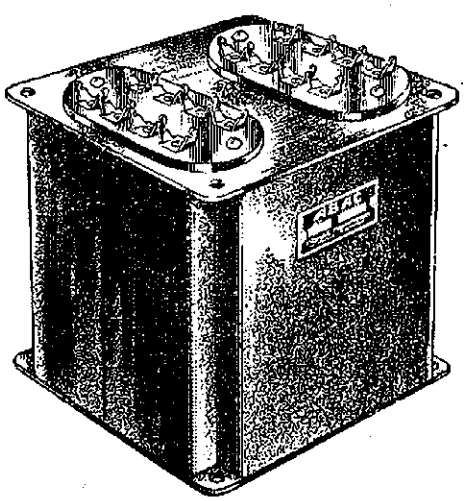
The optimum value of 8V R.M.S. (200 uA in a grid leak of 50,000 ohms.), represents the most favourable compromise between noise, heterodyne whistles and conversion gain.

APPLICATION DATA.

Due to the high slope of the triode, the starting and maintenance of oscillations will not present any difficulties and the feed-back coil may be rather loosely coupled

The recommended value of grid leak is 50,000 ohms and the grid condenser 50 uuF. These values are suitable for all wave ranges. To keep frequency drift to a minimum and to facilitate tracking of the oscillator, it is recommended to insert the tuned circuit in the anode side, and the fed-back coil in the grid circuit of the triode.

The A.C. voltage at oscillator frequency appearing at signal grid through the capacity to the third grid increases or reduces the conversion slope, according to whether the oscillator frequency is higher or lower than the signal frequency. It is therefore, better to operate the oscillator higher in frequency than the signal.



TRIMAX UNIVERSAL MODULATION. TRANSFORMERS.

From "Trimax," manufacturers of "ABAC" Transformers, comes this month news of their Universal Modulation Transformers Types TA907 and TA908. Designed so that practically every possible combination of RF power amplifier and AF modulator may be correctly matched, these transformers are ideal for Amateur requirements. Two sizes are at present being manufactured, TA907 which has a 30 watt (Audio) rating, and is designed to carry a maximum of 200mA unbalanced DC in the secondary, and TA908 which carries a 100 watt audio rating with a maximum of 400mA unbalanced DC in the secondary. Frequency response of both types is stated to be from 50-8,000 cycles per second, whilst the ranges of primary and secondary loads are as follows:—Primary, 2,500 ohms—18,000 ohms. Secondary, 208 ohms—26,000 ohms. That care has been paid to the design of these units is evidenced by their weight, TA907 weighing 18 lbs., whilst TA908 weighs 40 lbs.

Further information may be had by writing to "Trimax" Transformers, Cliff & Bunting Pty. Ltd., Box 21, North Melbourne, N.1., Victoria, and asking for leaflet 46-1. Supplies at the present time are stated to be limited, although small batches of both types are being manufactured.

NEW DIAL

Aegis Manufacturing Company (see advt. on Back Cover) are marketing a new dial which has special application to those enthusiasts who build up their own modulated oscillators, UHF Converters, Communication type receivers and special measuring gear.

The dial has a large knob as well as a small vernier knob with rubber cushioned drive. The main dial, about six inches in diameter is calibrated and the calibrations are read off through a hair-line engraved on a Perspex panel which overhangs the main dial scale.

FEDERAL HEADQUARTERS

The Sixteenth Federal Convention of the Wireless Institute of Australia was held during Easter, 19th-22nd April, in Melbourne. Delegates were present from all States and were:—

New South Wales, J. B. Corbin, VK2YC; Victoria, J. G. Marsland, VK3NY; Queensland, F. Nolan, VK4JU; South Australia, E. A. Barbier, VK5MD; Western Australia, J. Squires, VK6JS; Tasmania, A. Morrisby.

Members of Federal Executive: Mr. R. J. Marriott, VK3SI, Federal President; Mr. A. H. Clyne, VK3VX, Federal Secretary; Mr. T. D. Hogan, Federal Treasurer; Mr. C. C. Quin, VK3WQ, Assistant Federal Secretary; and Mr. V. E. Marshall of Federal Executive were also present.

Mr. J. Moyle, VK2JU, attended as an Official observer for the New South Wales Division.

The Federal President, Mr. R. J. Marriott, opened the Convention on the Friday afternoon at 2.15 p.m., and expressed his hopes for the success of the Convention. Mr. V. E. Marshall on behalf of Federal Executive welcomed the Delegates, and expressed the feeling of deep satisfaction that every State of the Commonwealth and Division of the Wireless Institute of Australia was directly represented at the Convention.

Mr. E. A. Barbier (S.A.) replying to the welcome said, "I feel, and I think the rest of the Delegates do, that we have come here to improve Amateur Radio, and to improve our station, and we thank you for your welcome."

Mr. R. J. Marriott, VK3SI, was then appointed Chairman of the Convention.

ANNUAL REPORT OF THE WIRELESS INSTITUTE OF AUSTRALIA.

With the successful termination of the war of 1939-45, amateur radio comes into its own. The war has taken place since the last Federal Convention and has had a profound effect on the affairs of both the Institute and its members.

First, it cancelled all activity among amateurs. Second, it gradually put out of action the Divisions of South Australia, Queensland, Western Australia and Tasmania, and drastically curtailed the activities of New South Wales and Victoria. Finally and most important, it proved the members of the Wireless Institute to be citizens of great loyalty in their efforts to bring this war to a successful conclusion.

Wartime Activities.

The number of members who were in the Armed Services represented 47 per cent. of the total membership. This was a fine total for the Wireless Institute to have achieved. It also proved the value of the training and experience gained in the peacetime hobby of the amateur.

In addition to the Armed Services the remaining members formed and operated Emergency Communication Networks in New South Wales and South Australia, they also became instructors to Service aspirants in such bodies as the R.A.A.F., Air Training Corps and in the W.I.A. itself. Others again, pursued their jobs with great vigor in all branches of radio, producing gear for the Forces and maintaining the communication services.

Re-Activation of Interest in Amateur Radio.

Early in 1945, it became apparent to most that the war was drawing towards its end and some thought was given once more to the old hobby. With this in view the Federal Executive invited suggestions from Divisions and members regarding the re-establishment of Amateur Radio. During May 1945, a draft plan with various ideas incorporated was circulated amongst Divisions for comment. From this was drawn up the final plan which was submitted later to the Chief Inspector, Wireless, for consideration. The regulations finally issued incorporated many of these ideas.

The circulation of this plan and the discussions which arose from it were responsible for the revival of the Divisions in South Australia, Queensland, Western Australia and Tasmania. The interest of members of all Divisions in re-establishing amateur radio was astounding. As a result, the membership of all Divisions is as high as ever. This is most gratifying to Federal Headquarters.

Magazine.

Federal Executive wish to acclaim the wonderful job done by the Victorian Division and the magazine committee in maintaining the magazine through the whole of war under the greatest of difficulties. "Amateur Radio" circulated amongst amateurs in the Services and at home and therefore contributed a great deal to hold the members together.

They are further to be congratulated on the excellent publication which recently commenced, namely, the printed magazine in a new form. We are sure this magazine will progress more than any previous one.

Postmaster General's Department.

Relations with the P.M.G. Department have been most cordial throughout the war. We feel that this augurs well for the future when so many alterations of regulations or frequences may take place. During the year a number of visits have been made by Federal Executive to the Chief Radio Inspector and many communications have passed between the Executive and the Department.

The licensing of amateurs commenced in December, 1945, and we wish to thank the P.M.G. Department for the expeditious manner in which this has been carried out.

Regulations.

The regulations issued which now control amateur radio differ in some ways from the pre-war regulations. The differences mainly concern the form of licensing and the standards of ability. These standards have been raised slightly above pre-war requirements, which the Federal Executive considers a desirable condition.

Frequencies.

The frequencies allotted to amateur experimental use to date are: 28-29 MC/S, 50-54 MC/S, 166-170 MC/S, 1345-1425 MC/S. The lower frequency pre-war bands are promised by the P.M.G. Department and are under consideration by them at the moment.

We believe all pre-war bands (with the possible exception of the 1.75 MC Band) will become available in the near future in the following order, 3.5 MC, 7 MC, and 14 MC with the possibility of a new band at 21 MC.

It will be seen therefore, that the progress made in re-establishing amateur radio is appreciable in the short time just past.

QSL Bureau.

The Bureau ceased to function during the war but it is now being revived and we hope will be in full swing before long.

I.A.R.U.

Federal Headquarters has maintained contact with the I.A.R.U. throughout the war and will continue even more so in the future.

Finance.

The Treasurer's Statement of Receipts and Expenditure is attached. It will be observed that the financial position of the W.I.A. Federal Headquarters is quite sound.

Conclusion.

The new era of peace finds a greatly increased interest in Radio and its manifold uses.

It behoves us all as members of the Wireless Institute to take this opportunity and spare no effort to increase the scope and activities of the Institute making it a more powerful force and a bigger thing than it has ever been before.

On Saturday evening Victoria as Headquarters Division, and as such, hosts to the Delegates entertained the Visitors to a Dinner and Theatre Party. Mr. H. Kinnear, VK3KN, Victorian President, extended an invitation to visit his home for supper. It is perhaps needless to say that an excellent time was had by all.

Friday afternoon and evening, all day Saturday, Sunday morning and Monday morning, were times that Federal Council spent in considering the items of the Agenda and other business and Convention concluded at 1 p.m. on Monday.

DIRECT DISC RECORDING.

A final word should be added regarding the mounting of recording turntables before closing. It is essential that these be rigid and level, particularly for 33⅓ r.p.m. machines. Some of the best commercial units employ cast aluminium motor-boards with moulded stiffening ribs, and while this expense will not appeal to the average amateur, the moral should be kept in mind. A good 5 or 7 ply sheet with several stout stiffening ribs glued and screwed to the underside, and the whole mounted in a sturdy frame will ensure freedom from vibration, and give good results for most amateur work.

ON THE HIGHS

28-29 MEGACYCLES.

The DX enthusiast will appreciate the inclusion of these notes in the magazine. The intention is to provide month to month information of the DX coming through on the 28 Mc band. Contributions from individual members are welcomed as the information may be of interest to some other Amateur; his information may be of interest to you.

Hams operating on 50-54, and 166-170, and if any on 1345-1425 are also requested to send along their activities. Contributors are requested to have their copy in the hands of the Editor not later than the 18th of the month.

28 megacycles has once again come into its own, for excellent DX contacts have and are being made from all quarters of the globe. Many rare countries are coming through which will no doubt increase the number of applications for Worked All Continents Certificates and other awards.

XZ4AM situated at Rangoon, Burma, has been coming through on CW on 28-25 Mc while XZ2DF is on fone on a frequency of 28.1 Mc. XU1YW in North China is reasonably easy to contact. CR8AG at Macao, which is 43 miles West of Hong Kong, is old VS6AG of the 40 Metre days. He reports that the Nips took possession of all his gear during the war. He is now on the air with a completely new outfit. Others heard are ZS5BZ on CW and Fone; ZS2TW, ZS6DW on Fone; ZC2CU, ZS2AL, ZS6BV, ZS5CU all located in South Africa.

South America too is providing its share of DX contacts and from reports in VK3 the following stations have been QSO'ed. HK1AB; HC1JW; HC1FG is usually heard with R8 Fone on 28 Mc dead. PJ3X on CW is an easy contact usually on Saturday and Sunday morning about 8 a.m. This station operates just out of the band at the low frequency end. ZP2AC; CE1BE; LU4BC; PY2AC and CE1AO (a YL or XYL) can always be heard in VK3 with R8 Fone. Steve of HK4AX, on 28,100 is also easy to contact on Fone. Others are CE1AH, OA4AS, PY2NX, PY2AJ, HK3AB, PY1DS, LU7AZ with a terrific signal; LU9AX, and LU9EP.

From South America we travel to Central America, where KZ5AA, TG9AK, K4ESH are to be found.

VQ 3TOM 28150 on Fone and CW is easy to contact. He is located in Central Africa. Others in the same part of the world are VQ6MS, VQ2PL and OQ5BQ. North Africa provides SU1CX, SU1USA. SU1MW is usually R8 Fone and this station reports that he is installing a pulsed UHF beamed signal with several kw input for tests with G6DH. FA8JD often heard from Algiers with good quality Fone.

A rare DX contact is provided by YI2XG, who operates from near Bhagdad, Irak, using 16 watts input and his signal packs a kick.

Many G/I calls, that is G's operating in Italy, have been heard and the most consistent is that of G2CR/I and G6MO/I VK3CP reports that the best Englishman heard by him is G3FJ on Fone, while his best European contacts have been PAOGN, G8UA, G2TA, F8WK, G6QB, ON4O, G5OQ. These contacts have been made with a bean antenna of the three element variety, and for those interested the following dimensions as found by cut and try, when exactly half wave dipole with a thermo galvometer in the centre by VK3YP, should be helpful. 16 ft. 7 in. director; 33 ft. 11 ins. total for folded dipole fed by 72 ohm co-axial cable; 18 ft. 5½ in. reflector. Both director and reflector have small stubs in these given lengths at their centres. 3 ft. 6 ins. spacing between Director and Dipole; 5 ft. 3 ins. between Dipole and Reflector. The Director's stub is shortened out giving 15 ft. 8 ins., which was all that was necessary to get a front-to-back ratio of 8½ R points. For best tests VK3BW, Port Arlington, is only too willing to oblige, and he indicated that the signal disappeared when the beam turned 20 degrees off head on position. VK3KX Colac also a good beam rotation test. Max Howden, VK3BQ, is also very pleased to help prospective rotary beam enthusiasts with rotating head mechanism.

In Tasmania, reports are that the DX are coming through consistently. VK7LJ worked a D2—sorry boys it was only a G7 operating with a D call. He and VK7CW also contacted a G6/I. VK7BJ wanted to be in on the contact, so having been given full directions went to work and after sorting out a weak signal way down in the hash, with some minutes of patient listening found that the signal came from a VK3 who had already forgotten his regulations. The ZL's are coming through in fine style in the "Apple Isle."

50-54 MEGACYCLES.

To date any calls mentioned in this section of the notes are from VK3 only, but it is hoped that active stations in other states will rally round and provide up-to-date information of their activity in this spectrum of the high frequency bands.

It seems that the Victorian Notes Correspondent made a "blue" in his notes in the April issue, when he referred to certain stations being active on 6 Mx. The calls in question are VK3MW and VK3BQ. The correct calls should be VK3NW and VK3TQ. It might be well to point out in defence of our Victorian Notes Correspondent, that the calls reported were noted down when called out at a Victorian Meeting. If the Correspondent mistakes a call under such circumstances it is up to the person holding the call to make sure that the letters of his call are distinctly heard.

The only calls reported to me (Editor) at present are VK3YH, VK3AFQ, VK3XA, VK3CO, VK3GG, VK3FT, VK3NR, VK3NW and VK3TQ.

The FCC has assigned channels to present commercial television licences, and licences of ten existing experimental television stations. All of the commercial assignments are for metropolitan stations with their existing powers and antenna heights.

Assignments were:—Channel 2, 54-60 Mc; Channel 13, 60-66 Mc; Channel 4, 66-72 Mc; Channel 5, 76-82 Mc.

Existing television stations that must change frequency will go off the air on or before March 1st, 1946, and return to the air with regular programs on or before July 1st, 1946.

Amateur service will change from the frequency space between 56 and 60 mc, to the space between 50 and 54 mc on March 1st, 1946.

Stations assigned channel 2 (54-60), may not begin operation before the 56-60 mc frequency space is vacated by the amateur service.

A crystal pickup cartridge with the crystal driven by a lever has been announced by Shure Brothers, Chicago.

Lower needle point impedance is said to be obtained. The lever arrangement is said to absorb the full impact of sudden jars to the cartridge or needle. Needle force of ¾ to 1½ ounce is attainable with the output voltage from 1.6 to over 3.

The cartridge is available in an aliminium case, weight 0.43 ounce, and is also furnished in steel weighing 0.85 ounce.

The National Union Radio Corporation have developed a new miniature type (2½ in. bulb) half-wave high vacuum rectifier, type number NU 1Z2. The tube can handle 20,000 volts, and in addition to its usual application as a half-wave rectifier at line frequences, the tube is said to be suited for fly-back pulse rectifiers, and RF supplies for television circuits.

The National Union Radio Corporation of America claim "so fine is the texture of the special florescent material developed by National Union Research Laboratories, it is calculated that a 10 inch picture on the screen of a National Union cathode-ray tube is reproduced on 10 billion crystals!"

DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: C. S. Higins, VK2LO,
Box 1734 JJ G.P.O., Sydney.
Meeting Place: Science House, Gloucester and Essex Streets.
Meeting Night: Fourth Friday of each month.

The March General Meeting of the Division was held as usual on the fourth Friday in the Month and quite a representative gathering of members were present. Numbered among the visitors was Federal President Ron Marriott, VK3SI.

Members will regret to learn of the passing of Max Nunne, VK2NE. Max after a long spell of indifferent health went to meet the Great Brass pounder early in March. The Institute was represented at the funeral by Bill Zech, VK2ACP, whilst a minute's silence was observed prior to commencement of General Business at the March Meeting.

The Agenda for the Convention was discussed at length—quite a few items, particularly with reference to the Constitution and the Magazine—being debated at length. Mr. Jim Corbin, VK2YC, was elected Convention Delegate whilst Mr. J. Moyle, VK2JU, will also attend in an official capacity as Observer. This Division is particularly fortunate in having such capable representation.

The Division has donated the sum of £5/5/- to the Food for Britain Appeal and any Member willing to make a donation to this worthy cause should send any subscription to the Division and thus help swell the Institute total. Again why not send a hamper to any G that you have worked quite a few times either pre or post-war war. That would be a QSL that would be very much appreciated. If you don't feel disposed to forward a complete parcel any donations of food—preferably tinned—may be left at a General Meeting and forwarded to British Centre. Inquiries are being made as to the possibilities of forwarding a shipment of food to the R.S.G.B. for distribution among English Amateurs.

The QSL Officer VK2YC suggests that members when designing their new cards endeavour to keep them a reasonable size—preferably Post Card size—so that they will fit the ordinary envelope. Again, large cards tend to become damaged during transit.

Owing to the time spent discussing Agenda Items it was not found possible for our Federal President to address the Meeting, but nevertheless his visit was much appreciated and this Division trusts that we will be able to see more of 3SI in the future.

Upon conclusion of General Business, supper was served and was much appreciated by all present.

Not much this month chaps as I feel sure that the Editor will have plenty of copy from the Convention.

Remember Monthly General Meetings are held on the fourth Friday of each Month and commence at 7.45 p.m.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne. WM 1579.
Meeting Place: Lecture Hall, Chamber of Manufacturers' Building, 312 Flinders Street, City.
Meeting Night: First Tuesday of each month.

Special Notice concerning subsequent meetings to take place on 1st Tuesday in each following month, 7th May, 4th June, etc.

Until further notice the Victorian Division will conduct it's monthly meetings in the Lecture Hall, Chamber of Manufacturer's Building, 312 Flinders Street, City.

By securing the above premises Council extend a hearty welcome to old faces, new and intending members and visitors and trust all will enjoy the extra comfort available by this departure.

The April Meeting was another bumper. The rooms as usual were packed with members and visitors and exceeded capacity.

Visitors from overseas and interstate included Albert Wilson of the U.S. Marine Corps, who is a commercial operator. Albert gave a stirring account of operating conditions on U.S. Ships in the Alaska waters and is fortunate to be with us owing to being on leave as 1st Wireless Officer aboard S.S. Yukon, which was wrecked, also present were VK's, 2TN, 7GR, Les Wesier.

3KN in the Chair welcomed visitors and was kept busy by the "Leftist's" with their suggestions regarding new frequencies. New meeting rooms and consequent comfort for large meetings and suggestions for the Easter Federal Conference.

During a discussion on Special Meetings, it was decided that the Secretary give special notice to members in the Public Notices column of Saturday's issue of "Age" newspaper as an expeditious means of notification owing to the long period between magazine issues. Members may be interested to learn that such a Special Meeting may be called at short notice, so keep yourself informed each Saturday.

The Chairman (VK3KN) commented on a luncheon rendezvous with Mr. F. S. Wood, Dave Medley, VK3MJ, Vaughan Marshall (VK3UK) and himself. Mr. Woods, as Senior Research Officer (late of Canberra), passed on some very helpful hints and suggestions which prompted a very interesting lecture by 3UK and 3MJ on the why, how and result of ionospheric predictions as applied to radio communications, also the methods used in making predictions.

It is now notified that C.S.I.R. gives permission to republish all data concerning ionospheric predictions.

Dave Medley (VK3MJ) has accepted appointment as Convenor of Propagation Committee for the purpose of working with Council and in conjunction as a Sponsor to this science.

Members were bewildered at the meeting and a solution is still sought that will enable members to get to know or identify each other. Any suggestions? The meeting closed after a lively session of motions and suggestions for F.H.Q. and Convention delegates.

Don't forget, you will enjoy the next meeting and the extra comforts available justify a packed house (We don't mean passages).

The following members and visitors were present at the April meeting.

VK3s, HX, XD, EE, AV, QS, AHQ, MD, EA, NW, ED, MJ, MN, IV, UK, OC, HC, ET, CR, WQ, LX, DY, QE, PG, ABA, TE, ZU, LN, UM, ZC, AKL, AD, OJ, QP, NU, JI, CF, YJ, CG, JO, FS, SZ, PU, TU, JJ, UJ, CP, UH, OF, OT, YL, BQ, XA, IK, RM, WC, ZV, NN, LF, GU, ZB, AFQ, RT, AHM, XJ, CO, RN, ADX, EK, JD, QU, TF, LA, DM, WY.

K. C. Sneddon, H. Johnson, R. W. Viney, C. Arnold, R. L. West, R. Curnou, W. Mills, D. Jones, A. E. Fisher, T. N. Porter, J. Sloss, R. Morrison, G. W. Neilson, T. C. Hall, J. J. House, W. E. Welles, J. Moran, J. E. Groves, P. Symonds, K. Maroney, D. Burns, J. Matews, W. A. Tetheradge, A. R. Lee, E. C. Barry, W. A. McLeod, and approximately eight other names that could not be read.

QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.
Meeting Place: State Service Building, Elizabeth St., City.
Meeting Night: First Friday of each month.

The venue of our meeting place being changed, our last General Meeting was held at the State Service Rooms, Elizabeth Street, City. It was our Annual Meeting and the good attendance elected the following office-bearers:—

4KS.—K. Schliecher returned as President.

4CJ.—C. Marley succeeds retiring Secretary 4ZU as Secretary.

4RC.—R. Campbell returned as Treasurer.

4ZU.—H. MacGregor elected Publicity Officer.

Council will comprise the following:—

President, 4KS; Secretary, 4CJ, and 4FY, 4HR, 4AW, 4ES, 4JU, and Mr. C. Reese as Student Representative. Personally we can't imagine a better team than that elected, so hold tight men. We're off!

The Convention Agenda was read out (and fully discussed with our delegate at a subsequent Council Meeting), and the job of selecting a delegate was then begun. Fortunately, 4JU was able to make the trip, as otherwise this State would have had to rely on a proxy. At the moment of writing Frank is on his way laden with our advice and hopes.

No doubt you fellows will say, "What! Again?" but the fact is that there's another change in meeting times. Owing to a better arrangement with the land-lord, we are now back to the old time, i.e., the last Friday in the Month, at the State Service Building. Council Meetings on the 2nd Friday in the month.

Student classes will be held on the other Fridays in the month as far as is possible.

That's a bit vague, so here is the dope. Considerable discussion took place re Student Classes, as the position regarding classes is not altogether satisfactory. After a comprehensive statement by Mr. P. Kelly, a pre-war Instructor, it was decided that it would be better to drop the class rather than continue as it was. However, 4FE offered to carry on for the time being, until we can obtain a paid instructor to run the classes on a purely commercial basis. Arthur was promised help by 4JU and 4CJ.

Several of the local gang will shortly be on 6MX, and in this connection we were wondering if any of the southern men (Jeeves, was that fellow's call 2LZ?) would be interested in directing their arrays at Brisbane and vice-versa. The thing would have to be done at specified periods of course, but it might prove interesting.

Some of the local gang are getting amongst the DX on 10MX, 4HR having worked 24 or 26 countries since coming back on the air. 4RC also lining them up and mowing 'em down. Our old friend Pat Kelly back with us again; was in Radar during the war.

4RY playing around with receivers, but like a lot of us doesn't get time to do much. We can't reveal his name, but one of the flock is seriously considering using fifteen or so frequences simultaneously in order to snare that elusive DX. What will some of these fellows do next?

4KS has the beam working very nicely while 4ZU has the 6MX convertor almost finished.

4HZ busy on an all-band TRF and a transmitter for 80 (if and when!). No AC as yet unfortunately, (but also no power leaks—4ZU) 4LN. Still thinking of collecting his gear from the RI. Has some ideas and some T40 tubes. The ideas include rotary beams on 14MC—a hang-over from pre-war days. A VK3, Reg. Stevens is now living in Gympie and has some junk on the way up, but is a bit bothered about the antenna situation.

We saved this one for last. 4KH has built himself another receiver.

The next Meeting of the Division will be held on Friday, May 31st, at 8 p.m.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.
Meeting Place: 17 Waymouth Street, Adelaide.
Meeting Night: Second Tuesday of each month.

At the General Meeting, held on Tuesday, 9th April, there was once more a record attendance, the total being 113. Several new members were enrolled, including some old "hams" returning to the "fold" and also some for the Student Classes.: Membership is now 190.

The President, Mr. I. Thomas, VK5IT, was in the Chair, and after opening the Meeting, welcomed the visitors, who included Messrs. R. Short, VK4HF and R. R. Smith, VK3RY; also Bert. Taylor, VK5AT; Don Taylor, VK5DX; and Bill Walker, VK5WW, who were resuming association wth the Institute.

Mention was then made by the President to the late Mr. H. W. Harrington, Superintendent of Wireless, who had given great help and encouragement to the Amateurs of this State. A resolution was carried to convey to Mrs. Harrington and her daughters the deep sympathy of the Members of the Institute. The Meeting then stood in silence for one minute.

A lecture on "Radar" was given by Mr. (Sqdrn. Ldr.) John Allan, VK5UL. A lot has been written on this subject of late and most of us, no doubt, had got a fair smattering of what it was all about without, perhaps, being able to fit all the bits and pieces together. In the course of his very informative lecture, Mr. Allan gave with the aid of chalk and blackboard, a most complete picture of the principles and apparatus involved. At the conclusion Mr. Pearn, VK5PN, expressed the feeling of the meeting in a vote of thanks which was carried in the usual way.

It was announced that Mr. Allan would interpret the Ionospheric Prediction Charts for us and that his observations for the ensuing week would be included in the Institute's Notes published each Saturday in the local newspaper. These predictions will become even more useful as we get our old bands back and have a choice of frequencies.

Several of the Student members who had earlier in the day sat for their "ticket," were at the Meeting, and Mr. Paris, supported by Mr. Wilkinson, expressed their thanks to the Instructors and the Institute for the excellent tuition received. Their remarks were responded to by Messrs. Buckerfield, VK5DA, and Roberts, VK5MY.

Owing to the Easter Holidays, the commencement of the next series of classes has been postponed and will now begin on Monday, 29th April. The course of twenty lectures will thus be completed in nice time for the October A.O.C.P. Examinations. Copies of the syllabus were distributed at the Meeting. Notes for each Lecture are also to be printed, thus saving time at the classes.

It has been reported that several Amateurs, in addition to their 28 m.c. signal, are also being received at good strength on 14 m.c. As this latter band is still taboo to us, it is asked that all those operating on 10 metres, particularly those who double in the final, check up on their transmissions to make sure they are also not radiating on 20 metres.

Council held a special meeting on 31st March to discuss the 67 items of the Federal Agenda and our representative to the Convention, Mr. Barbier, VK5MD, was thus well primed as to the views of this Division.

As our usual room is not available for May, the next Meeting of the Institute will take the form of a picture night, kindly arranged by the Vacuum Oil Co., and will be held in the Institute Building, corner of Kintore Avenue and North Terrace, on Tuesday, 14th May.

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, Newtown. 'Phone W 1328.
Meeting place, Photographic Society's Rooms,
162 Liverpool Street, Hobart.
Meeting Night: First Wednesday of each month.

This Division conducted its regular Council and General Meeting as usual. Council at 7.30 p.m. and General at 8.p.m. on the 3rd of March. Present were VK7LJ, President in the Chair, VK7's BJ; CJ; CW; and ML at the Council Meeting, with the addition of VK7's CT; AH; OM; AL; MG; CL; RV; Messrs. A. Morrisby and Koglin at the General Session. Apologies were received from VK7LL, VK7GT, VK7PA, VK7XA, Messrs. Gee and Neilsen.

The main business of the evening was that of dealing with the sixty odd items of the Convention Agenda, and all un-necessary discussion had to be eliminated. In all, good time was made.

A motion, moved by VK7CW and seconded by VK7AL, "that the frequency 28-28.1 M/c be reserved for CW—operation as most DX was found in this part of the band" was carried, and all VK7 Amateurs are asked to observe this as a personal courtesy.

Other States asked to co-operate in this matter; Yes 3YP, we'll have a kick at your tin! it seems that we are thinking your way in this matter.

Our delegate to represent VK7 at the Easter Convention is to be A. Morrisby, and although Alan is not a licences Ham, he has been an Institute Member and an experimenter for years. This combined with his experience in Radio during the war should fit him for the job. VK7 has every confidence in his ability to conduct the Division's business at the Convention.

Jack Coulter, VK3MV, called on some of the lads while in port here recently (and was given a right royal time, from all reports.—ED.). Any Hams visiting VK7 are invited to do likewise as we are always glad to make acquantances and renew old ones.

VK7LZ was seen recently in his home town, Launceston, after having spent some time in the services.

VK7PA has not found time to fire up the gear so far. Finds time taken up with hoe and paint brush at present. Has to revamp the RX for "Ten" when he does start.

VK7AL still struggling with a dual conversion super—1600-465 Kc. Better drop the 465 stage, Tom. Hi.

The Editorial note in "AR" of March re the ZL's on 3.5 Mc/s is very interesting. Let us hope that this and other old bands will be available in VK soon.

The next meeting of this Division will be held on Wednesday, June 5th, at the usual address and everyone is welcome.

RECTIFIERS.

We are now in a position to consider the operation of gas-filled rectifiers, and first comes a warning—never use a condenser input filter. Very large charging currents would flow into the condenser and the rectifier current pulses would approach or equal the saturated emission with a substantial increase in the rate of cathode sputtering, which at normal currents is low, and the life of the tube is thereby drastically shortened.

When we use a choke input filter the current pulses are reduced so that the peak current is much lower. Reverting to the possibility of arc backs, lower peak current means less anode heating, which would, on the other hand, be further increased by the rise in arc voltage of extremely high currents.

The peak currents are also kept low by the use of full wave rectification as in high vacuum rectifiers and matters are still further improved by using three or more phases.

Mercury rectifiers can be used in voltage doubling systems in precisely the same way as high vacuum tubes, but as the extra filament transformers probably cost as much as a suitable high tension transformer, there is not much point in it for amateurs.

Parallel operation of these tubes calls for current limiting resistors in each anode lead as with low impedance high vacuum tubes, and has the additional advantage of lowering the current peaks.

It may sometimes be necessary to place high frequency chokes in series with gas-filled rectifier anodes, because the starting of the arc discharge is a transit phenomenon and may cause radio frequency disturbances similarly to a spark. In many cases the use of wire wound limiting resistors will serve for both functions.

In Fig. 4 we show a full wave rectifier with the table of current and voltage relationships, assuming zero tube drop. Actually for mercury vapour tubes this is nearly 16 volts, which figure should be taken into account if really accurate figures are desired. For most purposes it may be neglected.

CLEARING THE ETHER "SERIES II."

every time the key is pressed and released, characters of the morse code are formed. The frequency of the note heard in the phones may be varied within certain limits, by varying the rheostat (R) and/or shunting a small condenser of suitable value across the grid and plate of the valve, as shown in the diagram. The output may be increased by inserting a small battery, of from 1.5 to 9 volts, in the anode circuit at "X," with the positive and negative poles in the direction shown.

The Buzzer A.F. Oscillator.—Consists of a sparkling buzzer, an 0.01 F condenser, battery, phones and key. When the key (K) is pressed current flows through the windings of the buzzer (BZ), causing the cores of the windings to become magnetised and attract the iron armature piece A. This breaks the circuit causing cessation of current flow in the windings and allows the armature to return to its normal position, thereby restoring the continuity of the circuit. Rapid repetitions of this operation producing an audible note in the phones, due to the back E.M.F. generated in the buzzer windings discharging through the output circuit, and sparking at the breaker points. Thus, as in the previous type, characters of the morse code are formed during the manipulation of the key. The level of the signals may be varied to a certain extent by varying the capacity of the series coupling condenser C; whilst the frequency may be varied within reasonable limits by adjusting the buzzer mechanism and applied voltage.

NEW V.H.F. TRANSMITTING TRIODE.

EIMAC RELEASE NEW LIGHTHOUSE TUBE

The Eimac 3X100A11/2C39 (about time something was done to simpify this tube designation business.—Ed.) is a triode of the Lighthouse variety designed for a plate dissipation of 100 watts at frequencies of the order of 2500 Megacycles.

The extreme efficiency of the Lighthouse tubes at these high frequencies is brought about by their entirely revolutionary design.

By complete rearrangement of the elements and by use of microscopically close element spacing (cathode to grid 0.005 inches grid to plate 0.022 inches) Electron transit time is reduced to an absolute minimum.

CHARACTERISTICS TYPE 3X100A11/2C39 EIMAC TRIODE.

Electrical.

Cathode coated unipotential.

Heater Voltage	6.3 volts.
Heater Current	1.1 amps.
Amplification Factor	(average) 100
Direct interelectrode capicatances	(average).
Grid to plate	1.95 uufd.
Grid to cathode	6.50 uufd.
Plate to cathode	0.030 uufd.
Transconductance (Ib 75 ma, Eb 600v)	20,000 umhos.
Maximum pate dissipation	100 watts.

Mechanical.

Maximum overall dimensions.

Length	2.5 ins.
Diameter	1.26 ins.

This tube is of baseless construction, the connections to the elements being brought out to annular rings. The terminal arrangements are such that the tubes can be used in cavity circuits, whereby the elements become part of the circuit proper. The plate is fitted with a large radiating surface to ensure rapid heat dissipation.

I.F. REGENERATION.

Most hams know that a touch of regeneration in the I.F. stage of a Super Het receiver aids greatly in achieving something approaching "single-signal" reception.

Whilst being well below the effective selectivity of a crystal filter, it affords an easy method of getting just a little more pep from the receiver on crowded ham bands.

Here is a method of producing such regeneration which does not upset the normal operation of the I.F. channel.

In the suppressor lead of the I.F. tube (the first, if there are two) insert the coil from one side of an old I.F. transformer, grounding the other connection. Shielding is not necessary.

Across the coil place a .0001 variable condenser with panel control. This assembly can be mounted in any convenient spot reasonably close to the base of the I.F. tube. One of the fixed plates of the condenser can be bent so that the circuit is automatically shorted to ground when he plates are in full mesh.

With the condenser in operation, a point will be found where the I.F. tube oscillates. The I.F. gain should be backed off and the regeneration control tuned to the point one side of resonance where most gain is apparent. A little experience in the handling of this control will produce quite worth-while results.

—B. J. FAYLE, VK3IW.

CORRESPONDENCE

Correspondents are requested to keep their letters short and to the point.. The Editor reserves the right to delete anything he may think fit. The views expressed by correspondents are not necessarily those of the proprietors.

Melbourne.

Editor "AR".—

One other grouch is this—When is the column conducted by "The Old Man" (or whatever other name "he" chooses) going to make its appearance again? In 12 years of amateur radio I have never heard such rotten operating as can be heard at the present time. To quote only a few instances. A VK3 splattering over one third of the band with over modulation says "Yes I know I'm over modulating but W-blub, blub, blub, said he could copy me better that way" or this VKXXX's carrier on for 6 minutes (timed) during hot DX period with a sotto voce conversation going on in the background between the announcement. Shades of "T.O.M.". Yes I know we have the RI's listening pulling us up, but there is nothing like putting a chap's call in the clear print in the Magazine to show him up.—Yours, etc.,

F. K. McTAGGART, VK3NW.

U.H.F. WAVEMETER

General Radio Company of Cambridge, Mass., have announced a new UHF Wavemeter, for the 240-1200 Megacycle band.

The range covered in a single direct reading range with an accuracy of plus or minus 2 per cent. Tuning element is a butterfly type tuned circuit which is coupled to a standard cartridge type crystal detector. Crystal current as indicated in microammeter gives an indication of resonance. Where the available power is not sufficient to actuate the microammeter the reaction of the wave meter upon the current under measurement can be used.

FOR SALE.—Quantity Air Ministry Transmitting Equipment in excellent condition. 1.5 mfd 4000 volt working Filter Condensers, £2 each; 3½ inch meters 0-6 amps Thermo, £2 each; 0-300 Ma and 0-500 ma DC moving coil, 35/- each; 0-15 volt AC moving iron, 35/-; Double section variable transmitting condensers (3000v), each section 0.00035 mfd, £1 each. Assorted coils, LT and HT transformers, 50hy chokes and transmitting racks, angle iron, louvered panels (5ft. x 2ft. x 2ft. 6in.). Ring U 4285, VK3WG or write 2 Anthony Street, Glen Iris, S.E.6.

FOR SALE: 400 volt 100 mil virbrator unit, 12 volt input. 3 tube battery super, 6K8G, 6S7G, 6C8G. Nine bound volumes of QST, 1930-1938. All guaranteed in first class order. What Offers? W. R. Jardine, VK3PR, Box 52, Leongatha.

FOR SALE: Transmitting tubes, mostly new. Types 813, 803, 807, 866/866A, 828, also 5BP1 (CRT) 6.3 and 1.4 volt tubes cheap. WANTED Characteristics of PT15 TX tube. Call or write VK3NW, 53 Wellington Street, Kew. Side entrance off Charles Street.

FOR SALE: Piezo-Astatic Crystal Microphone, type D104, in perfect order. What Offers? VK3CO, 35 Bertram Street, Gardenvale, S.4. LF 8306.

FOR SALE: Army wireless set No. 22, a current transmitter and receiver specially designed for tropical use; covers 2-8 M/c. Ceramic sockets and wave change switch, tropic proof components. Receiver has RF and 2 IF stages; transmitter has 807 final. In fairly good order. Set and power unit (12 volt) with tubes, meter and 2 spare vibrators, £25. VK6JS (in Melbourne) C/o "Amateur Radio."

AMATEUR RADIO

JUNE 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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

AMATEUR RADIO

VOL. 14 JUNE, 1946 No. 6

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

One cannot but be impressed by the wide field of Amateur activities covered by the directions, which the Federal Council at the recent Federal Convention has given to the incoming Federal Executive. The decision reached, not only give your Executive clear cut policy directions, but have set the stage for action on all aspects affecting the welfare of the Australian Amateur in the post-war period. This 1946 Convention unquestionably set a new high, not only in inter-Divisional Co-operation, but also in Federal consciousness, the latter being exemplified in person by the Delegates themselves but equally by the Divisional Councils who instructed them.

The W.I.A. has a very full year ahead. Initially the Divisions will be carrying on the overhaul of their domestic machinery, for a thorough "house cleaning" is essential if we are going to cope effectively with the changed circumstances and conditions to-day... Amateur Radio has wider horizons and a new status to-day, both very different from pre-war days. Then we used to talk of the Ham as "a potential National Asset," to-day, he is a PROVEN National Asset tested in six and a half years of war. Then we used to speak of "2½ mx" as "the ultra highs," but to-day thereabouts is merely the very high frequency portion of the spectrum, for beyond stretches limitless new fields in the Super High frequencies. To-day we stand on the threshold of new achievment as assuredly as the old timers did when they were given "200 mx and below."

Our membership is the largest in the history of the W.I.A., but of comparable importance is the fact that the average technical standard of members is at a considerably higher level than ever before, owing to the intensive war time training and experience of Hams who were in the Services or the Radio Industry. This, however, has brought a complementary problem in its train, as those Hams who served during the war on the Home front, outside Radio, find themselves with a tremendous amount of leeway to make up. They find themselves confronted with a bewildering array of new techniques and devices and a whole new vocabulary embracing wave guides and magnetion, P.E.'s and P.R.F. and so on. Bridging the gap between the war trained Ham and the Amateur out of touch with war time technical developments, is an important and urgent task which the W.I.A. has been tackling seriously. [Continued on Page 9.

IN THIS ISSUE

FREQUENCY MODULATION EQUIPMENT

* By J. Brown, VK7BJ

§ PART II

Before dealing with the equipment needed for transmission and reception of Frequency modulated signals, the matter of phase shift must be mentioned, as it is continually occuring. Two waves of the same frequency need not be at the same portion of their cycle at the same time, in Fig. 1a, wave B is zero and going positive 90 degrees after wave A and is said to have a phase difference of 90 degrees lagging on A. This phase difference can have any value between 0 and 360 degrees, lagging or leading. In A.M. transmission we are not much concerned with deliberate phase changing except in the case of a push-pull amplifier, where two voltages 180 degrees out of phase are needed. Whilst this is fairly easily accomplished, in F.M. we generally have to provide for phase changes of 90 degrees, and this is not so simple.

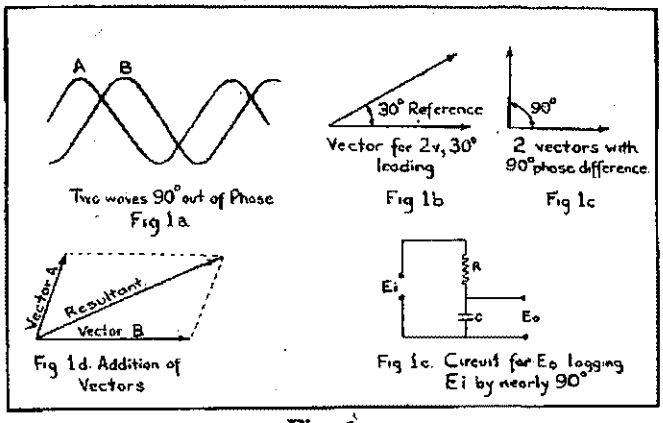

Fig. 1.

Before describing some common methods, it will be best to introduce a simple way of picturing waves. Instead of actually drawing the waves, use is made of vectors, which take into account both phase and amplitude. A vector is a straight line used to depict a wave, it's length representing the amplitude of the wave and it's direction or angle, the phase. See Fig. 1b (angles of lag are measured clockwise). When two or more waves are combined, if they are of the same frequency, they form a new wave with the same frequency but a different phase angle and amplitude. The new wave can be obtained from the vector diagram by adding the vectors, this being done by completing the parallelogram for two of them at a time and drawing the diagonal. The diagonal gives the phase angle and amplitude of the new wave (Fig. 1d.).

Fortunately, the phase change most often required in F.M. is 90 degrees and this is fairly easily obtained if the action of resistance, inductance, and capacity on an A.C. current is considered. When an A.C. voltage is applied to a resistance a current flows, this current being in phase with the voltage and it's magnitude depending on the resistance. In the case of an inductance the current which flows, will be 90 degrees behind the voltage and for a condenser it will lead the voltage by 90 degrees, the magnitude in both cases depending upon the reactance of the component. If the circuit consists of resistance and reactance, the total impedance must be obtained by adding the components vectorially and if one of these is much larger than the other, the smaller one will have very little effect on the total impedance of the circuit.

A simple arrangement for getting a 90 degrees phase change uses a condenser and resistor in series (Fig. 1e.). If R is much larger than the reactance of C the impedance will be mostly resistive and the current will be nearly in phase with applied voltage Ei. This current, in flowing through the condenser, will cause a voltage drop, which will lag the current by 90 degrees, across it and so the output voltage Eo will lag the applied voltage by 90 degrees. Results can be varied by making the reactance of the condenser larger than the resistance, or by using an inductance in place of the condenser; the output voltage always being taken off the component with the lower impedance.

This simple arrangement is suitable for all frequencies where the resistance/ratio does not approach too close to unity, but it does not give exactly 90 degrees phase change. More complicated arrangements are used in commercial transmitters, the simplest of these being a series tuned circuit. The circuit is tuned to resonate at the operating frequency and behaves as a pure resistance, the applied voltage and the current being in phase. A voltage lagging 90 degrees can be taken from across the condenser or one leading 90 degrees from across the inductance.

We can now deal with the circuits required for F.M. transmission and reception. The signals are in the UHF band and for satisfactory operation of the receiver a large signal is required at the detector circuit, indicating that the superheterdyne is the most suitable type. To enable the large frequency band required to be passed, a high I.F. frequency (in the 5 Mc/s region) is used. This also helps to eliminate image interference. In order to flatten the pass band, resistance loading of the I.F. transformers is sometimes used, and to provide the high gain required special valves of the 6SG7 or 6AC7 type are preferable. So far the receiver is not very much different from the conventional A.M. receiver for these frequencies but, instead of applying the output of the I.F. amplifier to a rectifier, it is passed on to a limiter-dis criminator circuit which converts the F.M. signal to an A.F. output voltage.

The limiter serves to remove any noise, etc., which may appear as amplitude modulation of the signal. The signal is fed into the stage at a high level, all the peaks being shaved off, and only a signal of constant amplitude passed on. For this reason the I.F. amplifier must provide a large output in order to secure the full advantage of the noise limiting. There are many types of limiters but most of the simple ones possess disadvantages. One type is the grid-leak limiter, the action being similar to the ordinary grid-leak detector, a high negative voltage will be developed across the grid-leak R. When a noise peak arrives, on the negative peak the grid is driven further negative and the plate current cuts off. However, for impulse noises, the positive peak is not very much affected. A second type depends upon anode saturation This has a very low value of screen and plate voltage and if the grid is made more positive very little more output current can flow. Thus when a noise peak arrives the positive peak will be suppressed but, however, the negative peak will not be very much affected. A good arrangement is a combination of the two (Fig. 2), the negative peak being suppressed by the grid-leak action and the positive peak by plate saturation. In order to get more effective action two noise limiters in series are sometimes used. AVC is not often used in S.M. receivers, as the largest possible signal is required at the input to the limiter and it's output is constant pro-

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§Part I. see "Amateur Radio," April 1st, 1946.

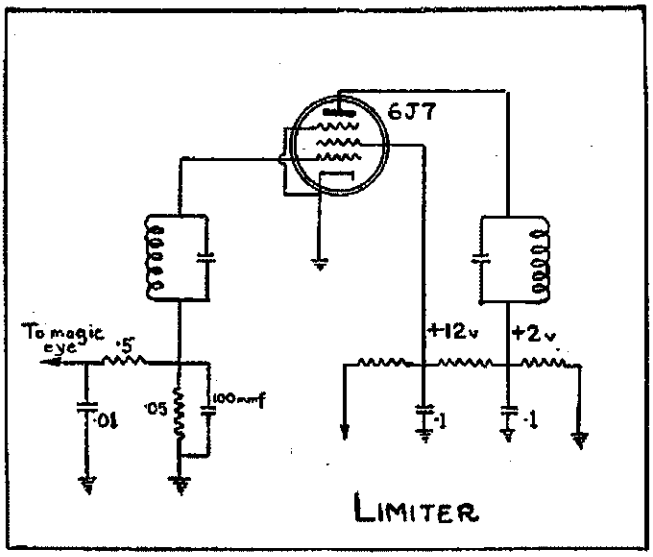

Fig. 2.

vided the signal does not fall below the limiting level. However, an AVC voltage is obtained across the grid-leak of the limiter and may be used to operate a tuning indicator, or is sometimes applied to the R.F. stages (if any).

Conversion of the F.M. carrier into an A.F. signal may be accomplished in several ways. An ordinary A.M. receiver will detect F.M., if the signal is tuned half way down the side of the selectivity curve. Variation of the carrier frequency will then vary the detector output, but the action is not very linear and is inconvenient to tune. Also the noise suppression advantages of F.M. are lost. An F.M. signal may also be detected by means of a super-regenerative receiver but again the advantages of quality and noise suppression are lost. A practical development of the detuned receiver idea is to use two tuned circuits, one tuned above the mean frequency and the other below it, these being fed from a limiter. The two circuits are detuned by an amount greater than the frequency deviation to be received and the carrier is tuned to the centre point. The circuits, together with their associated diodes, may be considered to be in push-pull, thus improving linearity. When the carrier is unmodulated, equal voltages are applied to the diodes and the voltages across the load resistance cancel out. When the frequency is on either side of the mean, one diode will have a higher voltage applied to it than the other and the

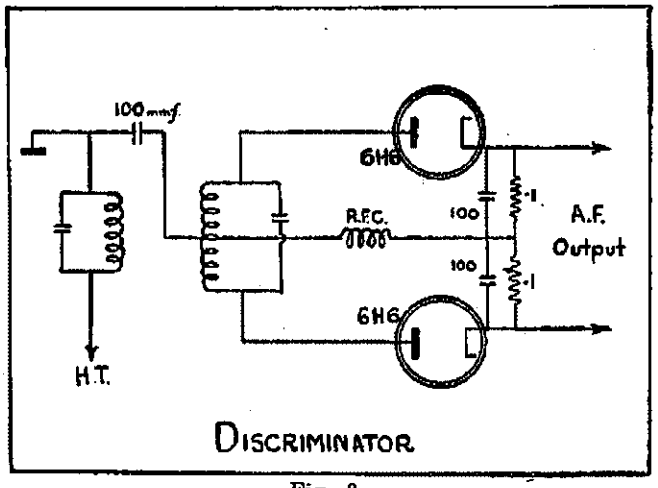

Fig. 3.

cancellation in the load resistance will not be complete, thus an output voltage will be developed. This voltage will be either positive or negative depending upon which diode has the greater voltage applied to it, i.e., depending on which side of the mean frequency the carrier is at that instant. This system is perfectly workable but is hard to line up and so is not often used,

The arrangement usually used is the discriminator shown in Fig. 3. Both circuits are tuned to the mean frequency and the circuit depends for it's operation on phase changes in the transformer when the carrier frequency is varied. At resonance the voltage across the secondary is 90 degrees out of phase with the voltage across the primary. The voltage applied to each diode is the vectorial sum of the primary voltage and the half of the secondary voltage across which the diode is connected. As diagram 11 shows, at resonance the total voltage applied to each diode will be equal and no output will be obtained as complete cancellation occurs in the diode load resistances. At frequencies other than resonance the primary and secondary voltages are no longer 90 degrees out of phase and so the vector diagrams will be as shown in Fig. 4, B and C. It will be seen that the voltages applied to the diodes are no longer equal and so a voltage will appear at the output of the diode load, being either positive or negative depending on which diode has the larger input, i.e., on which side of the mean frequency the carrier is at that instant.

The remainder of the receiver consists of the A.F. amplifier which should be designed for high fidelity, power supply, speaker, etc., all of which involve no new principles.

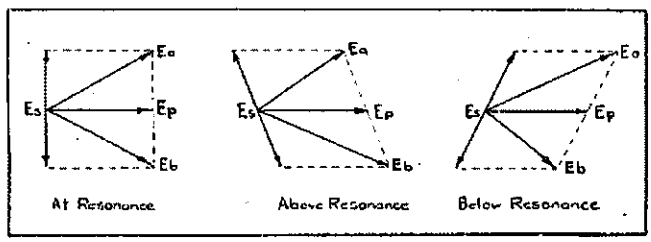

Fig. 4.

Fig. 4. Phase and Voltage Relationship in the Discriminator.

Note:—Ea and Eb represent voltage between plates of diodes and earth in Discriminator circuit of Fig 3.

At the transmitting end, there are many schemes for producing F.M. but, at the moment, only three seem to offer much promise for the amateur. The first of these is the reactance tube method. A valve is connected as shown in Fig. 5, by means of a phase-splitter a grid voltage 90 degrees out of phase with the plate voltage is obtained and this causes a change of plate current which will also be 90 degrees out of phase with the plate voltage. Thus the plate circuit of the valve is caused to appear as a reactance, either capacitive or inductive, depending on the precise connections of the tube. By varying the gain of the tube the value of the plate reactance will also be varied and, if the plate circuit is connected across the frequency controlling tank of a self excited oscillator, the frequency of the transmitter will be controlled by the grid voltage variation of the reactance tube. The initial frequency deviation obtained is generally not as much as desired, but it can be increased by placing the oscillator on a low frequency and multiplying to get the final frequency, e.g., an oscillator on 3600 Kc/s varying between 3957 and 3603 Kc/s (a deviation of 3 Kc/s), when multiplied by 8 would have a mean frequency of 28,800 Kc/s per second and would vary between 28,776 and 28,824 Kc/s per second (a deviation of 24 Kc/s).

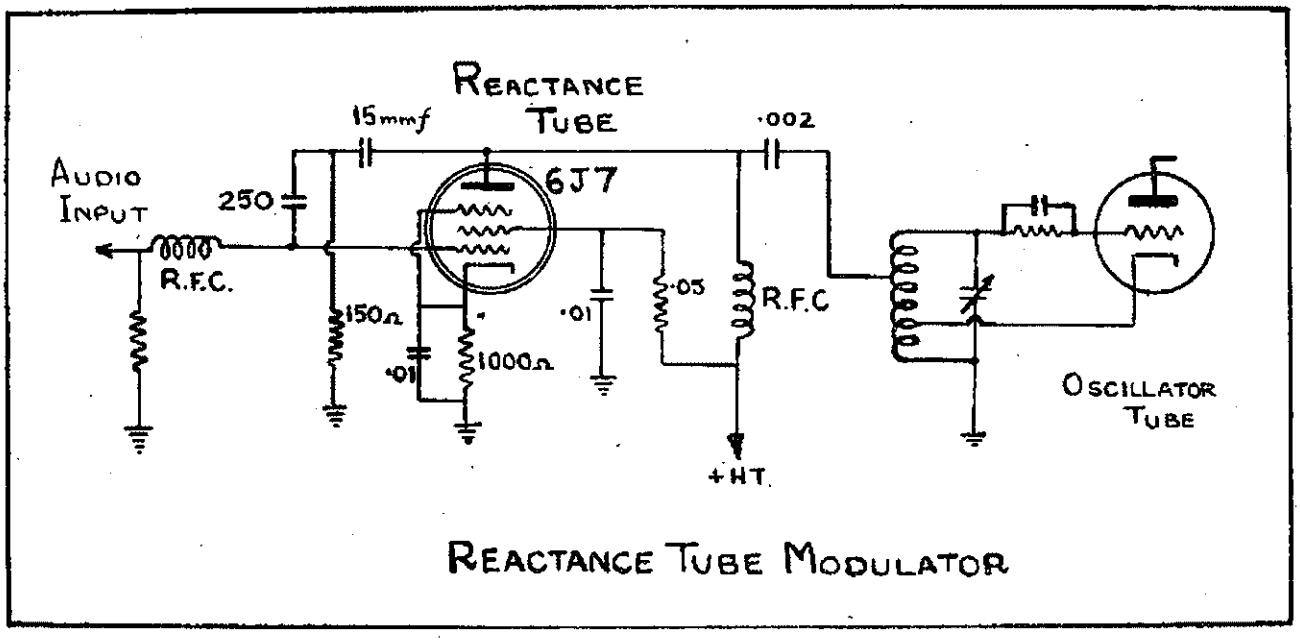

Fig. 5.

As the transmitter must be self excited, its stability is such that it is suitable only for the UHF band. It is possible, however, to improve the stability by referring the mean frequency to a crystal control oscillator. The output of an oscillator is fed to a mixer tube where it is beat against a crystal oscillator and the beat-frequency (465 Kc/s would do) is fed to a discriminator of the type previously described. The discriminator will give no voltage output when the beat is exactly 465 Kc/s., i.e., when the self excited oscillator has its correct frequency, but if it has not, the beat will not be 465 Kc/s and an output voltage will be delivered from the discriminator, the polarity depending on the direction of the frequency departure. The modulation components are filtered off by an R.C. filter and the voltage is then applied as a bias to the grid of the reactance tube, which causes it to alter the oscillator frequency. The circuit is so poled that, if the oscillator mean frequency tends to change, the variation in reactance tube bias will pull it back again. The control is good but not perfect, however, as a frequency change must occur before any control voltage is developed.

The second type of modulator is, I am afraid, much more complicated, but theoretically and practically it is the type originally used by Armstrong and produces phase modulation which is changed to frequency modulation by means of a filter in the audio input circuit. This filter reduces the amplitude of an audio frequency signal in accordance with its frequency, thus converting phase modulation to frequency modulation (see article 1). The circuit uses a crystal control oscillator. The output of the crystal oscillator is split into two halves, one half undergoes a 90 degrees phase shift and the other is passed throngh a balanced A.M. modulator which eliminates the carrier and produces only side bands. The side bands are then combined with the portion of the carrier which has been shifted 90 degrees, giving rise to phase modulation. The side bands may be represented as a pair of vectors which, as they are of different frequencies to the carrier (one above and one below), are continually changing their phase in relation to it. For 100% A.M. the side bands each have half the carrier amplitude and rotate in opposite directions. For A.M. at the point at which the side bands are in phase with each other they are also in phase with the carrier. In the Armstrong system, however, the carrier (or the side bands) shifted 90 degrees and so, when the side bands are in phase with each other, they are 90 degrees out of phase with the carrier.

The maximum phase change that can be obtained gives a deviation ratio of not much more than one, but for linearity it must be restricted to about 5. If we are to transmit a 30 cycles per second audio frequency with a deviation of 75 Kc/s per second we need a final deviation ratio of 2,500 and we would have to multiply our frequency by 5,000 times to get the required deviation, i.e., if the carrier were to be 50 Mc/s the original oscillator would have to be on 10 Kc/s. As this is impracticable, a dodge has to be introduced. Say we start with a frequency of 200 Kc/s and multiply it to 10,000 Kc/s, this also increases the deviation by 50 times. This is then beat against a crystal oscillator and a low frequency beat (say 500 Kc/s) is picked out. This low frequency signal retains the deviation of the 10,000 Kc/s signal and if we now multiply to our final carrier frequency (50 Mc/s), we get a further multiplication of 100 and so our total deviation increases is 50 by 100 equals 5,000 times. The whole arrangement is very complicated and the frequency control is not perfect as, owing to the tremendous frequency multiplication involved, many unwanted deviations are also magnified.

For amateur work smaller deviations are satisfactory as it is not required to transmit such low audio frequencies. Therefore the same degree of multiplication is not required and the apparatus is somewhat simplified. Starting in the 160 metre band and neglecting audio frequencies below 200 cycles, a deviation of approximately 3 Kc/s can be obtained in the 6 metre band by straight multiplication. By multiplying to the 20 metre band, beating back to the 160 metre band and then multiplying to the 6 metre band a deviation of approximately 25 Kc/s could be obtained. On the whole, however, the circuit is not very attractive to amateurs.

Continued on Page 27.

CLEARING THE ETHER, SERIES II, Part II

* By G. Glover, VK3AG

ADVICE TO THE NEW AMATEUR.

First of all the writer must congratulate the candidate upon his successful negotiation of the examination and tend to him a hearty welcome to the "Ham Fraternity."

We will presume that he is an honest fellow, and unlike most hams has waited until the day AFTER receiving the Official Station Licence before commencing operations. (How many new hams can truthfully say that?) Well, now his troubles have begun in real earnest. Firstly, he is deluged with advice of all sorts and descriptions, and from every Tom, Dick and Harry. All well meant by well meaning hams anxious to give the newcomer to the game the benefit of their own personal experiences. After listening to all this advice the poor newcomer begins to tremble at the knees at the thought of all the trouble he has let himself in for. What with High C, Hartley, T.P.T.G., Series and Shunt Feed, etc., the poor fellow is an absolute nervous wreck and acquires that look so commonly attributed to Radio fanatics.

The writer's advice to all newcomers is to listen to all this advice, and having politely thanked the donors, make a careful note of its text for future reference, then use his own discretion. After all he is an Experimenter and must therefore expect some of his experiments to be a failure; How could he learn if this were not the case.

After careful study of the following paragraphs the newcomer should be in a position to decide for himself the type of circuit most suitable for his purse and purpose. Any advice given by the writer is only intended to act as a guide.

We will now deal with the Transmitter, Frequency Meter, and Receiver, in that order.

The Transmitter:—The main requisities of a Transmitter for telegraphic work are: stability, sharpness of emission, overall efficiency. These requirements are satisfied in a varying degree by different circuits and layouts.

Let us consider the various elements and units which go to make the whole, commencing with the most important unit. "The Oscillator" or "Basic Frequency Generator."

Oscillators:—All oscillators depend for their operation upon the energy fed back from the anode circuit to the control grid circuit. Expressed in another way, the feed back circuit by providing negative resistance equal in magnitude to the positive resistance, represented by circuit losses, causes continuous state of oscillation in the circuit as a whole.

Oscillators are divided broadly into two groups: "Self-Controlled" and "Crystal Controlled" oscillators. In the former type the frequency of oscillation is determined by the circuit constants; whilst in the latter an electro-mechanical device, better known as a Piezo-electric crystal, is employed to determine the frequency of operation. Both these groups of oscillators may be divided into different types. Some of the commonly known circuits are: the Hartley, Colpitts, T.P.T.G., Electron Coupled and Tritet—each has its particular advantages and disadvantages—broadly speaking the type of oscillator to be used should be determined by requirements and not by prejudice.

Series or Shunt Feed:—All anode and grid circuits may be either "shunt" or "series" fed—the latter has the advantage of simplicity and lacks the parallel loss path introduced by the "choke" in the former circuit; however, in some cases it is most desirable to keep the D.C. out of the tank circuit; therefore we must resort to shunt feeding and ensure that the choke employed is designed to give minimum power loss at the operating frequencies. The natural period of the choke should be at least 20% lower than that of the lowest operating frequency to be used. Where a wide range of frequencies is to be employed, the choke should consist of a number of seperate "pies" in series, each pie having a higher natural period than its predecessor. The ratio of one pie to another should not be an exact integer, that is, they should not bear harmonic relationship.

The "Tank" Circuit—This name has become rather aptly associated with the tuned circuit. A most appropriate title in view of the fact that this circuit acts as a reservoir of r.f. energy in a similar fashion to the mechanical flywheel. The energy storage effect of the tank is termed the "flywheel effect."—Just as the "flywheel effect" smooths out the pulses of energy due to the explosions in the cylinders of the internal combustion engine, so does the same effect smooth out the pulses of energy supplied by the valve in the electronic circuit. Smoothing out has the effect of reducing the harmonic content and improving stability: Hence, a tank-circuit having a large ratio of Inductance to Capacity (Low C) is equivalent to a light flywheel, while the converse (High C) corresponds to a heavy flywheel. Obviously the heavier the flywheel, the smoother the resultant motion of the machine or analogously, the lower the harmonic content in the wave.

Figure 2 depicts, in graphical form, an easy method of arriving at the optimum L-C Ratio.

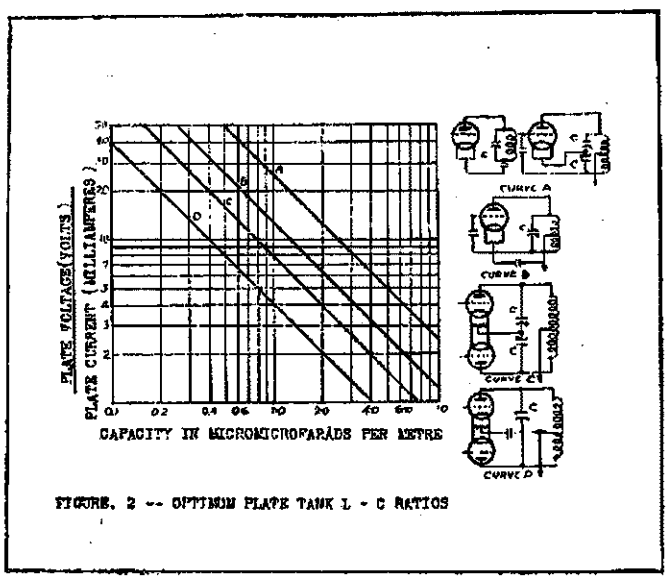

FIGURE. 2 -- OPTIMUM PLATE TANK L - C RATIOS

Tuning Condensers:—should be carefully selected to suit power and frequency employed. Dielectric losses in the insulation employed can reduce operating efficiency considerably, therefore, when choosing condensers for U.H.F. or V.H.F. operation, insist on low loss insulation such as, Mycalex, Loaded Ebonite, Ceramic or Polystyrene.

Spacing of plates should be such as to enable capacitor

* Glorad engineering services.

to withstand, Peak voltage applied, that is, D.C., plus R.F., plus Modulation (in the case of telephony). If the condenser is too large it represents poor space economy. One method of reducing space requirements of capacitor, and a very good one too, is to employ good Mica (preferably oil filled) condenser, to block D.C. out of tuning capacitor. The value of this series condenser should be at least ten times greater than the maximum capacity of the tuning condenser, otherwise, the effective range of latter will be considerably reduced, and the R.F. dissipation in the fixed capacitor will be unnecessarily high.

Split-Stator Capacitors may be used to great advantage, particularly in neutralized and push-pull circuits. Apart from doubling the voltage rating, for a given spacing of the plates. The use of this type of capacitor removes the necesssity of passing large r.f. currents through rotor bearings or brushes—pigtails used on earlier model condensers being impractable at U.H.F. and V.H.F., owing to the inductance introduced by the pigtail or spring.

The use of fixed value of capacity in parallel with a small tuning capacitor is to be recommended. Not only does it permit the use of small sized tuning capacitors, but also provides Higher "Q" circuits and vernier control of frequency. On the other hand, a series capacity is also useful for reducing the effective range of large tuning capacitor, when restricted frequency coverage is desired.

When capacitors are operated at U.H.F. and V.H.F. "fringe effect" and "dielectric heating" become problems of a major nature; therefore when ordering special or standard capacitors specify:—

(1) **Operating Frequency.**
(2) **R.F. Current.**
(3) **D.C. Voltage.**
(4) **Modulation Voltage, if any.**

Where standard units are to be operated at more than 75 per cent. of their maximum rating, it is advisable to employ two units, each having twice the storage capacity, in series. Another point which must be borne in mind is that, where capacitors are in series the destribution of r.f. voltage and power depends upon the ratio of their capacitors; thus, if one unit has ten times the capacity of the other, the larger unit will have only ten per cent. of r.f. voltage applied across it, and therefore from an r.f. viewpoint can be reduced in size accordingly. However, from D.C. angle, the distribution of voltage depends upon the ratio of the leakage resistance, so unless a resistor network is placed across each condenser, to stabilize D.C. drop across it, one unit may be called upon to withstand the full D.C. voltage if the other unit develops a bad leak.

By pass and Blocking Condensers:—As their name implies these condensers serve as by-pass and blocking condensers respectively, or in other words, the former by-passes alternating currents to earth, whereas the latter pass them to the next stage or circuit, at the same time blocking the flow of direct current—the efficiency of a condenser as a by-pass depends upon, apart from the power factor, the ratio of its reactance to the reactance of other elements in the circuit, and it can be determined by using Ohm's Law for A.C. circuits.

Condensers for radio frequency applications should be non-inductive, and preferably of silvered-mica construction when a high degree of accuracy is called for, in the lower voltage range. Oil filled and "vaccum" capacitors are regularly employed in high voltage circuits.

One point worthy of note in connection with ultra-high-frequencies is that, the length of leads necessary to connect a large capacitor introduce undesirable inductance, and in many cases it is necessary to employ a small parallel capacitor with short leads to shunt out this effect.

Earths:—A most important point which must be given very careful consideration when laying out and wiring up equipment, is the disposition of earthing points. In general a single earth point should be employed for each circuit, unless empirical results indicate that extra points are necessary to balance out inherent instability or parasitics. Most particularly it must be emphasized that, on no account should D.C. or A.C. circuits be permitted to use chassis or wiring shields as a return path.

Grid Leak Bias:—Many oscillator and amplifier circuits, employ what is known as "grid-leak-bias," that is, a resistor is inserted in the grid circuit. During that portion of the cycle when the grid is driven, positive current flows in the grid cathode circuit, this rectified current flows through the grid resistor causing a negative standing bias to appear at the grid.

The value of this bias is determined by the value of the resistor in Ohms multiplied by the D.C. grid-current in Amps; e.g., 10,000 Ohms x 0.020 Amps equals 200 Volts.

A variable grid-leak is a valuable adjunct to a self-oscillator, as by adjusting its value to the optimum we may secure maximum output consistent with "a good note" or "clean keying" and high effciency.

Piezo-Electric-Crystal:—The writer does not propose to deal with this subject at any length because it warrants a separate study; however, one or two cautionary remarks would not be out of place.

Firstly, "X" and "Y" cut crystals which were used so widely before the War are now as obsolete as the "penny-farthing bicycle," so be wise when ordering a new crystal, get the "gen" on the latest cut and order accordingly.

Secondly, variations in ambient temperature alter the operating frequency of the crystal to an extent dependant upon the characteristics of the crystal. Moral, reduce this factor to a minimum by controlling or reducing changes in ambient temperature.

Thirdly, don't overpower the crystal by trying to use it in a circuit employing high powered "bottles" and high anode voltages. Results may be spectacular; but, they are more likely to be disastrous, that is, the crystal may fracture if the crystal current is excessive—anyway stability is considerably reduced.

Fourthly, don't try to draw power from a crystal oscillator which you expect to be stable—treat it as a "generator of basic frequency" and rely upon the following amplifiers to supply power output required.

Fifthly, a small variable capacitor between the grid and cathode will enable the frequency of the oscillator to be adjusted readily over a narrow band. Furthermore, such a capacity usually stops the tendency of certain valves to oscillate when the crystal is removed.

Last but not least, if you must insist on using holders of the home-made unsealed variety—then, take every precaution to keep the plates of holder, and the crystal, free from oil, grit and verdigris—use carbon-tetrachloride or alcohol.

Filament Centre-Tap:—In the case of filament type tubes it is necessary to return the grid and anode circuits in some way to the filament. One method of so doing, is to employ centre-tapped transformer winding—this has two disadvantages, they are:—

(1) It is necessary to employ a separate winding for each tube employing a resistor in the circuit to provide bias.
(2) The centre of transformer winding, that is, equi-voltage point, is not necessarily the electric-magnetic centre of the filament circuit; hence, hum is present in the output circuit.

The better method is to employ a shunt resistor with adjustable centre-tap, which may be moved to reduce hum to a minimum. The resistor should, unless the demands of a particular circuit call for a lower value, have a resistance of ten times that of the filament, that is, wastage of power is limited to ten per cent. of the filament consumption: furthermore, it should be capable of carrying both the current due to the applied filament voltage and half the cathode current—Yes, only half the current! Why? because one half of the cathode current passes through each side of the resistor, as that particular end

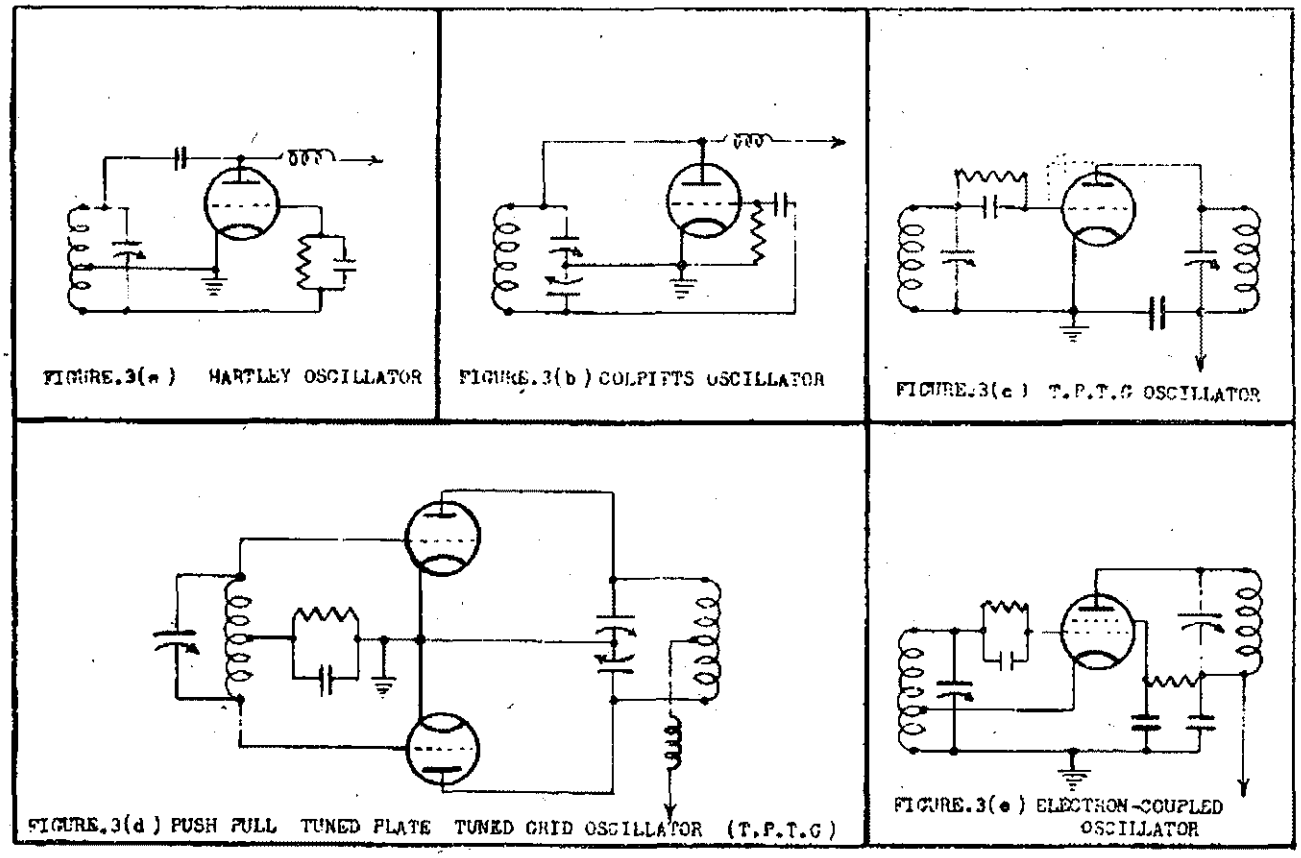

FIGURE.3(a) HARTLEY OSCILLATOR

FIGURE.3(b) COLPITTS OSCILLATOR

FIGURE.3(c) T.P.T.G OSCILLATOR

FIGURE.3(d) PUSH PULL TUNED PLATE TUNED GRID OSCILLATOR (T.P.T.G)

FIGURE.3(e) ELECTRON-COUPLED OSCILLATOR

of the filament becomes positive—once again the story of electrons taking the path of least resistance.

Typical Self-Controlled Oscillator Circuits:—Fig. 3 shows the following circuits in the order given: (a) Hartley, (b) Colpitts, (c) T.P.T.G. (single-ended), (d) Push-Pull T.P.T.G., and (e) Electron-Coupled. Now to consider each in turn:—

Hartley Oscillator:—In this circuit the extremities of the tank circuit are connected to the grid and plate. A tapping is taken to the cathode, or earth, at a point determined by excitation requirements, that is, tap is moved nearer to the plate end to increase the excitation, thereby introducing more turns into the grid circuit—excitation is reduced by moving the tap in the opposite direction—in general, tap will be located between points where 50 to 85 per cent. of the total turns are in the grid circuit.

In view of the fact that distributed and tube capacities affect the frequency, it is essential to ensure that these factors are as stable as possible.

Colpitts Oscillator:—The major difference between the Hartley and Colpitts Oscillators is that, the latter employs tapped capacity connection as cathode return instead of tapping on inductance Thus by arranging two variable condensers of optimum ratio in tandem, and having plates shaped to give desired effect, the Colpitts oscillator may be employed to give constant output from one end of capacity range to the other.

Tuned Plate Tuned Grid Oscillators (T.P.T.G.) (single-ended):—The most notable feature of this type of oscillator is that it employs two tuned circuits, one is connected in the plate and the other in the control grid circuit. Coupling between the two circuits is provided by the inter-electrode capacity of the valve, or where this is insufficient, a small external capacity connected between the grid and plate of the valve.

The operating frequency is chiefly controlled by the constants of the tuned circuit connected to the plate; but is varied to a certain extent by the tuned circuit associated with the grid, however, the chief function of the latter is to control the excitation—for optimum operating condition it is adjusted to a slightly lower frequency than that of the anode circuit.

Push Pull T.P.T.G. Oscillator:—operates in the same manner as the single-ended version, but has the advantage of greater stability, due to the push pull action of the valves cancelling certain inherent defects, improving flywheel effect, and balancing out even harmonics.

The Electron Coupled Oscillator:—employs the Hartley circuit using a tetrode or penthode type valve. The screen grid acts as the plate circuit of the oscillator, while the normal anode circuit of the valve acts as isolation or buffer amplifier. In this case the cathode is tapped on to the single inductor used, at a point representing 35 per cent. of turns, as viewed from the grounded end of the coil.

On the whole this circuit provides a very stable frequency source and, apart from the more complicated bridge oscillator, is the answer to the Ham's prayer. This circuit also has definite advantages when one contemplates both crystal and self controlled operation with the same oscillator, as will be seen when the subject is covered during the discussion of practical application in a later section.

PROPAGATION PREDICTIONS FOR JUNE

The following predictions are condensed from the Radio Propagation Bulletin for June (A.R.P.C.—18), published by the Radio Research Board for the Australian Radio Propagation Committee. Copies of the Bulletin are available from Newsagents and Booksellers, priced 2/-.

Zone E.—Latitude 10 degrees South.—(Nth. Queensland, Northern Territory, Nth. Western Australia).

28 mC is effective for skip distances of 2500 miles from 0730 to 1600 local time at point of reflection. These predictions are made with the understanding that the point of reflection is in E zone between latitude 5 deg. South and 15 deg. South.

Zone E.—Latitude 20 degrees South.—(Southern Queensland, New South Wales, South Australia, Western Australia).

Skip distance is 2500 miles on 28 mC between the hours of 0950 and 1620 in this zone. Reflection point must be in E zone between latitudes 15 deg. South and 25 deg. South. For shorter skip distances (1200-2000 miles) 28 mC is useable between 1000 and 1500 local time.

Zone E.—Latitude 30 degrees South.—(Victoria, Southern New South Wales, Southern South Australia, Southern West Australia).

28 mC useable between 1100 and 1600 for skip distances of 2500 miles. Reflection point in E zone between 25 deg. South and 35 deg. South. This reading is given as the maximum useable frequency.

Zone E.—Latitude 40 degrees South.—(Tasmania).

Conditions in 28 mC in this zone are still not conducive to long distance working. The maximum useable frequency given is 26 mC.

Readers are asked to note that the above data is given for single hop working. For those interested in working out the best conditions and frequencies for multi-hop paths, a study of the Bulletins is recommended.

Editorial

While the Divisions have their hands full with domestic problems, your Federal Executive has two main tasks to perform. Firstly, to obtain as speedily as possible, the restoration of our pre-war privileges and where appropriate to seek the introduction of new ones covering the V.H.F. and S.H.F. regions. The retiring Federal Executive have done a fine job and with the helpful co-operation of the P.M.G. Department, we are already some distance down the road. Our task is merely to pick up where they have left off and follow the clear line of direction given by the Federal Council at the recent Convention. The Federal Executive's other main responsibility for the forthcoming twelve months, is to carry out the Federal Council's directions on Federal Organisation, the two prime factors of which are the revision of the Constitution and taking over "Amateur Radio" from the Victorian Division as a Federal Activity.

We have a full and busy year ahead. We enter it confident and hopeful that when the Divisions and Federal Executive assemble their representatives at the Federal Council table a year hence, all will feel a sense of satisfaction borne of the knowledge that the hopes of twelve months before have been turned into accomplishments.

V.E.M.

THE FEDERAL CONVENTION

The Sixteenth Federal Convention of the Wireless Institute of Australia, was opened at the rooms of the Victorian Division at 2.15 p.m., on Friday, 19th April, 1946. The first Convention since 1939, this was probably the most important in the history of the W.I.A., certainly it was a very representative gathering, and the business listed for discussion was handled in a manner reflecting great credit upon each and every delegate.

Present as Delegates were:—

N.S.W., Mr. J. B. Corbin, VK2YC; Vic., Mr. J. G. Marsland, VK3NY; Q'land, Mr. F. W. Nolan, VK4JU; S.A., Mr. E. A. Barbier, VK5MD; W.A., Major J. Squires, VK6JS; Tas., Mr. A. Morrisbey, VK7VJ; F.H.Q., Mr. R. J. Marriott, VK3SI.

COUNCILLORS AND FEDERAL EXECUTIVE.

Standing: J. G. Marsland, VK3NY; J. B. Corbin, VK2YC; E. A. Barbier, VK5MD; A. Brown, VK3CX; R. J. Marriott, VK3SI; J. Moyle, VK2JU; Major J. Squires, VK6JS.

Front: A. Morrisby, VK7VJ; C. C. Quin, VK3WQ; T. D. Hogan, VK3HX; F. Nolan, VK4JU.

Also in attendance were the Federal Secretary, Mr. A. H. Clyne; the Assistant Federal Secretary, Mr. C. C. Quin; the Federal Treasurer, Mr. T. D. Hogan; Federal Councillor Vaughan Marshall, and as Observer for the N.S.W. Division, Mr. J. M. Moyle, VK2JU.

Mr. Vaughan Marshall, on behalf of the Federal Executive, welcomed the visitors, and following on the reply made on behalf of the Delegates by Mr. Barbier, nominations were called for the position of Chairman, to which Mr. Marriott was appointed.

First business of the Convention was the presentation of the Annual Report and Financial Statement, which were published in these columns last month, following which the Convention proceeded to discussion of the Agenda Items. Listed first, as being the most important business were those items dealing with the general organisation of the W.I.A.

It was agreed that revision of the Federal Constitution was necessary, and that this should be carried out by the process of comment by the Divisions made on drafts to be submitted by Federal Executive. It is hoped that by this means it will be possible for a new Federal Constitution to be ready for ratification at the next Federal Convention.

It was agreed also that F.H.Q. should remain in Melbourne so long as the office of the Chief Inspector is located there, obviously F.H.Q. must function in fairly close liaison with the Chief Inspector, and for this to be done with any measure of success, personal contact is a prerequisite.

The Federal Convention recognised the desirability of the adoption of a uniform Constitution by the Divisions.

When items concerning Contests came up for discussion, it was decided that F.H.Q. should organise a DX Contest to be held in 1946, irrespective of the frequencies available. In this connection it was agreed that New South Wales should be authorised to organise the 1948 DX Contest, in view of the projected World Convention to be held in Sydney in that year.

In order to perpetuate the names of Amateurs who lost their lives in the service of this country, during the recent war, it was decided that a memorial DX Contest should be organised and that the names of these Amateurs should be carried on what ever trophy is to be awarded.

As a result of discussion at this Convention a "Worked-all-States" Certificate is to be issued for interstate communication on all frequencies above the 28 Mc/s band,

and in addition a trophy will be awarded to the first Amateur to perform this feat. Also a National Field Day will be organised, covering all available bands.

Turning to consideration of Membership Certificates and Badges, it was agreed that in future this should be undertaken by F.H.Q., and this body was also instructed to consider the adoption of a standard design for members' stationery, log books, etc.

At this point in the proceedings, the magazine "Amateur Radio" was listed for discussion. Mr. Marsland gave a summary of the history of the magazine and placed before the Convention figures relating to circulation and finances with particular reference to the period since October last, when publication of the printed magazine was resumed.

Following considerable discussion regarding the future of the magazine, it was decided that "Amateur Radio" should become the sole responsibility of the Federal Council, and the Executive was instructed to negotiate with the present proprietors, the Victorian Division, with a view to acquiring the Magazine. In order to ensure a reasonable inflow of notes and contributions, it was agreed that each Division should appoint a Liaison Officer, whose responsibility it would be to see that the Divisional notes and at least one technical article per month are forwarded.

With a view to publicity, F.H.Q. was instructed to complete a census of Amateur activity during the war and to give the results all possible publicity.

Dissatisfaction was expressed with the new rules proposed by the A.R.R.L. for the DX Century Club, inasmuch as it is proposed to start the Club from scratch again; also it was agreed that steps should be taken to enable F.H.Q. to become the authority to verify applications for various certificates awarded by overseas bodies.

The Convention spent considerable time in discussion of the new P.M.G. Regulations, and it was decided to seek certain changes, notably for a return to one-class licencing, and re-introduction of the 16 years minimum age provision. An increase in power is also to be sought, likewise the return of Amateur frequencies now held by the Services, and approval for the use of F.M. Television, Pulse and Facsimile transmissions above 100 Mc/s. It was also considered desirable to explore the possibility of regaining our harmonically related bands.

Unanimous disapproval was expressed concerning Section 62, of the 1946 edition of the P.M.G.'s Handbook (which prohibits the incorporation in a power supply of components capable of being used to increase the transmitter power beyond that authorised) and F.H.Q. was instructed to seek its deletion.

Permission is to be sought for the handling of official W.I.A. information over an official W.I.A. station in each State; it is felt that such an arrangement would be of inestimable value to seek its deletion.

The Convention decided that negotiations should be opened with the P.M.G.'s Department to secure a more equitable policy in respect of B.C.I. interference, and that the Department be requested to define its policy in regard to machine-made interference.

It was decided to re-open negotiations for the removal or reduction of duty payable on all imported Amateur gear not intended for re-sale, and for the granting of import licences where necessary.

The consideration of the Agenda was concluded with the passage of resolutions fixing the venue of the next Federal Convention—Melbourne was decided upon—and providing for the publication in this issue of the Convention procedings.

During the foregoing business the Chairman had requested submission of items for consideration as General Business, fifteen items were submitted and all were, after discussion, carried unanimously.

Continued on Page 17.

CRYSTAL CONTROLS FOR V.H.F. BANDS

Quartz Crystals for frequency control have come to be accepted as necessities by most Amateurs, so much so, that most Hams are apt to give little more than a passing thought to this most important part of their rig.

During world war 2, communications played a very large part in achieving the victory. Only when the exacting requirements of service conditions made themselves manifest was it realised how important was the necessity for extreme frequency stability of transmissions. Consequently, the various services were quick to lay down specifications which were worked out after due considerations of all the factors involved. As a result very considerable advances in the science of Quartz Crystal production have been made, and we as Amateurs should be prepared to take advantage of these new developments.

When the crystal was first introduced as a means of controlling frequency it was thought that the ultimate had been reached in stability; never more would trouble be experienced from unstable transmissions; ended for all time was the bugbear of an operator having to chase a station all over the dial of his receiver. To a certain extent this was true, for the frequencies then in use were comparatively low, but as the use of higher frequencies became more popular it was realised that the state of affairs was not so happy.

Modern Crystals.

Two factors govern the requirements of a crystal for use in Amateur transmitters (or any other transmitter for that matter):—

(1) Accuracy of calibration.
(2) Temperature Co-efficient.

The first named is a function of the mechanical accuracy to which the crystal is ground. Here great strides have been made by the use of the etching processs for crystal finishing. Not only is it extremely difficult to finish a crystal to extreme accuracy by abrasive lapping, but more serious still is the effect of aging. When crystals are finished by the abrasive method it is not always possible to remove every trace of the abrasive compound from the surfaces of the finished crystal, with the result that whilst the crystal is in operation, and in most cases oscillating vigorously, the process of lapping goes on with the result that before very long the frequency has been increased. It is common practice these days to "etch" finish a crystal to frequency. The blanks are usually lapped by the old abrasive method to within a few kC of the finished frequency and then immersed in hydrofluoric acid until the desired frequency is reached. Not only is it easier to control the etching process, but also the surfaces of the crystal which have become impregnated with abrasive are eaten away and the abrasive action completely stopped.

Furthermore the type of holder used also has an effect upon the operating frequency and must be taken into consideration.

The second consideration, that of temperature co-efficient is not dependant upon the accuracy to which the crystal is ground, but rather upon the selection of the cut of the crystal. As most Hams know, several modes of vibration are found in the quartz "mother." The thickness of the crystal for a given frequency is dependant to a large degree upon which cut is used, as is also the temperature co-efficient.

The earliest known cuts (X cuts) have temperature co-efficients of the order of 20 to 30 cycles per Mc., per degree Centigrade. That is to say that for every degree centigrade change in the ambient temperature of the crystal, there will be a frequency change of 20 to 30 cycles for every megacycle of the frequency to which the crystal is ground. For instance, taking the extreme case of 30 cycles drift, on a 7mC crystal there would be a drift of 210 cycles for every degree change in temperature. Now a rise of temperature to the order of 20 degrees C. is quite within the bounds of possibility within the first hour or so of operation of a transmitter starting from cold. Over this rise the drift would be 4200 cycles, which is quite serious enough on 7mC, but assumes all the proportions of a major catastrophy when the same crystal is used for quadrupling to 28Mc. Under these circumstances the drift would amount to 16,8kC. Rather staggering isn't it?

Fortunately for the lot of the V.H.F. man this unhappy state of affairs need not cause him any undue concern, for there are other cuts which exhibit a far less drift than this. These cuts, known by the following designations, AT, BT, CT, DT, and ET, are used for widely differing frequencies. In addition to these there are also the GT, MT, and NT cuts, about which more later.

The above low drift types actually exhibit a zero temperature co-efficient over a few degrees of temperature change, and under the worst possible conditions rarely more than 1 cycle per mC. per degree C.

It becomes quite obvious then that crystal control can be entirely practicable even on bands as high as 166-170 mC. To illustrate this a table for the various V.H.F. bands is given at the end of the article, and features suggested methods of frequency multiplication.

To revert to the aforementioned types of cuts, let us see for what purpose each is most suited.

The AT cut is most extensively used for low drift crystals ground to frequencies between 300 and 5000 kC or in megacyles .3 to 5 mC.

Above this frequency the crystal becomes rather thin (a 5mC. AT cut crystal measures 0.0132 inches) so use is made of the BT cut. BT cut crystals are normally used for frequencies 4.5 and 10 mC. CT and DT cuts are used for frequencies below 0.5 mC. These types are known as shear types and depend not upon thickness, but upon length and breadth for their modes of vibration.

Harmonic generating crystals are known as ET and FT cuts.

The GT cuts have a temperature co-efficient of less than 0.01 per cent., over a temperature change of 100 degrees C. At a certain ratio of length to width one mode of vibration has a zero temperature co-efficient, making it very useful for frequency standard crystals.

The MT cut can be used from 50 to 100 kC., whilst the NT cut is a low drift crystal for use in the range between 4 kC and 50 kC. These last two mentioned cuts are used for phase modulated transmitters.

So you can see from the foregoing that the technique of quartz crystal production has progressed considerably since the days of the X cut.

Hand in hand with these developments have been the advances made in the design of crystal holders. Pre-war Hams ideas of a holder for the most part consisted of a couple of pennies or discs of similar size and material, which were ground more or less flat and placed in a tube base. This method has probably been the cause of more broken crystals than enough. Cases have been recorded where the crystal has actually jumped out of such a contraption.

Two distinct types of holder are in common use to-day.

They are:—

(1) Pressure type.

(2) Variable air gap type.

In addition to these, special types have been developed for particular applications.

The pressure type holder, in which the crystal is mounted between two plates which are maintained in contact with the crystals by means of a spring, is most suited for higher frequency crystals. The plates, or electrodes, to give them their proper designation, are relieved in the centre so that the crystal makes contact only on its extreme corners, thus providing an air gap. There are many variations of this type holder, to name two well known varieties, the DC11, which is designed to take 0.75 inch square crystals, and the FT243, which is the by now familiar miniature holder designed for use with 0.5, inch square crystals. Although the construction of these two types varies somewhat, the principles by which they operate remain the same.

The variable air gap holder is most suited for the lower frequency crystals. Most types are adjusted in the laboratory for most satisfactory performance, but there is at least one well known type in which the air gap is externally controlled, giving a frequency variation of a few kilocycles on either side of the mean frequency. As a general rule crystals vary slightly when placed under pressure in a holder, so that for greatest satisfaction it is better to order them complete with holder.

If, by now, the reader (if he already did not do so), has begun to realise the futility of buying crystals of unknown or doubtful cut, this article will have served the purpose for which it was intended. With the likelihood of enormously increased occupancy of the Amateur bands there is no place for the signal that is not stable. Good crystals may cost a little more than poor ones, but will certainly pay dividends in the long run.

			28 to 29 mC BAND.			
Fundamental Frequency in kC/s.	7,025	7,050	7,100	7,150	7,200	7,225
Output from 1st Doubler	14,050	14,100	14,200	14,300	14,400	14,450
Output from 2nd Doubler	28,100	28,200	28,400	28,600	28,800	28,900
			50 to 54 mC BAND.			
Fundamental Frequency in kC/s.	6,262	6,300	6,400	6,500	6,700	6,737
Output from 1st Doubler	12,524	12,600	12,800	13,000	13,400	13,474
Output from 2nd Doubler	25,048	25,200	25,600	26,000	26,800	26,948
Output from 3rd Doubler	50,096	50,400	51,200	52,000	53,600	53,896
			50 to 54 mC BAND.			
Fundamental Frequency in kC/s.	8,350	8,400	8,500	8,600	8,800	8,980
Output from Tripler Stage	25,050	25,200	25,500	25,800	26,400	26,940
Output from Doubler Stage	50,100	50,400	51,000	51,600	52,800	53,880
			166 to 170 mC BAND.			
Fundamental Frequency in kC/s.	6,150	6,180	6,214	6,240	6,260	6,295
Output from 1st Tripler	18,450	18,540	18,642	18,720	18,780	18,885
Output from 2nd Tripler	55,350	55,620	55,926	56,160	56,340	56,655
Output from 3rd Tripler	166,050	166,860	167,778	168,480	169,020	169,965

"GRAPHICAL ANALYSIS OF RESISTANCE-COUPLED PENTODES."

At the annual meeting of the Adelaide Division of the Institution of Radio Engineers (Australia), Thursday 3rd. May, a gathering of sixty members was addressed by Mr. Langford-Smith, Applications Engineer of Amalgamated Wireless Valve Company Pty. Limited on the above subject.

A selection of lantern slides were used to illustrate the results of tests carried out at the Valve Company's Applications Laboratory at Ashfield, N.S.W., and a short sound film, produced by the Radiotron Sales Production Department, depicted the assembly of a typical Australian made receiving valve (6F6G) at the Valve Company's Works.

☆

W's ON EIGHTY

As from April 1st, U.S. Amateurs have been permitted to operate on the band 3.7—4.0 Mc. C.W. may be used throughout the entire band, but 'Phone must be restricted to the portion between 3.9 and 4.0 Mc.

In making this allocation the U.S. authorities have broken the agreement that International Frequency Bands will be released simultaneously in all countries, and whilst we wish our American cousins every success, we cannot but feel that the time is ripe for a complete revision of the position relative to the release of the lower frequency bands.

☆

Connecting wires in radio receivers are eliminated by a method announced recently. Bare metal sprayed into channels in a plastic chassis is the basis for the method which, it is said, speeds production, reduces operating costs, permits lower prices and improves performance. The process has been used in many countries, notably in Germany where, during the war, the spray method was used in fabrication of coils.—Q.S.T.

☆

The British G.P.O. are prepared to allow those interested in the radio control of models to use a frequency of 460.5 Mc/s for the purpose of emitting control pulses. The output from the transmitter must be limited to 5 watts.—R.S.G.B. Bulletin.

ON THE HIGHS

28-28 MEGACYCLES.

Apart from an occasional fade out for 24-48 hours conditions have been good during daylight hours, the band opening around 6 a.m. EST and closing around 8 p.m. EST.

DX contacts normally followed the daylight route, East Coast W's being first heard followed by Central and South Americans and then all North and South America coming through until noon, when West Coast W's and a few South Americans are workable up to 3.30 p.m. EST.

African contacts commenced about 3 p.m. EST and continued on good days until 8 p.m.

Europeans appeared as early as 3 p.m. and faded out around 8 p.m. with an occasional break through at 10 p.m. for an hour or so.

Asian and Oceania contacts were possible at any time during daylight and once in a while during the evening up to midnight.

SU1KE and several G's have been heard on rare occasions at 8 a.m. EST, their signals being heard via SOUTH America.

AUSTRALIA.

Three element rotary beams are springing up everywhere with VK3IG holding the record for height—90 feet and VK3BW winning in the other division with good DX contacts on an 8 foot high array.

Among those using beams and getting their share of DX are VK's 3SB, 3YH, 3CZ, 3NW, 3KU, 3KR, 3KX, 3OP, 3VU, 3BQ, 3CP, 3YP. Country Hams are being heard in Melbourne at reasonable strength and provide the most satisfactory contacts for beam tests, the most consistent being VK's 3JA, 3KX, 3SE, 3MC, 3KJ, and 3HG.

Information is scarce regarding Interstate Hams although all districts are heard regularly, reports to the magazine will be appreciated as it is desired to make these notes representative of Australia.

NORTH AMERICA.

XE1KE; 28050 on cw is the old X1AY of early 10 mx fame.

CENTRAL AMERICA.

Numerous TG9's in Guatemala are active on fone and CW, the most consistent being TG9JW, TG9PB and TG9RC. TG9JW is using a 2 section 8JK beam and is usually S9. TI2RC, 750 watts 28220KC fone and TI2AW 28070 CW are best from Costa Rica.

VP6RB 28350 fone, and VP6PC 28000 fone and VP6JR 28750 fone, have been worked around 8 a.m. EST.

K4ESH 28050 CW is the most consistent Porto, Rican.

KZ5AW 28050 CW and KZ5AA 28040 put in good signals. KZ5AA is running 1 KW, the rig being 10 miles away and on the other side of the Panama Canal from the receiver. It is remote controlled over a pair of telephone wires and is keyed by a tone oscillator and a W.E. teletype relay which is so fast it follows the tone oscillator of the frequency, falls below 300 cps.

VP5EM Kingston, Jamaica has good fone. It is of interest to note that the old VP5PZ presented his 1KW rig to the Government during the war, the call ZQI being used. This Old Timer is at present in Canada and hopes to be back in Jamaica soon.

SOUTH AMERICAN.

The most consistent contact is PJ3X 28000 CW who is on every day around 10 a.m. EST.

OA4AS 28040 fone and CW has an ex-VK as assistant operator. His name is unknown but his present call is OA4V.

HK4AV 28180 fone is also consistent and HC1FG on 28000 fone is another regular.

VP3LF 28350 fone is heard regularly but has not yet been contacted.

Others heard include YV5AN 28030 CW, CX1FB 28025 CW, LU9AX 28060 CW, LU3DH 28020 CW, VP4TR 28075 CW.

AFRICA.

ZS and ZT stations heard and worked are too numerous to list but some of the consistent rarer ones are as follows:—FA8JD 28040 fone and answers CW calls; SU1MW 28100 fone; VQ6MI 28050 CW; VQ3TOM 28040 CW and fone; VQ4AA; VQ2PL 28120 CW and fone; VQ2GW 28160, 28490 CW; CR7AD 28650 CW; OQ5AQ 28060 CW; OQ5BQ 28000 fone and CW; SU1KE.

ASIA.

VU7BR 28120 CW; YI2XG 28050 CW; VU2AA 28090 CW; VU2WP 28090 CW; XU1YA-XU1YZ 28000-29000 fone and CW; CA6AG 28120 CW; PK4BA 28220 fone.

EUROPE.

ZB2A cw; XACP cw; KABZ fone; D4AEx; D2DI; PAoUN; SV1EC fone or CW; EP1C; XADK fone; G2VV CW; D4ABQ fone.

The stations from the United States are rather a problem if one has hopes of DX in other directions and if your beam is on South America, unfortunately it passes through New Zealand with consequent S9 plus signals from that country especially the few ZL phones parked in the first 100 Kc of the band.

The most outstanding W signals are from W6POZ Galeta, California and W5AYH. The last named has possibly the highest Ham antenna in the world for it is 200 feet high and is a folded dipole mounted on stand-offs at the top of a grounded steel tower of the local BCL station. The feeder is a 600 ohm line up the centre of the tower.

From the country, VK3GD at Stanhope, reports success in the DX line. Using low power, 7 watts input to a

Continued on Page 17.

Q.S.L. BUREAUX

The Federal and State Qsl Bureau have again commenced activities after the enforced period of hibernation during the war years. The following list shows the appointment of Qsl Managers for the various States, together with their respective addresses.

N.S.W. Division.—VK2YC, J. B. Corbin, 78 Maloney Street, Eastlakes, N.S.W.

Vic. Division.—VK3RJ, R. E. Jones, 23 Landale Street, Box Hill, Victoria.

Qld. Division.—VK4EN, Eric Neale, 38 Felix Street, Wooloowin, N.3., Brisbane, Queensland.

S.A. Division.—VK5RX, G. Luxton, 8 Brook Street, West Mitcham, S.A.

W.A. Division.—VK6RU, J. E. Rumble, Box F319, G.P.O., Perth, W.A.

Tas. Division.—VK7AL, T. A. Allen, 6 Thirza Street, Newtown, Tasmania.

The Federal Qsl Manager is pleased to renew working acquaintance with old Divisional Managers and extends a welcome to newly appointed Managers.

Owing to the anticipated increase in Qsl traffic, it has been decided by the Victorin Division to divide that State Bureau into two sections—for inward cards and for outward cards. Mr. Frank O'Dwyer has kindly offered to take charge of the outward section and all outward cards should be mailed or handed to VK3OF. His QRA is VK3OF, Mr. Frank O'Dwyer, 190 Thomas Street, Hampton, Victoria. The work of the bureau will be lightened by the division of work and the handling of cards thus expedited. VK3OF knows the game thoroughly by virtue of tuition from VK2YC and the writer and all users of the bureau are requested to extend him the same co-operation as it has been the writer's privilege to enjoy since the founding of the bureau in Victoria in 1931. All despatches of outward cards to VK3OF should be accompanied by currency or stamps at the rate of ½d per card, and cards should be sorted into countries. All cards for VK3 stations should be sent to VK3RJ as usual.

An alphabetical list of Australian experimental licence holders together with addresses will be issued by the P.M.G. Department Wireless Branch, Treasury Gardens, Melbourne, at the end of June. It is expected that the list will be available as previously, on application accompanied by the fee. The pre-war fee was 2/6 per annum.

Addresses of overseas bureau will be published in these notes as information of their reactivation comes to hand.

Cards for VK3 stations will be held for a period of six months only, and as the family bath heater is now of the gas variety, some other form of combustion will surely be devised for cards unclaimed after the period stated.

Cards for Victorian stations will be distributed as under:—

W.I.A. Members.—At monthly meetings.

Country Members.—Posted monthly.

Non W.I.A. Members.—Cards will be forwarded on receipt of a stamped, addressed envelope (large size for preference).

A list of cards on hand will be published monthly in these notes.

Pirates—Cards will be handed over by appointment (at the office of the R.I.).

Cards are on hand at the Victorian Bureau for the following stations VK3BC, CI, EE, EO, EZ, HE, IP, IW, JK, MC, NC, NF, NM, QN, SB, SE, TM, UP, UQ, VD, VJ, VU, YH, YR, YT, YW, ZL, ZT, ZU.

When ordering new supplies of cards from printers, ensure that the size conforms to that of the normal postcard envelope. Larger or smaller cards are a confounded nuisance.

Bureaux Managers Note. — If they desire to publish calls of Hams, for whom they are holding cards, please forward the information not later than the 18th of each month.—Editor.

FEDERAL CONVENTION.

The items of General Business provided for: approach by F.H.Q. to the Chief Inspector for interpretation of Regulations, a ban on QSL cards bearing commercial matter, holding of all Divisional meetings in the same week of the month, a "CW only" sub-band in the 10 Meter band from 28.0-28.1 Mc/s, acceptance by all Divisions of the existing Federal Constitution, a telegraphic address for F.H.Q., an Emergency Communication Network, incorporation in each Divisional Constitution of a clause restricting voting power to members holding current experimental station licences, acquisition of an accurate Frequency Meter by each Division, full use in Institute publicity of the privileges of membership, amendment of the existing Federal Constitution to allow Federal Council to alter at its discretion the per capita contributions to Federal Funds, payment of visiting delegates travelling expenses from W.I.A. funds, a policy to be determined in the handling of QSL cards, amendment to the Federal Constitution to require replies from Divisions to F.H.Q. within fourteen days, and moves to be made to secure greater representation on the Experimenters Advisory Committees.

At the conclusion of the above business, delegates expressed their appreciation of the hospitality extended by the Victorian Division, and Messrs. Marriott and Hogan in reply commented on the splendid spirit of co-operation, evident at the Convention, following which the Chairman declared the 1946 Federal Convention closed at 1 p.m. on Monday, 22nd April.

ON THE HIGHS.

6V6, he has worked VK2, 4 and 6. His first contact was a W6, followed by ZL's VS3JH, G6ZO/I. George is not in favour of dividing the 10 mx band.

166-170 MEGACYCLES.

It seems that there are at least two stations working on this band in VK3. To quote VK3MB: "VK3TZ and myself are a bit tired of talking to ourselves on the 166-170 mc band and also of calling CQ, because either we aren't getting out far enough or no one is listening. We suspect the latter and have come to regard 1¾ metres as our own private telephone line for daily ragchews."

The gear being used are parallel rod oscillators and acorn or peanut tubes as super-regan detectors. Three element vertical beam antennas are being used.

VK3MB says that they hope to work over longer distances, and that he is thinking of taking a portable to Macedon to see how it works out.

DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX,
Box 1734 G.P.O. Sydney.

Meeting Place: Science House, Gloucester and Essex Streets.

Meeting Night: Fourth Friday of each month.

The Annual General Meeting of the Division was held at Science House, Gloucester Street, Sydney, on Friday, 26th April. There was an excellent attendance, among the visitors being VK4JU, on his way back from the Federal Convention, where he ably represented Queensland.

The official business of the meeting was the presentation of the Annual Report and financial statements, and the election of Council for the ensuing twelve months. The following seven members were elected:—W. M. Moore, VK2HZ; W. G. Ryan, VK2TI; J. M. Moyle, VK2JU; H. Peterson, VK2HP; G. W. Dukes, VK2WD; M. H. Meyers, VK2VN; and J. B. Corbin, VK2JB. Subsequently, this Council held its first meeting and Wal. Ryan, VK2TI, was elected President. Ex-Officio members of Council were also elected at this latter meeting, the appointments being:— Honorary Secretary, P. H. Adams, VK2JX; and Honorary Treasurer, G. Cole, VK2DI. Bill Dukes carries on as Membership Secretary.

At the general meeting there was considerable discussion on "break-in" and "duplex" operation, including the special case of "cross-band duplex." Of course, if the regulations are strictly interpreted, none of these forms of operation are permitted, but there are many who think that some provision should be made, especially for operation on the 50 mc and higher frequency bands. This is a matter which, we understand, was discussed at Convention, so no doubt there will be ample opportunity for further discussion at the next general meeting, when the official minutes of Convention should be available.

At the conclusion of general business a most interesting lecture on "Aerials" was delivered by A. H. Treharne, B.E., B.Sc., VK2IQ. Mr. Treharne dealt with all types of antennas and feed systems, including radar aerials, and covered a very wide field in the rather short time at his disposal.

The only thing he did not tell us was how to make W.A.C. on 28 Mc—but perhaps VK2TI could give us the best dope on that. The other day he worked CEIAO at 1315 and followed this with W2LWU, K6BHL, PAOUN, XUIYY and finally FA8JD at 2000. He worked VK2DI for the Oceania contact, giving him W.A.C. in well under seven hours. Nice going, Wal! All this was done with a humble two-wave Zepp. He thinks he would do much better with a beam but for some obscure reason still sticks to the Zepp!

VK2RA still continues to raise those good ones that we can all hear so well. Ray has now worked 40 countries with the aid of a "W8JK" and, now, a V-Beam on Europe.

Rare ones heard lately are TG9CV and CR9AG, who incidentally will be remembered as VS6AG before the war.

What is your reaction, chaps, to an unofficial DX Honour Roll? It interested send in your lists of countries worked, including the call of station worked in each, and we'll list the first 20 each month. Don't send cards as this is purely unofficial and we'll take your word for it.

It is expected that FHQ will have something to say in this issue about the results of the deliberations at Convention, so there is no point in discussing them here. Council has had a brief unofficial report from our delegate, Jim Corbin, and it seems as though the foundations of a solid post-war W.I.A., thoroughly representative of the Australian amateur, have been well and truly laid. It is indeed pleasing to know that the idea uppermost in the mind of every delegate was the constructive improvement of the Institute as a Federal body, capable of efficiently representing the amateur in Australia. This spirit of co-operation, so evident at the Convention, promises well for the future and we can confidently expect a better, stronger and more united W.I.A. than ever before.

One point arising out of the Convention is that the VK-ZL-DX Contest will be held this year, irrespective of what bands are available. We mention this now so that you will have plenty of time to try out all those fancy 28Mc beam arrays and decide which ones suit your purpose best. Of course, a beam alone won't win the contest for you—the operator has to be good too! On the subject of operators—and signals—isn't it time we had a bit of a clean-up? There is no excuse for rotten signals these days—and you hear some pretty rotten ones, both C.W. and phone, from time to time. There seems to be a gentlemen's agreement that phone should not be used in the 28,000 to 28,100 k.c. portion of the band, but evidently we are not all gentlemen. There is no point in sticking religiously to this rule on nights when no DX is coming through, but, during daylight hours in the week-ends, it should not be asking too much to leave 10% of the band free for C.W. Incidentally, the band has been extended to 30 Mc. for the G's who are also allowed to use ten watts on the band 1800-2000 kc.

Regarding the VHF bands, VK2VN supplies the following extract from an agreement between the United States and the British Commonwealth and Empire concerning frequency allocations in the region between 200 and 300 Mc.

> "The Commonwealth and Empire agree that they will interpose no objection to activation by the U.S. of an interim amateur band 235 to 240 Mc and Canada agrees to take similar action in the interest of the radio amateurs of both countries. It is understood that, upon the expiration of this interim period, the amateur band, in both Canada and the U.S., will revert to 220-225 M."

Morrie stated that the interim period referred to in the agreement is to terminate as soon as possible after the 1st January, 1948.

At the April General Meeting, a total of £6/10/- was handed in for the "Food for Britain" Fund. This is an excellent example of the real ham spirit.

VK2YC reports that the total cards received in the QSL Bureau since the bands were opened total about 150. Of these, foreign cards represented about 20 different stations, and of these twenty, eleven sent only a single card. So don't blame Jim if you haven't got cards from all those W's you've been working!

With normal conditions on 28 and 50 Mc it is very hard to keep track of the activities of country members. If you are on the air, drop a line to Box 1734 and tell us what you arre doing; anything of general interest will be included in these notes.

Finally, remember that the general meetings are now held in the Main Lecture Hall at Science House, on the fourth Friday of each month and commence at 7.45 p.m. sharp. Coffee and biscuits are served at 10.30 and the lights go out at 11 p.m.

REPORT OF A.O.C.P. CLASSES.

Course No. 1.—Course No. 1 commenced at the premises of the Women's Emergency Signalling Corps, 10 Clarence Street, on Monday, 21st January, with 37 students. The duration of this course was fixed at three months, but after the course had been running for some time it became apparent that the full syllabus could not be covered in this time.

Accordingly, the class was held on one extra night per week, making three nights per week in all. The fees for this course were: £3/10/- for the complete course or alternatively £1/1/- application fee, the balance being paid in instalments. Of the 37 students, 17 paid the full amount in advance.

The writer was assisted by Mr. Hicks, VK2AD (Morse), and Mr. Piermont, VK2NQ (Theory and Morse), but Mr. Piermont found it necessary to relinquish his duties on 18th February. The course finished on Monday, 8th April, with 30 students, 12 of whom sat for the April A.O.C.P. Examination, the results of which are not yet known.

A two stage "Bread Board" transmitter was built and used for demonstration purposes, the components being supplied by Mr. W. G. Ryan. A visit to the transmitter of Station 2UE was arranged, and was attended by 10 students. A good deal of assistance in the morse instruction was given by Mrs. F. V. McKenzie and her staff.

The class rooms leave a great deal to be desired but it appears that nothing can be done about this at the moment due to the difficulty of obtaining accommodation elsewhere.

Course No. 2.—As a result of discussion at the March Council Meeting, it was decided to increase the duration to 19 weeks, and the fees to £6/6/-. An advertisement was inserted in the March issue of "Radio & Hobbies," and from this 66 inquiries were received requesting details of the course.

A printed pamphlet setting out the full details was forwarded to each metropolitan inquirer, and explanatory letters were sent to inquirers from other States and country towns (10).

To date 28 application forms have been completed and returned, of which 8 have paid the full fees in advance. Three of these were members of the last course, but it is expected that there will be a few more when the results of the examination become available.

More demonstration equipment is being constructed, and members of the Institute could undoubtedly assist greatly in this regard, by loaning certain items of equipment, such as receivers, frequency meters, burnt out valves, etc., to the class for short periods during this course.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne. WM 1579.

Meeting Place: Lecture Hall, Chamber of Manufacturers' Building, 312 Flinders Street, City.

Meeting Night: First Tuesday of each month.

The May meeting of this Division was held in an atmosphere of comfort, dignity and ease, worthy of some record after the inconvenience, tolerated in good spirit, during the past several months owing to inadequate space of the W.I.A. Headquarters. We hope to hear of further good news in this respect soon, so ears to the ground "Gents" and keep reading the Public Notices in the "Age" each Saturday.

This meeting was a huge success, and one of the best held for many years. There were over 150 members and visitors present and seated, about ten standing (Sorry fellows), so come early next time.

Bob Cunningham, 3ML, commanded the chair and welcomed visitors and notably F8S1.

Ray Jones, VK3RJ, the inward Q.S.L. manager distributed cards.

Jim Marsland, VK3NY (Vic. Div. Federal Convention Delegate), gave advance information on doings of the Convention.

There was further discussion, which was in the nature of persuasion to Station operators to confine 28 Mc/s to 28.1 Mc/s for CW, and fone stations to operate in any of the remainder of the band. There seems to be the general agreement that fone stations should be Q.R.T. on frequencies between these two limits on 28 Mc/'s band.

The highlight to the night, was a very interesting lecture on the principals and application of Radar, very capably given by Vaughan Marshall, VK3UK.

Some embarassment has been caused by inaccuracies in these notes and your correspondent desires it made clear that some can happen unwittingly, as these notes are compiled from notes hurriedly made at meetings (not in shorthand) and from voices fitted with rubber heels. Its pretty hard to keep up sometimes.

The Council of this Division has decided to discontinue "service rate" subscriptions for membership as from July 1st, 1946. Approval has also been given for the purchase of a Philoscope for the Lab. Committee and members convenience.

Ray Jones, 3RJ, Membership Secretary, reports that there is a slight lull in his activities as such and finds a little time now for blowing up an occasional crystal between QSO's.

New member, G. A. Oxley.

Further justification for ears to ground, particularly country members, is the possibility very soon of Special Notice in Public Notices of Saturday's "Age." Keep your cheque books handy Gents. The shipping strike is now over and things will move fast from Sydney.

IN THE WESTERN ZONE.—8JA.—Getting out well with 20 meter V beams, has WAC and 28 countries so far. Finds new 9 tube receiver much better than old TRF job. 3MC.—Jamie swears by vertical radiators but has recently been converted to three element rotaries and is busy building a supporting tower. Countries worked total 30 but still wants Sth. America for WAC. But is doing very well for a new comer on the air. 3NC.—Norm., who is old 3PG of QRP fame, still sticks to low power. Is using a vibrator pack and about 8 watts input to a V beam. Getting out fairly well, but the two tube receiver not performing up to requirements. Intends putting up a rhombic on Europe. 3HG.—Now has rotary three element going nicely and getting share of D.X. Now has 30 countries including South America. 8KX.—Nuff sed. Everyone knows how Ron works em. 3KJ.—Hear Doug with nice signal occasionally but no news of what he is working. 3TW.—Still seems so have a new rig every other day, but in between times works quite a bit of D.X. 8JX.—Has a new receiver perking nicely on ten, but has not completed the Xmitter yet. 8YN.—Another newcomer, has a six stage rig, a 13 tube receiver and is sure getting out. Was heard working a "D" the other day. 3TN.—Having a spot of bother with the mixer in the receiver. Will have another newcomer in Hamilton, as Bruce Learmonth, passed at the last exam. and will be on the air in the next week or two. Quite a lot of the D.X. heard here has been going back to 5BF, an old friend of the 40 meter days. Congraulations Frank, the boys are anxious to work you again when the bands permit.

AT STAWELL.—The local gang here consists of 3US, 3AKP, and myself, 3YW. in our suburb of Ararat we have 3GN and 3FJ (ex-3WC), and out in the bush is 3HL.

3US at present has an E.C.O. working into a single wire fed 40' meter aerial, last heard of he had departed for VIM to collect a Xtl and a 807, Syd is using a Jones Super-Gainer for a Rx and finds it very fb. 3AKP is at present moving into a new house and worrying just where the antenna is going, will probably end up with a vertical. Keith was using two trannies in series for his power supply, one night there was a sizzle and then there were one. Me, well I have been pumping 40 watts into a vertical two half wave in phase and find them very FB, however, since the threat of local QRM has loomed larger I have put a reflector behind the antenna with the usual results. 3HL has not even opened his boxes of gear yet, but threatens to get busy (perhaps) when the crop is in. I wonder why Charlie Nelson changed his call to 3FJ, anyway he will be off soon, the Tx is just panting to go, the Rx ticking over, and the sticks rose from their beds recently. 3GN had bother in finding that elusive 28mc spot (lots of us did I guess) after borrowing my Wave meter, however, he got there, but I believe has been having trouble with the super.

QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.

Meeting Place: State Service Building, Elizabeth St., City.

Meeting Night: First Friday of each month.

Just by way of a change this month we won't discuss the last G.M., except to say that it was decided to hold a "Field Day" on the weekend following the next meeting. The idea is for the Gang to spread out on the best 10 mx sites near Brisbane and proceed to work all and sundry. We expect to camp out on the Saturday night and make a weekend of it. Ten metres will of course be the band used, and it should prove a good show. The winner will receive a dozen bottles brown liquid and two HK54's. The winner won't, as you might think, be the fellow with the highest score. No, he'll be the chap who lends me that extra blanket if I'm cold. Don't mind us, folks—it sounds good and our intentions are the best. Providing we're not frozen stiff, the affair will duly be reported in these pages.

Of interest to our country men, the library service is likely to be renewed at an early date—more later. And that reminds us, speaking of country men, we received a couple of pages of juice from 4DK, up in Columboola. Following considerable procrastination, we're told, Jack advises of his activities over the last five or six months and painted a most realistic picture of himself and the 2nd op., George, sorting out the radio gear from bags of chaff and poultry feed. At all events a t.r.f. receiver is now in operation and a rig is due to materialize at any tick of the clock. The fly in the ointment of course, is the lack of A.C. Glad to hear from you Om and best of luck.

Ten metres in Brisbane, towards the end of April, has been rather eratic (pardon us—more eratic than ever!) with signals sometimes lasting only a few seconds. 4SN in Meringenden is rather disgusted with the band for the same reason. Must remember to dust those 20 mx coils once again!

After hearing (and seeing) the performance of the new 10 mx Rotary at 4KS several of the local gang won't be happy until they've got one of their own. It's a 3 element job and although everyone knows that the things do work, there's nothing like a demonstration to convince the skeptics.

We fear that a grave injustice was done to 4HR in last month's notes. It was erroneously reported that Tibby had worked 26 countries since again getting his haywire cranked up. Friends, the number should have been 36.

Speaking of DX worked, why not run a column in "AR," giving the 12 or so highest scores in Australia. The thing would only include those countries worked since the lifting of the ban, and it would be interesting to see who's leading who from month to month. What say, Mr. Editor, if you are after something to put in the magazine?

In case some of our members are not aware of the fact, we would like to advise that the QSL Bureau is functioning under the able care of 4EN, so forward your cards to Box 638J G.P.O., and Eric will attend to them. A visitor to the last meeting was 4LP, back from Darwin to get his discharge from the R.A.A.F. Looking very well on it too! Another unfamiliar face was that of Bill Faber, 4WF. Glad to have you with us Oms!

Called on 4HU on a recent Sunday morning and found George laying a path in the front garden. Doesn't know where he got the time for Ham Radio before the war, he says. Bill Petersen, 4FY, putting out a very FB signal on 10—that mike you're using sure gives a faithful reproduction of your voice Om. And then, when we're tuning across the band and the receiver suddenly goes dead we know that we are right on 4JP's carrier. Likewise with 4ES. Incidentally Herb. finds his co-axial vertical half-wave on 10 mx the goods for sucking up the soup. 4ZU is hoping his will do the same on 6 mx.

In order to break the meeting monotony, it has been decided to hold the next couple of council meetings at home of 4HR, who is bed ridden (for a month or two) with a fortunately not painful complaint. Needless to say, Tibby has the rig alongside the bed!

A rare signal heard in Brisbane, by several of the locals, was that of 4WS up in Ipswich. Just why you are the only Ipswich man to be heard Om, we don't quite know.

Following his visit to VK3 for the Convention, our delegate, 4JU, delivered a comprehensive account of the proceedings to Council at last night's meeting (10th May). Our members will be pleased to know that Frank did a good job for VK4 at the Convention.

Following the finish of business at General Meetings, it has been the custom for the boys to drift away to various near-by cafes for supper. To stop the party from breaking up in this fashion we intend turning in Refreshments at future General Meetings.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.

Meeting Place: 17 Waymouth Street, Adelaide.

Meeting Night: Second Tuesday of each month.

The Monthly General Meeting of this Division took place on Tuesday, 14th June. As the Institute's usual rooms were not available, members met at the Institute Building, North Terrace, where the Vacuum Oil Co. had kindly arranged a very attractive program of talkie pictures. On the grounds that the Amateur's activities should be balanced and that he take an interest in other things besides his chosen hobby, a brief outline of the subject matter of the films is given. One picture showed the work done by the Tennessee Valley Authority, in the United States, to combat soil erosion and restore the land to fertility and production. The river was dammed in many places to curb its boisterous waters during flood periods, also to provide hydro-electric power and for irrigation. In addition, farmers had to be persuaded to try new methods. One outstanding example of this and of particular interest to us here in Australia, was contour plowing, where the furrows, instead of being plowed straight, follow the contours of the land, the idea being to prevent the formation of channels down a hill where

the water would wash away the soil. The whole project was on an immense scale.

Another film dealt with the construction of an oil pipe line from the Texas Oil fields to the East Coast, a distance of over 1300 miles. This was a war necessity, as there were an insufficient number of tankers available for transport, by the usual sea route, to cope with the increased demand. Unlike our own Whyalla pipe line, which is a surface job, these pipes were laid underground. The outside of the pipes were bitumized and then covered with protective wrappings put on by a tractor crawling along the top of the pipes whilst they were supported above ground.

As an experimental departure from the usual lecture on a radio subject, the picture evening was a very pleasant and instructive diversion.

Items of general business were attended to at the conclusion of the entertainment. Nominations for next (financial) year's Council were announced as being just sufficient to fill all positions. There will thus be no need for a ballot.

Mr. John Allan (VK5UL) presented his interpretations of the May Ionospheric Charts as applicable to this State. His notes were read out and a condensed version is being included in the W.I.A. notes to the local newspaper.

The Secretary, Mr. Barbier (VK5MD), made reference to the Federal Convention, which he attended as a delegate. He stressed the atmosphere of co-operation that prevailed throughout and described the gathering as an outstanding success. He will make a full report at the annual meeting.

In accordance with the Convention's request, a Liaison Officer has been appointed in this Division to collect and forward articles and other material to "Amateur Radio." The writer of these notes has "fallen" for the job.

At the last Council Meeting it was unanimously decided to elect Mr. Joe McAllister as an honorary member. Mr. McAllister is our energetic Membership Organiser, and has rendered valuable and untiring service to the Institute over a period of years.

Whilst on the topic of membership, it is opportune to mention that the double century has recently been attained and now passed. This achievement is in no small measure due to the efforts of the gentleman referred to in the preceding paragraph.

Another achievement worthy of note is VK5KG's recent effort of a W.A.C. in one day, the feat actually being accomplished over a ten hour period.

The second series of Student Classes commenced on April 29th, with 16 starters, which was nearly double the minimum needed. The course will conclude in time for the October A.O.C.P. Examinations.

The next meeting will be on Tuesday, 11th June, at 17 Waymouth Street, and is the Annual General Meeting for the election of Officers and presentation of reports by the Secretary and Treasurer. Immediately following this, there is to be a special meeting to ratify the proposed Constitution.

WESTERN AUSTRALIA

Hon. Secretary: H. B. Lang,
42 Ord Street, Claremont, W.A.

Meeting Place: Builders' Exchange, St. Georges Ter., Perth.

Meeting Night: Third Monday in each Month.

The third Monday in each month is the General Meeting night of this Division. Monday, May 20th, was the first meeting on the newly appointed night, and the attendance, in view of the short notice, was indeed promising.

Business was confined to a general review of the Con-

ventions proceedings, the official report, and personal observations of our delegate, Major J. Squire's.

Twelve new members were elected and amongst those, a sincere welcome was extended to two old timers in 6SA and 6AG. The Institute will be all the stronger for their support. It was found necessary to change the meeting night to the third Monday in each month, because of the number of Public Holidays that generally occupy the first Monday of each Month. It is to be hoped that all members will keep this date free and come along and swell the crowd.

There is not a great deal of activity locally on 28 mc, however, each week the numbers are increasing and the latest to make the band is 6NL. Victoria was heard t'other evening with a very fb. S9T9 signal. 6HL—busy rebuilding and has convertor working nicely. It is rumored he has a partner now—hi —. 6WH—busy working on new Beam and comes on every now and then, Fone and CW. 6KW—Ron is bagging some nice dx., both Fone and CW. Latest is G on Fone and more to come. 6RU—Jim also very consistent and doing well. Very busy at moment on Antenna Construction. 6SA—Yes, Jim is there, and in between working what there is to be worked, is planning new rig. 6LW—Not heard much lately, but has been most consistent in the past. Very keen on 50-54 mc band. I guess that new tube will soon be doing duty Wally. 6BX—Just moved from AC (Bluff Pt.) to (DC into town), very qrl house cleaning, etc. No Ham activity expected here for some time. 6EL—Just about in "nut house" working out what Xontri tubes will work off 220v. DC mains and provide 50 watts. Working out convertor to work into B/C-S/W Rx. Spending a lot of money annoying Valve Companies for details of high voltage heater tubes. 6WZ—Busy pestering city hams per correspondence for dope on VHF gear and panting for his holidays (nearly over now Harry), and then get cracking on Antenna construction—re manufacture and shack rearrangement—wood chopping and gardening permitting. 6HM—Tas three element Rotary and PP807 in final 6PJ. Very nice signal; very consistent lately. 6HW, 6IG and 6ZO—Keeping the Port flag flying. All seem to be getting out well. 6FL—Getting nice results from two element Rotary, expects to be on 50mc soon with new Tx and 832 final. 6DF—Has new 3 element Rotary mounted on 3 inch by 3 inch oregon stick—Rotates entire mast. 6GM—Very busy but not on new rig. How soon, when and how, George? 6HT—No word from the Southern port. How about some notes, Harry? 6AJ—Very keen, and getting out well. Has new 2 element Rotary; is only 200 yards from 6FL, often work each other—nice CW! 6TX—Not ready yet. House hunting, like hundreds of others. 6RU—Jim Rumble is our QSL Officer and is open for business. 6BC—Very QRL, Subiaco Radio Club. This club has an ever increasing membership and is to be congratulated on the excellent work they are doing.

And finally, there is a man in Perth, employed by the Perth City Council, whose job is to do some shooting. Yep, he's a crack shot and rarely misses in the city environs, and what he shoots will be left unsaid. But I'de really like to hire that guy to put holes, bang smack through the final tubes of those selfish few, who use that first 100 kc for fone work. If you only have one xtal and it happens to put you in that part of the band. Stay on CW. It will probably improve your fist anyway. If you must go Fone, then save the pennies and give yourself a

birthday present. There are some choice frequencies between 28100 and 29000 kc. Are YOU one of the selfish, inconsiderate few?

73 till next month.—6FL.

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.

Meeting place, Photographic Society's Rooms,
162 Liverpool Street, Hobart.

Meeting Night: First Wednesday of each month.

General Meeting, first Wednesday in each month at Photographic Society's Rooms, 162 Liverpool Street, Hobart.

The monthly General Meeting was conducted at 8 p.m., on May 1st, attendance was fair, present being L. Jensen, 7LJ, in chair; J. Brown, 7BJ; A. Finch, 7CJ; C. Walch, 7CW; M. Loveless, 7ML; Doc. Kelly, 7LL; "Pop" Medhurst, 7AH; D. Watson, 7DW; C. Miller, 7CM; T. Connor, 7CT; N. Hopwood, 7GJ; T. Allen, 7AL; M. Conway, 7CL; Koglin; A. Morrisby; G. Oakes.

Apologies C. Oldham, 7XA; P. Allen, 7PA; and Allenby.

The first named six constituted the Council, which met earlier, 7.30 p.m. on Council Business as is the usual practice.

At the commencement of General Business, 7CW, was congratulated on having attained his First Class Certificate, further congratulations went to 7BJ, for his F.M. article in "AR."

The matter of Annual General Meeting was then discussed at length and the old idea of the June long weekend, King's Birthday holiday, was adhered to and the Saturday night, June 15th, set down in accordance, this will be VK7's 21st Anniversary and we hope to make it a memorable occasion and with existing conditions the committee will be hard put to attain this end as catering can be very difficult to say nothing of finding the amber fluid.

The proposal is to hold the Annual Meeting early, commencing about 6 p.m., and follow up with a re-union dinner, all members being asked to make a special effort to attend.

With these arrangements settled the main item of General Business was then called for. Mr. A. Morrisby to give his "Delegates Report" on the Federal Convention at which Alan proved himself to be a budding politician.

The tempo was too fast for anything other than a shorthand expert to take copy, so the best I can say here, is that the Convention was a successful event generally speaking. The Constitutional matters were satisfactory to all.

Some doubt exists about the Regulations Proposals, it being evident that the Federal Executive had no desire to approach the P.M.G.'s Department at this juncture for variations to regulations that they themselves had been party to setting up, and that there had been somewhat of a gentleman's agreement between a majority to defeat any proposals on regulation alterations.

That this should be so, is to say the least of it, most unfortunate for, if it could be shown that anomalies existed, this was the Convention at which to see them rectified as far as possible, particularly as these regulations were drawn up and accepted before the main body of amateurs had completed their reorganising.

The highlight of the evening goes to 7CW, VK7's first "rotary beam" (first at least to my knowledge) having appeared over his domicile.

It has aroused the neighbors curiosity to such a degree

that a contest seems inevitable, general opinion is that Mr. C.W. has produced an ideal clothes drier for Mrs. C.W. There's one worry—how is poor Mrs. C.W. going to pin the clothes to it?

With a couple of ZS's as a start it should give CW good heart and with much of such DX we can anticipate other neighborhoods being similarly decorated..

I believe 7GJ has to be congratulated, seems a modulated oscillator has arrived, handle is Jack, has he had a go at the key yet GJ?

7AL still trying to produce the "perfect 28 mc RX," The mitter will need rebuilding if that RX doesn't soon perk Tom!

7JH, at Waddamana, reports having given up the idea of 28 mc's in the valley in which he finds himself, says nothing doing at all, is contenting himself by waiting and hoping for the opening of the lower frequencies.

Bad luck Jack and hope you don't have to wait too long.

In referring to our Convention Delegate, A. Morrisby, last month, I stated he was not a licenced ham, although this is so, Alan does hold an A.O.C.P. and even now the station licence may be on the lift.

FREQUENCY MODULATION.

There is a simpler means of producing phase modulation, which is perhaps more suitable for amateur use. Two valves V1 and V2 are fed from a crystal oscillator, a 90 degrees phase shift being made in the drive to V1. The output of both tubes is fed into a single tank circuit. Modulation is applied by means of a push-pull transformer to the grid, thus the grids are 180 degrees out of phase for audio frequency. At no modulation the two carriers combine to form a new carrier with an intermediate phase. Under modulation, when the output of one valve is reduced, the output of the other is increased and vice-versa. Examination of vector diagrams will show that considerable phase modulation occurs; some A.M. also occurs, but this may be eliminated by a limiter in the transmitter or else by relying on that one in the receiver. With this circuit it is possible to get a direct deviation ratio of 1.5 with sufficient linearity for voice working and so not so much frequency multiplication is required. If the oscillator is in the 160 metre band and 200 cycles is the lowest audio frequency we are interested in, a deviation of 300 cycles can be obtained directly. By multiplying to 10 metres a deviation of approximately 5 Kc/s can be obtained.

The treatment in this article can only be taken as an outline, as space forbids description of the complete units, but, for amateur use, the reactance tube system, particularly for the higher frequencies where the simple self excited oscillator can be used, appears to be most suitable. For practical transmitting and receiving circuits past issues of Radio and QST should be referred to, as several outfits of all types have been described in these.

Not much space is left for discussion of aerials, but for amateur use any aerial suitable for the UHF band required will be sufficient. For broadcasting purposes, American engineers seem to have settled on horizontal polarisation which, they claim, has the advantage of better signal/noise pickup ratio. A low angle field uniformly radiated in a horizontal direction is desired, and whilst this is easily done with vertical polarisation by using a vertical aerial with each half wave in phase, it is not so simple for horizontal polarisation. The usual horizontal aerial, at these frequencies, is markedly directional. Two horizontal types have been evolved. The one that is coming into use now is the doughnut which is simply a circular loop laid flat. The directional properties of a vertical loop are well known, but when it is mounted horizontally it gives uniform radiation in all horizontal directions. A

number of loops may be mounted above each other to concentrate the radiation at low angle.

The older form is the turnstile, two half wave doublets being mounted 90 degrees apart and excited 90 degrees out of phase. This causes the field of one of them to fill in the hollows of the other and so a uniform horizontal field is produced. This type may also be of interest to amateurs for use on the lower frequency band. A number of these may also be stacked one above the other to increase the low angle radiation.

For reception, if only one or two directions are required, a simple half wave aerial will do, but if omnidirectional reception is required, a doughnut or turnstile will be needed. Of course a rotary beam would be the ideal pick-up source. In fact the best arrangement, for lazy people, would be a beam which would be controlled by the received signal strength and would rotate until the maximum signal was being received.

FOR SALE, EXCHANGE, WANTED

9d. per line, minimum 2/-.

FOR SALE.—Amplion genemotor, 32 volt input, 500 volt, 150 milliamp output. Perfect order. Apply VK3JA, Nullawarre, Victoria.

FOR SALE.—Bliley 465Kc Xtal mtd, £4; 2 genuine Hammarlund variable selectivity 465Kc IF transformers, litz wound, air-tuned, £3 pair; 2 Hammarlund type litz wound air-tuned 465Kc IF transformers, 30/- pair; Eddystone 465Kc BFO unit, 12/6; Crown 1939 model 3 gang dual-wave coil unit complete with 3 gang condenser, unused, £2; National Velvet Vernier Dial, 30/-; BTH pick-up, 35/-; Rola G12 speaker, 32 volt DC field, 7000 ohms input, £5; D104 Xtal mike, £4; Ferranti AF3 audio transformer, £1; Ferranti AF5 CC push-pull plates to PP Grids audio transformer, 30/-; Ferranti 3-inch moving iron 0-100 volts AC meter, 30/-; do 0-7.5 volts AC, 30/-; Weston 0-1.5 amps RF 3-inch thermoammeter, 75/-; Triplett 0-1 Ma 3-inch meter, £2; Weston 3-inch multiscale meter for volts, milliamps and ohms 1 Ma movement, £3; 2 Weston 250 Ma 3-inch meters, 45/- each; 2 Weston 150 Ma 2-inch meters, 35/- each; University 2½-inch 0-5 Ma meter, new, 50/-; 2 801 tubes, 50/- pair; All parts guaranteed good order and condition. B. R. Mann, Quambatook, Victoria.

CORRESPONDENCE

Correspondents are requested to keep their letters short and to the point. The Editor reserves the right to delete anything he may think fit. The views expressed by correspondents are not necessarily those of the proprietors.

Labuan Island.

Editor "AR."

For your information the call sign of this station is now VS3JH and not VS5JH as previously. The QTH remains the same, Sgt. Hunt, J. A., c/o HQ. B.M.A., Labuan Island, North Borneo.

Amateurs in this area are now licenced for ten with 50 watts input, and as far as I can see I am the only Ham to take advantage of this.

I would appreciate it if you would make it known to VK's through the Magazine, that some delay with QSL cards from here is likely. I have an enormous amount of cards to hand and now I cannot cope with them. I have managed so far to keep more or less clear but it seems very unlikely that I can keep it up for long.

The first copy of your magazine (March issue) arrived to-day although I have been a member since last October. Doubtless due to the poor mail facilities these days.

Yours etc.,

JOHN A. HUNT, VS3JH.

AMATEUR RADIO

JULY 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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

AMATEUR RADIO

VOL. 14 JULY, 1946 No. 7

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.
Editor:
T. D. HOGAN, VK3HX
Phone: UM 1732
Technical Editor:
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Distribution:
H. N. STEVENS, VK3JO
Business Manager:
J .G. MARSLAND, VK3NY
Advertising Representative:
W. J. LEWIS
20 Queen St., Melbourne, C.1.
Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.
Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

The AUSTRALIAN AMATEUR is now permitted to use part of the 7 Mc and part of the 14 Mc band.

The allocated frequencies are :—

7150 Kc --- 7200 Kc

14100 Kc --- 14300 Kc

The use of these frequencies became effective on the 1st July, at 3 p.m.

IN THIS ISSUE

CLEARING THE ETHER, SERIES II, Part III

*By G. GLOVER, VK3AG.

This part deals, with the Operation of T.P.T.G. Oscillator, and faults likely to be encountered with same. Principles underlying the Construction of a modern transmitter. Electrical design features of one type of Basic Frequency Generator, with universal application.

OPERATION AND CONSTRUCTION OF TRANSMITTERS.

In preceding sections the author dealt with problems associated with circuit components. In this section he proposes to deal with practical applications. In all probability the reader became weary of what might appear to be unnecessary stress laid upon simple points; however, as trifles make perfection, and it is usually the accumulation of these little trifles which constitute the big problem, it is not as unnecessary as first thoughts would indicate.

Before proceeding to describe the construction and operation of a modern transmitter, it would not be out of place to describe the actual tuning procedure employed with one of the oscillators detailed in previous section, and outline some of the faults which occur and the symptoms thereof.

Tuning Procedure for T.P.T.G. Oscillators.—The correct tuning of this outfit is as easy as falling off the proverbial log. If the following instructions are carried out.

Disconnect aerial feeders, set grid-leak at maximum (if variable unit employed), anode "tank" tuning capacitor as near desired frequency as can be "Guesstimated" from known inductance and circuit loading factors. Apply reduced value of H.T. to anode, and be ready at all times to take your foot off the key in the event of an excessive rush of current.

Now rotate the grid capacitor until the anode current "dips" to minimum value, then INCREASE the capacity slowly, watching the needle of meter carefully. Current indicated will increase slowly at first, then when certain point is reached, the increase becomes very rapid. At this point REVERSE the rotation of the dial until it moves just beyond the point of rapid increase. Now leave it there. The general tendency is to leave grid circuit tuned too near the resonant frequency of the anode circuit. Result: Oscillator either refuses to start or signals are "chirpy."

Next take your absorption frequency meter, more generally referred to as a wavemeter. What! you haven't got one? This simply goes to prove the writer's introductory remarks, about putting the cart before the horse. In any case, it is advisable to obtain, or build and calibrate, an absorption type meter before proceeding further. One cannot afford to be without such an indispensable piece of apparatus. Various types will be described in a later section.

To proceed with the good work. Place the meter just far enough within the electro-magnetic field of the anode tank to get reliable indication, and measure frequency. Readjust anode tank and repeat tuning operations until the desired frequency is achieved.

The next problem is to connect the aerial feeders and increase the anode voltage. Naturally both alterations are going to affect the frequency. The factors controlling change in frequency due to connection of aerial feeders are, nature of reactive load reflected, and tightness of coupling between the tank and aerial coils. Where it is desired that the aerial feeders should reflect only resistive load, then an artificial load of desired resistance should be shunted across the aerial coupling coil, and the coupling of the latter to the anode tank coil adjusted until desired output is achieved before attaching feeders. Under these conditions, when the feeders are connected and adjusted correctly, there should be no change in the frequency, and the anode meter should register exactly the same current as when dummy load was connected.

When the aerial system employed contains reactive components, the anode tank capacitor must be readjusted to compensate for same; therefore, it is important to note that the Frequency Meter should be constantly applied after each change in adjustment or loading. Beware of over-coupling the aerial to a self-controlled oscillator, because "double wave emission" will result. Go outside and check the feeders, for single resonance indication after all other operations have been completed.

The Amateur who does not wish to go to the expense of an r.f. meter for the aerial circuit, can employ pealamps as indicators while adjusting the feeders. For best results pealamps should be short-circuited by a loop of wire, the loop size being chosen so that lamps are very dim, under these conditions small changes of current are easily perceptible. Where currents to be measured are too small to illuminate the lamp unaided, a low subsidiary voltage, furnished by battery or A.C. source, may be applied to the lamp via potentioneter and r.f. chokes. The voltage applied should only be sufficient to enable dim indications to be given when the r.f. is applied.

Where a variable grid leak is employed it will be found on reducing the value, that a point is reached where the anode current increases out of all proportion to the aerial current. At this point rotation of knob should be reversed until point is reached, where ratio of input to output is at its most efficient value.

FAULTS.

The following examples of typical faults likely to be encountered with this type of oscillator, and the cause thereof, may be of some assistance when trouble-shooting.

Broad Wave.—Caused by coupling aerial too tightly. Damping due to, modulation (harsh note), poor r.f. choke, high r.f. resistance in circuit, etc.

Wobbulation or Instability.—Due to vibration of coils, r.f. choke, wiring, etc. Input power variation, or overloading. Aerial feeders swinging violently.

Chirping or Breaking.—Due to over-excitation. Aerial coupling too tight. Loose contact.

Harsh Note.—Incorrect excitation or adjustment. Placement of filament centre-tap. Poor filtration.

Double Wave.—Caused by aerial coupling being too tight, sometimes indicated by flickering aerial current.

Excessive Anode Current.—Anode voltage too high. Tube not oscillating. Value of grid-leak insufficient. Aerial coupling too tight.

High Grid Current.—Aerial coupling too loose. Feeders out of tune. Value of grid-leak insufficient.

Creeping.—Due to heating of overloaded tube or grid-leak. Inductance capacitor, r.f. choke, etc., heating.

CONSTRUCTION AND OPERATION OF MODERN TRANSMITTER.

The first point which has to be considered is the overall design of the whole set up. Bread-board, Standard Relay Rack, Cabinet, or Console. Which is it to be?

*Glorad Engineering Services.

The Bread-board set up is definitely the most efficient and accessible for experimentation with an individual unit, but represents very poor space economy for the entire set up.

The Standard Relay Rack represents a good compromise between the bread-board and cabinet set-ups, and has the advantage that standardized units and assemblies can be readily interchanged.

The Cabinet provides means of dust-proofing and fool-proofing the equipment, but is more costly. However, the cost is offset by the fact that a well-designed and constructed cabinet can be employed by the Flat-dweller, whose activities are restricted to the Living Room, without offending the most critical housewife.

The Console represents the ideal method of construction for the "Ham," who is only interested in "Brass-Pounding" or "Drooling into the Mike," while seated at a beautiful piece of furniture located in the luxurious surroundings of the Lounge, but hardly meets the requirements of the true experimenter. The latter may experience all the thrills of lounging while operating, by employing a small consolette, housing remote control equipment to operate the main rig.

The writer has evolved a system which combines all the best features of the Rack and Cabinet systems. It consists of employing a Standard Relay Rack enclosed in "Frameless" Cabinet, so constructed as to enable modifications of size to suit height and number of racks employed.

The next point to be considered is the "Scope" of the set-up. To be completely modern it must be capable of expansion, unit by unit, until the final goal is achieved. As the true experimenter does not recognise a "finite goal," the rig must be capable of endless expansion.

By suitable switching and patching it should be capable of:—

(a) Transmitting telegraphic and telephonic intelligence on all frequencies, present and anticipated, in the H.F., V.H.F., and U.H.F. spectrums.
(b) Certain units should be adaptable for use in Frequency Modulation, Facsimile, Television and Pulse transmission experiments.
(c) Provision should be made for the inclusion of S.H.F. or Micro-Wave Technique.

Quite a tall order you will admit; but nevertheless possible. Naturally only certain units are common to the requirements of (a), (b) and (c), but switching and patching can work wonders.

Another very important point is "Economics." Our design must make provision for:—

(i) Expansion to meet requirements of "A" and "B" Licencee.
(ii) Expansion at a rate determined by the depth of user's purse.
(iii) Experimentation and communication with interim equipment.
(iv) Changes of set up at minimum cost.
(v) Avoidance of waste, due to necessity for discarding units as equipment grows.

The answer to all this is, simple subdivided, plug-in, units of universal design and application, such as will be described in succeeding sub-sections.

Last but not least of the major considerations is "Standardization." While many Amateurs are already using Rack and Panel outfits, in many cases the racks are made of wood or, incompletely and incorrectly drilled, and of non-standard dimensions. The same applies to panel sizes.

By using equipment of standard dimensions one is able to readily interchange units, and obtain standard "Blanks" drilled and punched to suit individual requirements. The writer cannot stress too strongly the advisability of "Standardizing." The standard width of panels is (19 in.) nineteen inches, and the height progresses in one and three-quarter inch (1¾ in.) units, as indicated in Table hereunder:—

No. of Units.	Size.	No. of Units.	Size.
1	1¾ in.	7	12¼ in.
2	3½ in.	8	14 in.
3	5¼ in.	9	15¾ in.
4	7 in.	10	17½ in.
5	8¾ in.	11	19¼ in.
6	10½ in.	12	21 in.

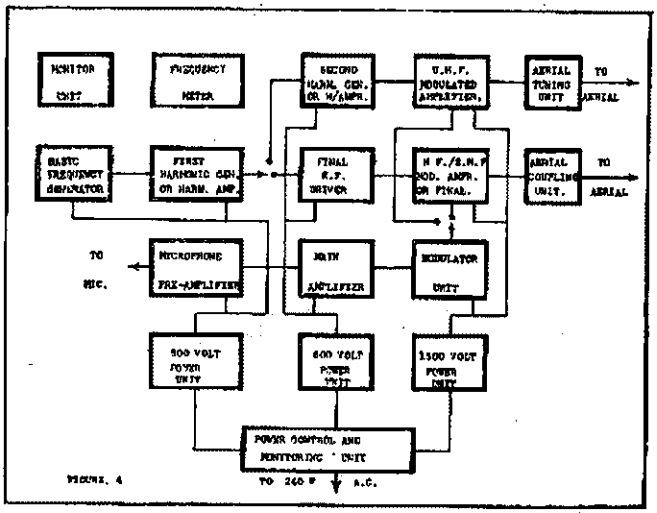

FIGURE 4

Figure 4 is block schematic covering operation (a) and is the basis for discussion in the succeeding sub-sections.

Now to break the circuit down into units in their correct order of priority, commencing with the "Basic Frequency Generator."

Basic Frequency Generator or B.F.G.—The major requirements of such a unit are:—

(i) Stability.
(ii) Frequency Coverage.
(iii) Spot Frequencies.
(iv) Compactness.
(v) Minimization of Controls.

Stability (i).—Yes, this is definitely the major feature required of the B.F.G., for without it the whole system is N.B.G. Stability calls for rugged components and construction. Furthermore, it demands constant loading and temperature, also frequency elements unaffected by external influence.

A preceding section covered various types of oscillators and outlined their advantages and disadvantages. Any one of these oscillator circuits may be employed to satisfy (i). The actual form taken by the components, and the lay-out is the problem we are confronted with here; plus one additional problem, that of maintaining constant loading. This is most easily accomplished by employing a "Buffer Amplifier," operated in the Class "A" region. Hence our unit consists of two valves, the actual oscillator, and its associated buffer.

Frequency Coverage (ii).—With the expansion of "Ham" activity into higher and higher frequencies, changes of bands brought about by International Conventions, necessity for providing emergency frequencies, and other contingencies, a wide frequency coverage is demanded. Hence, the B.F.G. must be capable of generating a range of basic frequencies wide enough to permit, "Harmonic Generators" or "Harmonic Amplifiers" employed, to provide final frequency required. Experi-

ence indicates that V.F.O. tunable from 1.5 to 2 Mc. will meet all requirements, and provide for emergency operation in this band.

The reader will no doubt recall that the writer stated earlier that the E.C.O. circuit represented an excellent method of achieving flexibility. Hence it has been chosen for the B.F.G. under discussion.

Spot Frequencies (iii).—It is desirable to have available certain frequencies to which we can switch readily. From time to time circuits have appeared whereby this could be achieved by employing a special unit located on the operating table. At the conclusion of this series of articles, the writer proposes to publish a separate paper outlining a modern remote controlled system, for the present it is his intention to deal only with the more conservative type of manually operated unit. With either system the best method of achieving spot frequencies is by using Piezo-Electric Crystals. Where crystals are not available "Fixed-Tuned L.C. Circuits" may be employed.

Compactness (iv).—In order to maintain the highest degree of space economy, reduce distributed reactances and circuit losses to a minimum, and minimize overall weight, it is necessary to keep all components as small as is consistent with the requirements of power, insulation, efficiency and stability.

Minimization of Control (v).—If quick changes of operating frequency are to be made, controls must be reduced to an absolute minimum. This is best achieved by employing ganged controls, or spot frequencies, in conjunction with band-pass and untuned stages where practicable.

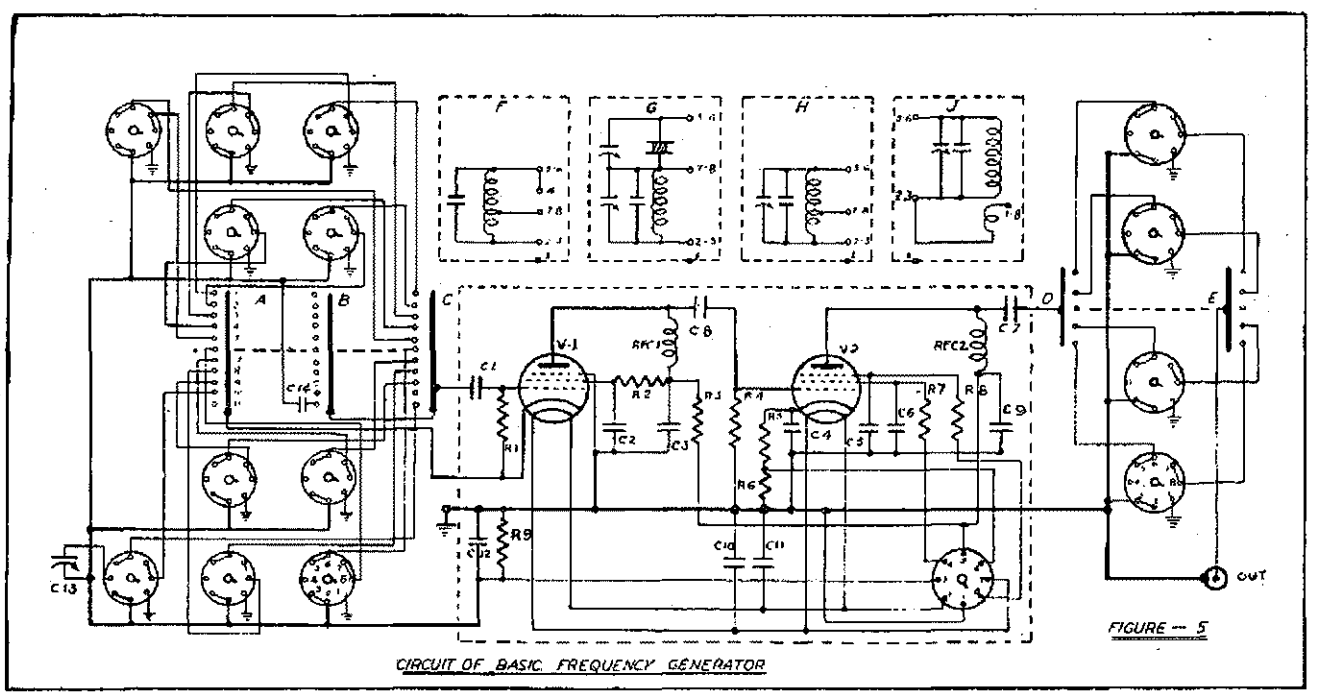

FIGURE — 5

CIRCUIT OF BASIC FREQUENCY GENERATOR

CIRCUIT.

Figure 5 depicts circuit B.F.G. The section within the dotted lines represents the "valve section," and contains the unvariable components associated with the operation of the valves.

Some Electrical Aspects of the Valve Section:—

(a) The R/C combination in the grid circuit of the oscillator provides necessary operating bias, and at the same time the resistor eliminates the necessity for r.f. choke, and ensures continuity of grid circuit at all times.

(b) As the drive available to the Class "A" buffer amplifier is quite sufficient without the necessity of tuning the input circuit, the circuit is simplified by eliminating the third set of tuning elements. Furthermore, the fact that the input to the buffer is untuned serves yet another purpose, that is, the fact that input is not sharply peaked reduces effect on oscillator when the suppressor circuit of buffer amplifier is keyed.

(c) It has been previously stated that, in order to secure maximum stability it is essential to offer constant loading to the oscillator circuit. However, we are faced with certain complications if we desire to use (BK), break-in operation to you, because we cannot tolerate strong signal from the oscillator swamping the receiver. Many Hams "Key" the oscillator for this reason, and stability suffers as a consequence. The alternative is to let the oscillator run, and key a succeeding stage. This means that the oscillator must be carefully shielded and filtered. Furthermore, keying must take place before the level of output has reached a value, which would be beyond the suppressive capabilities of normal shielding and filtering. The obvious choice is the buffer amplifiers; but if we operate or key this valve in such a manner as to change the loading on the oscillator, instability results.

Our circuit represents the best compromise possible, that is, a penthode valve is used as an electron-coupled oscillator, thus providing a certain amount of isolation between the frequency determining circuit, and the buffer stage. The untuned nature of the buffer grid circuit still further reduces reaction, and the use of suppressor control ensures minimum reaction due to changes in valve parameters during keying. Suppressor keying also provides smooth signals, particularly if the correct "thump" filter is employed to give desired wave front.

(d) Both tubes are of the receiving type, hence when crystal-control is employed, very little load is placed on the "rock."

(e) Small resistors in series with cathode of each tube

(Continued on Page 26)

DIRECT DISC RECORDING

PART III——THE TRAVERSING MECHANISM.

(Based on a Lecture delivered to the Sound Recording Institute of Australia by Mr. R. Kinley.)

Part II of this series was devoted to the choice of the first mechanical element of a disc-recording plant, namely, the turntable and its driving system, and it is proposed here to review the associated equipment which serves to draw the cutting head radially across the surface of the disc and thereby generate the well-known spiral track. As was mentioned earlier, the mechanical aspect of a recording machine is very similar to the engineer's screw-cutting lathe, and the similarity will become even more apparent when we examine the action of the cutting head and stylus.

Commercial gramophone records operating at 78 r.p.m. usually employ a spiral track pitch of about 96 lines per inch, and this enables playing times of about 4 and 3 minutes to be achieved for 12 inch and 10 inch records respectively. Such a groove spacing will permit amplitudes of up to 0.010 inch to be attained, and these are sufficient to operate a wide range of playback pickups and acoustic reproducers. In the case of amateur recording, however, it is probable that such a variety of playback devices need not be catered for, and that a lightly-damped electric pickup will invariably be used. It thus becomes possible to produce satisfactory recorded volume levels with smaller amplitudes, provided that the signal-noise ratio (so well-known to "Hams") is sufficiently great. The noise in this instance is "needle scratch," and is due to microscopic variations of a random nature in the surface of the grooves of the record, and which can be kept at very low levels by taking adequate precautions when recording. It is therefore only necessary to maintain amplitudes which will be sufficient to yield a signal which is well above the noise level, and closer groove spacing can be employed, with the attendant advantage of securing a longer playing time per disc.

With slow-speed recording, such as at 33.3 r.p.m., other considerations (which will be considered later) place a limit on the maximum permissable amplitude, and again it will be seen that a closer groove spacing can be adopted with advantage.

Traversing mechanisms for amateur work should therefore be chosen with a view to the ultimate use of the discs produced, and the optimum spacing of the grooves in this regard. Recording practice in various parts of the world has adopted 96, 112, and 120 lines per inch as standard groove pitches, depending upon the subject matter, and in some instances as many as 144 lines per inch have been employed.

Traversing gear for disc recording falls into two main types, depending on whether their mechanism is located above or below the turntable. Their functions are identical, but each has certain preferred features from the point of view of operating convenience.

The first type is that which operates from below the turntable, and is probably the simplest in principle. The cutting head is mounted on an arm similar to the conventional playback pickup, but carries on its pivot shaft, and below the turntable, a sector plate or gear wheel which is driven from the centre spindle by means of a chain of reduction gears. In this way the arm is gradually advanced across the surface of the disc with each revolution of the turntable, and means are provided for de-clutching the gear-train whenever the cutting head is raised. This form of mechanism is finding increased popularity with commercial recording units from overseas, because of its inherent simplicity and ease of operation by the least technically-minded operator. From the point of view of the recordist who may require more versatility in his equipment, however, there are several disadvantages in this arrangement, and it may be as well to review a few of these at this point.

In the first place, the mechanism, while simple in character, is not easily constructed in the home workshop, nor is the use of a lathe much of an advantage in making the gears, etc. Commercial interests who contemplate quantity production of such units are prepared to secure the necessary plant for such purposes, and can then readily produce them at reasonable cost.

From the operating point of view there are other mitigating features, chief of which is the difficulty of varying the rate of feed across the disc. While this is not impossible with this type of unit, it certainly calls for additional refinements which can add greatly to the cost. The desirability of being able to vary the rate of feed and thereby secure different lines per inch of the resulting spiral will be mentioned later, but for the moment it can be accepted that for full versatility, and to a certain extent for economy in disc consumption, it is a desirable feature.

The second type of traversing mechanism, which is by far the most popular with both professional and amateur recordists, employs a lead-screw similar to that of a lathe, and is entirely located above the turntable. In its most usual form, it is arranged to straddle the turntable between mounting posts located on the baseboard, but other arrangements are known where it is placed on one side so as to leave the disc quite clear of mechanism.

The cutting head is mounted on a carriage which can ride on rails across the surface of the disc, and is controlled in this respect by the leadscrew, which is driven through a gear train from either the centre spindle or the turntable rim. In certain cases the carriage rails may be made similar to those on a precision lathe, but in less ambitious set-ups they may be simplified down to a single rod of circular cross-section with sliding sleeves to support the carriage. The criterion in either case is obviously to ensure that the motion is easy-running without binding or undue looseness which could bring about minor irregularities in the spiral track. For convenience in operating, means are usually provided for enabling the motion from the leadscrew to be connected at will to the carriage by means of a half-nut or similar device.

With this type of mechanism, certain refinements which can add to the versatility of the equipment can be more readily introduced than with the first-named type. One of these is a means of reversing the direction of advance of the carriage relative to the motion of the turntable, so that the commencement of the spiral can be located at the outside edge of the disc (Outside-In cutting), or close to the centre (Inside-Out cutting). The relative merits of these alternatives will be discussed later in this series.

Another refinement which is not altogether necessary, but which is often preferred by professional recordists, is a means of providing a rapid-spiral feed. An instance where this may be used can be seen on commercial recordings for the operation of automatic record-changing mechanisms. Another use is when several recorded bands are cut on the same disc and it is desired that they can be reproduced either separately or consecutively. A

distinct break of about 1/8 inch can be readily made between each band if a quick-spiralling feed is provided, so that each can be quickly selected when playing back, while continuous playing across the disc is still possible if so desired. The usual way in which a rapid-spiral feed is obtained is to provide a "free-wheel" or slipping clutch mechanism in the gear train to the leadscrew, which can be advanced by a handwheel to provide rapid feed.

A word should now be added with regard to possible faults in the traversing mechanism in order to provide a guide when designing or selecting a unit. The uniform nature of the spiral in a commercial recording is a noteworthy feature to be remembered by all who would undertake this work for themselves, and it is in this respect that the first and most common fault in traversing mechanisms is found. Irregularities in the rate of feed bring about irregularities in the spacing of consecutive grooves, and this fault is generally spoken of as "Twinning." Should it be periodic in character, and occurring only at evenly spaced intervals, it is sometimes known as "Banding." In either case it is a mechanical fault in the system which requires to be eliminated before satisfactory recording is possible, as the effect is to seriously limit the peak amplitudes of the signal which can be engraved without cutting over to the adjacent grooves. Such a limitation can also impair the resulting signal-noise ratio during subsequent reproduction. Causes can be either faulty design or workmanship, or poor adjustment. It must be remembered that the mechanism must move freely but without undue slackness, and it is wise to make all bearings and sliding surfaces adjustable in this respect. It will be found that leadscrews are best mounted between ball or pointed centres, rather than in sleeve bearings which require considerable precision in their manufacture in order to be satisfactory.

Minor variations in the pitch of the leadscrew are inevitable unless it has been precision-ground, and these will be reflected in the resulting spiral on the disc. As a point of practical interest, it has been found preferable to use a leadscrew of rather coarse pitch, and to employ a greater gear reduction from the turntable in order to secure the required spiral groove pitch, rather than to gain the same result with a fine-pitch leadscrew and less gear reduction. The reason for this is twofold. The minor variations when cutting a coarse leadscrew are likely to be a smaller percentage error of the nominal pitch than with a fine pitch, and secondly, the "gear hum" from the reduction gears is likely to be much less with the smaller and more numerous teeth associated with larger gear ratios. Thus for a desired spiral of about 100 lines per inch, it would be preferable to use a gear ratio of 10:1 with a 10 T.P.I. leadscrew, rather than a ratio of 3:1 with a 33.3 T.P.I. leadscrew.

There is one minor disadvantage of a coarse leadscrew however, which should be mentioned in passing, and that is the inability to quickly commence cuttng at any given point on the disc. With a fine screw, the half-nut can be quickly engaged with an appropriate thread because of its comparatively fast rate of rotation, whereas the coarser and slower turning screw will take longer to permit engagement to be made, but it is generally considered that the advantages of a coarse thread far outweigh this disadvantage.

The profile of the leadscrew thread is a matter of some importance also, particularly where the carriage mechanism requires an appreciable force to move it. The familiar Whitworth thread can bring about "twinning" when a half-nut is employed unless a heavy engagement pressure is used. Due to the inclined nature of the thread faces, there is a tendancy for the half-nut to "climb" them and disengage itself if the axial thrust is at all high, and even if absolute disengagement is not brought about, and small "climbing" will introduce "twinning." For this reason, square thread profiles are to be preferred, and the half-nut can be simplified down to a single tongue which can engage with the threads. It is unfortunate that square thread profiles do not lend themselves to precision grinding as readily as do those of a Whitworth nature, and it usually becomes necessary to content oneself with a lathe-cut job. However the observant enquirer will examine carefully the sides of the thread to ensure that no "chatter marks" or other surface irregularities are present to an excessive degree, in which case there should be no cause for apprehension when it is put to work.

In recent years, a number of commercially-built traversing mechanisms which conform fairly well to the specifications given above has appeared on the Australian market, and it is probable that only the most ambitious recordists will prefer to build their own units. However the above remarks will serve as a guide towards the selection of a particular make.

The principal mechanical aspects of a recording machine have now been reviewed, and succeeding articles in this series will be devoted more to the electrical and manipulative sides of the art. Before concluding this chapter, however, a few words should be added regarding the manner in which the cutting head should be attached to the carriage of the traversing mechanism. This will necessarily depend upon the type of cutting head employed, but generally speaking, it must be capable of permitting some movement in a vertical direction to allow for minor variations in the flatness of the disc being recorded. This feature is most conveniently provided by means of a hinged connection between carriage and cutter which can be adjusted to give free motion with the minimum of backlash. The height at which this hinge lies above the record surface is important, and should not be too great, as a tendency for the cutting head to bounce when recording is likely to be then present. Experience shows that best results are obtained for heights not exceeding that of the centre of the cutting head above the disc, although experiment may reveal an optimum position for any particular head.

The residual stylus pressure required for instantaneous recording on Cellulose Nitrate and smilar materials is in the region of 50 to 60 grams, and as the weight of the majority of cutting heads exceeds this figure, it is necessary to provide a means of counterbalancing, either with an adjustable tension spring or a counterweight. The particular choice of the method for so doing is usually determined by the space available for raising the head clear of the disc.

The movement provided by the hinge should be large enough to permit the head to be raised well clear of the disc and enable the ready changing of cutting styli, and for safety, some form of cam-operated device should be included so that the head can be locked in the raised position, and gently lowered into contact with the recording disc.

The angle at which the stylus meets the surface of the disc is important, and as will be been later, is close to 90 degrees. It is necessary therefore to include some form of adjustment in this connection, either by means of a special clamping device, or by providing means of raising or lowering the hinge relative to the record surface. Needless to say, the stylus should also be perpendicular to the disc surface when viewed from the front of the cutting head.

Theoretical considerations show that the stylus should travel along a true radius of the recording disc, but in practice it will be found advantageous to advance it slightly forward of this position in order to cause the thread to throw itself clear of the groove when it is cut, and thus avoid tangling itself round the stylus. The amount of advance varies from 1/8 to 3/8 of an inch, depending on the largest diameter of the disc being recorded.

SOUTH AUSTRALIAN DIVISION

ANNUAL REPORT

Presented to the Annual Meeting of the Wireless Institute of Australia, South Australian Division, 11th June, 1946.

Gentlemen,

It is my privilege and pleasure to present to you tonight a report for the period from the date of the re-formation of the Institute in July last to date. That period has been a momentous one both for the Institute and for Amateur Radio as a whole, for it has seen the former revitalised with an enthusiasm among members which must at least be equal to anything shown in the past. It has also seen the return of the Amateurs of this and many other countries to the air; although to date we have only the use of a few and restricted bands of frequency this may not be an unmixed blessing, in as much as it will have given many the experience of 28 M.Cs. which they would not otherwise have gained. It has shown them that attention to details in both receivers and transmitters is necessary, which was not so essential on the lower frequencies on which they had previously worked. They will find, however, that similar care when they do return to the lower frequencies will pay dividends. The importance of aerials, too, has been more forcibly demonstrated.

Although the amateurs of some countries, notably Great Britain, have returned to the air under much more liberal regulations than in pre-war days, we find that our Government has seen fit to impose on us restrictions which we had not previously suffered, and has entirely debarred us from certain avenues of experimentation, such as frequency modulation, television and pulse transmission. Some of the restrictions, such as the ban on "canned music," meet with the approval of the majority of us, but others including the qualifying age and the two classes of licence do not, and we are, through our Federal Executive, registering our protests in the hope that we may secure alterations which will put us on a footing with the amateurs of countries whose governments have not imposed such restrictive regulations.

I would like to trace very briefly the history of this Division of the Institute from its re-formation. As most of you are aware, the South Australian Division of the Wireless Institute had, during the war years, ceased to function as an organised body, although a few stalwarts kept some contact with Federal Headquarters. This was mainly due to the fact that the vast majority of those amateurs who were not directly serving in the Forces were so fully occupied in work either directly or indirectly connected with the war that they had no time to keep the Institute going. One wartime activity of members of the Institute, if not of the Institute itself, was the formation of an A.R.P. Wireless Communication Network. This, although formed somewhat late in the piece, nevertheless became a very active and efficient organisation with stations at Adelaide, Prospect, Norwood, Thebarton, Unley, Woodville and Glenelg, the headquarters station at Adelaide working on a frequency of 1775 K.C., the outstations on 3605 K.C., carrying out by-weekly tests. These stations were maintained with the personnel of approximately 30. The organisation had as its controller the late Mr. H. W. Harrington, Superintendent of Wireless, and as deputies Mr. Jack De Cure, Radio Inspector, and Mr. E. A. Barbier, our Secretary. Fortunately, like other branches of A.R.P., this one never had to go into action, but it would undoubtedly have given a very good account of itself had it been necessary for it to do so.

Towards the middle of last year, when it was obvious that hostilities were going to end, a number of amateurs considered it was time to get the Institute moving again and a meeting was called for 18th July, which, to the gratification of the sponsors, was attended by about 43 interested people. The meeting was an enthusiastic one, and it was unanimously decided to reform. A committee was appointed and began to work immediately in a spirit of enthusiasm. You will appreciate that they faced a big task. The funds available from pre-war days amounted to 10/3, and practically no stocks of stationery or other requirements were on hand, while accommodation for meetings was at a premium. However, after considerable search a room was secured at 17 Waymouth Street, and a general meeting was held on the 14th of August, with an attendance of about 60, and a council was elected, followed by a lecture on transmission of pictures by radio and wire by Mr. Jack De Cure. The Council held its first meeting on 21st August, at which the various officers were appointed, and as the Council consisted chiefly of members of the original committee they were able to swing into action immediately. Many important items were given priority, such as the establishment of full contact with Federal Headquarters, the appointment of a committee to draw up the constitution, etc., etc. It was, I consider, an outstanding achievement that an A.O.P.C. class with 19 members should have been started only two months after the first general meeting. Since the first meeting in August we have had a general meeting each month, at which a lecturer has been provided, with the exception of the September meeting, when we visited the R.A.A.F. school; December, when we had a most successful Christmas social; and May, when due to the fact that our meeting room was not available we accepted the offer of the Vacuum Oil Company to provide a picture night for us. Since the inaugural meeting our membership has shown a remarkable growth; from 43 who attended that meeting we have grown to a strength of over 200, by the end of May. A feature has been the wonderful attendance at meetings, which reached its peak at the April meeting when, from a total membership at that time of approximately 180, which of course includes country members, we had an attendance of 113. These large attendances have been most welcome and gratifying, but have been almost an embarrassment to the Council in as much as that the room secured for meetings, which it was thought would see us through the first twelve months, soon proved totally inadequate, and we had to look for a larger one. We were fortunate in securing one in the same building, but it looks as if we shall have to ask the owners to buy more chairs and instal elastic sides. However, we still hope to see the attendance grow, and if the time comes when it is necessary, we shall even book the town hall.

I would now like to deal in more detail with some of our activities.

A.O.P.C. Classes.—As I have already mentioned, these were inaugurated within two months of our first meeting, with a roll call of 19. Those 19 members as well as the Council are deeply grateful to Mr. Roy Buckerfield and Mr. Harry Roberts, who conducted the theory and code classes respectively. A number of these students presented themselves for the examination in May. We

understand that the results of the exam. are out, but I am, unfortunately, unable to secure much information as to how our candidates fared, beyond the fact that one member of the class secured 87 per cent. of his theory paper, and will be given an opportunity to retake his code test at the next examination. The second A.O.P.C. class with 16 students is well under way with Mr. Askins conducting the theory and Mr. Roberts again giving code instruction.

Technical Committee.—This was formed early in our activities, and is composed of some of the best technical brains of the Institute. Their help and advice is available to any member who desires it. Members of the committee will welcome any approach either directly or through the Secretary. The committee comprises Messrs. McGrath, Brown, Buckerfield, Wreford and Al. Smyth.

Trade.—Another early move by the Council was an approach to the Trade for price concessions. As a result of this members who hold a station licence are now supplied at dealers' prices, while other members receive a concession of 10 per cent. from the leading houses in the trade. This, I think, is a privilege not previously obtained by the Institute for its members, and one which should be appreciated. While many of our members undoubtedly obtained price concessions in certain quarters in the past, these did not accrue to members generally by virtue of their membership.

Identity Plaques.—These were introduced some months ago and members are finding them very useful in identifying and getting to know one another at meetings Since they are retained between meetings by our membership organiser, members do not arrive at meetings and find that their plaques are in another suit.

Lecturers.—We have been indebted during the period under review to the following for having provided lectures or other interest at our monthly meetings; Messrs. J. De Cure, David Cox, Al Smyth, Morrie Phillips, Merv. Brown, Reg. Davies, John Allen, Mr. Gill (Headmaster, School of Mines, R.A.A.F. School), and the Vacuum Oil Company for a picture night. To each we tender our thanks.

Trophies and Donations.—We are also indebted to the local branch of the I.R.E. for a donation, and to Messrs. Bob Bruce and Frank Miller for offers of trophies for contests. It is hoped to announce details of these at an early date. In arranging these the Council is bearing in mind the advisability of encouraging activity on the ultra-high frequencies. We also place on record our thanks to the Camera Club for granting us the use of a room for Council Meetings.

Experimental Advisory Committee.—This has been formed by the Wireless Branch of the P.M.G.'s Department under the new regulations, and takes the place of the old vigilence committee. Under the chairmanship of a Radio Inspector it comprises three nominees of our Institute and three others appointed by the Superintendent of Wireless. It is felt that some of our members have a wrong idea of this committee, and have some distrust of those of our members who serve on it. The view to take is that the committee is working in the interests of amateurs as a whole, and not as a watchdog for the Department. We should all, as decent citizens, be prepared to abide by the regulations which

govern us, even if we do not entirely agree with them all. It is in the interests of us all that only signals of decent quality and subject matter should be permitted to go on the air, and we should be prepared to assist in suppressing poor signals or doubtful subject matter. There is so much listening on short wave by the general public in these days that a few irresponsibles could quite easily give a bad name to all amateurs. On the other hand, if any of us should unwittingly put out a poor signal, or otherwise contravene the regulations, it is much nicer to receive a tip from the advisory committee than an official notice from the Department. The feeling should be that the committee is there to assist and advise us if necessary, and we should look on it as a friendly body and not as an espionage system. At present the committee consists of Mr. Cec. Pike (Chairman, Messrs. Warwick Parsons, Launce Deane, and E. A. Barbier — Institute nominees — and Messrs. Ralph Turner and A. L. Saunders—non-W.I.A. Members.

Ionospheric Charts.—The Council some time ago arranged with the C.S.I.R. to send up these their monthly bulletins, and we now receive them regularly. We are deeply grateful to Mr. John Allen for interpeting these for us, and we have made a start on having them published regularly in our notes in the press. The Council trusts that members will find this service useful as an aid to determining the possibilities of D.X. They will become even more useful when the lower frequency bands are returned to us.

Constitution.—This has been drafted and under review for some months, and will be submitted to you to-night for approval. Much thought and a considerable amount of work has gone into this, and it is hoped that it will be accepted in the form in which it will be presented.

Incorporation.—It has been my ambition to see this annual meeting as that of an incorporated body, and we have been working to that end. However, it was decided that the Federal Convention should discuss the adoption of a standard constitution for all divisions, and we feel in view of this that it would be foolish to push on with our incorporation only to have to alter our constitution in a few months. This would cost money, and we have therefore decided to withhold incorporation until we have seen whether unanimity can be achieved throughout all divisions. We feel that there should be a common constitution, and that membership of one division should be in all respects on the same footing as all other divisions. The Convention decided that each division should examine the subject, and we feel, therefore, reluctantly compelled to defer the matter of our incorporation until we know the views of other divisions.

Magazine.—Our official organ, "Amateur Radio," is now being received regularly by all financial members at no cost beyond their annual subscription. I think you will agree that for an all-amateur effort it is worthy of the very highest praise. We offer our thanks to the energetic committee for producing it and to the Victorian division for sponsoring it and bearing a financial loss thereby over a number of years. I have made regular appeals at monthly meetings for articles suitable for publication in this paper, but regret that up to date the response has not been overwhelming. I do again appeal to any and all members who can do so to support the committee with articles and other matter suitable for publication. I record the Council's appreciation of Mr. Frank Wreford's efforts in contributing the monthly notes from this division, and I think we can claim that they will stand comparison with those from any other division.

Federal Executive.—I desire to express to the members of the Federal Executive our appreciation of their work on our behalf. We know that they have been left with a legacy of work as a result of the recent Federal Convention, but it is our hope and trust that they will carry the various matters entrusted to them to a successful conclusion. They are assured of our continued and fullest support. When in Melbourne last week I had the pleasure of meeting the majority of the members of this executive, and I can assure you that in them we have a live and enthusiastic body who will energetically carry out the instructions of the divisions, which, as they realise, is their main function. Our worthy Secretary has been appointed as our representative to the Federal Council.

Convention.—I think most of you are aware that the Federal Convention was held in Melbourne over the Easter period, and we were fortunate to be so ably represented by Mr. Barbier. As he is due to give you his own report later in the evening I do not intend to go into details on this subject, but would like to thank him for having represented us so well, and to say from the report which he has already presented to Council that we may expect a lot of good things as the outcome.

Instrument Library.—It is the aim of the Council to establish as soon as funds and facilities are available a library of instruments which will be of use to members. I am pleased to inform you that the first instalment of this is already purchased—a reliable frequency meter, of well-known American make, and from this it is anticipated that members will be able to obtain calibrations for their own meters to an accuracy of 1 K.C. or better. The instrument has just come to hand, and we expect to make a further announcement at an early date.

General.—During the period covered by this report the Institute has lost by death two old friends. The first was our late member Al Reimann, VK5JO, who held various offices and took an active interest in the Institute over a number of years, and was a regular attendant at meetings from the time we reformed to the

(Continued on Page 26)

NEW TUBES

From Amalgamated Wireless Valve Company comes the news that supplies of the new locally made miniature 1.4 volt valves, types **1R5, 1S4, 1T4, 3Q4** (see footnote) and **3S4**, together with the range of single ended A.C. types **6SA7-GT, 6SF7-GT, 6SJ7-GT, 6SQ7-GT,** and **6SK7-GT** are expected to be available almost immediately. From another source it is learned that high quality sockets for the miniature tubes are shortly expected to be available in all States.

A.W.V. advises that the American Fire Underwriters have refused to approve type 3Q4 for use in battery/mains receivers, owing to the special pin connections with two pins connected to the plate, which if the valve was inserted in the wrong socket, might be dangerous to the user. As a result, R.C.A. have announced type 3V4 which is electrically similar to the 3Q4, but has different pin connections. Local production will therefore change over to type 3V4, and type 3Q4 will be deleted.

RADIOTRON 7193 (2C22)

Radiotron 7193 (2C22) is an Australian made VHF triode with the plate and grid connections brought out through the top of the bulb.

It is capable of being used as an oscillator or amplifier at frequencies as high as 300 Mc/s. Physically it is slightly smaller than type 1A7-GT, but it may be used on plate voltages of 300 volts (CCS) and 500 volts (ICAS) with a plate dissipation of 3.3 watts for both ratings. A useful output is obtained up to about 250 Mc., whilst the resonant frequency of the input circuit is 235 Mc.

RADIOTRON 7193 (2C22) CHARACTERISTICS

***Heater, Coated unipotential cathode—**	
Voltage (A.C. or D.C.)	**6.3**
Amperes	**0.3**
†Direct interelectrode capacitances—	
Gride to Plate	3.6 uufd.
Grid to Cathode	2.2 uufd.
Plate to Cathode	0.7 uufd.
Overall Length	3-1/8 inches
Seated Height	2-9/16 inches
Maximum Diameter	1-5/16 inches
Bulb	T9
Caps (two)	Skirted Miniature
Base	Intermediate Shell Octal 8 Pin
Pin 1	No Connection
Pin 2	Heater
Pin 3	No Connection
Pin 4	No Connection
Pin 5	No Connection
Pin 6	No Connection
Pin 7	Heater
Pin 8	Cathode
Cap above Pins 1 and 8	Plate
Cap above Pins 4 and 5	Grid
Mounting Position	Any

CHARACTERISTICS TYPE 7193 (2C22) AS AMPLIFIER

‡Plate Voltage	300 max. Volts
Plate Dissipation	3.3 max. Watts
AS CLASS A1 AMPLIFIER	
Plate Voltage	300 Volts
§Grid Voltage	—10.5 Volts
Amplification Factor	20

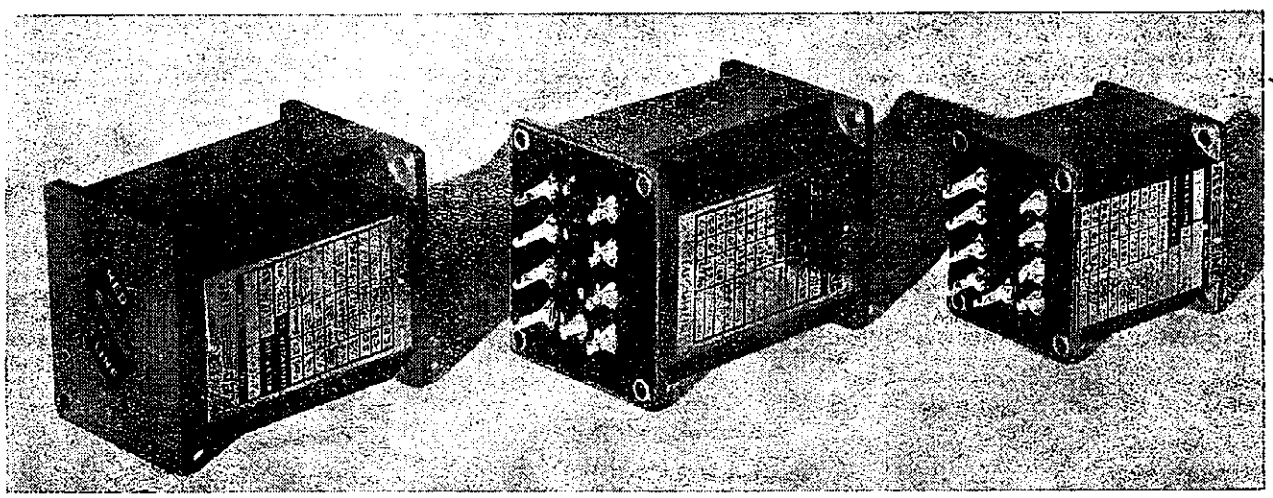

Plate Resistance	6,600 Ohms
Transconductance	3,000 Umhos
Plate Current	11 m.a.

*In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode must be kept as low as possible.

†With no external shield.

‡This value is for Continuous Commercial Service (CCS). In intermittent Commercial and Amateur Service (ICAS) the plate voltage may be as high as 500 volts max., but the maximum plate dissipation remains unchanged.

§Under maximum rated conditions the resistance in the grid circuit should not exceed 1 megohm.

The approximate resonant frequency of the input (grid-cathode) circuit is 335 Mc.

RADIOTRON TYPE AV11, HIGH VOLTAGE RECTIFIER

Radiotron type AV11 is a special war-time emergency type of high voltage rectifier with higher current carrying capacity than any other in its group.

Although manufacture has been discontinued large stocks are at present held.

REVISED RATINGS TYPE AV11

Filament Voltage	2.5 Volts
Filament Current	1.75 Amps.
Maximum Overall Length	5¾ Inches
Maximum Diameter	2-1/16 Inches
Bulb	ST16
Base	Medium 4 Pin
Pin 1	Filament
Pin 2	No Connection
Pin 3	No Connection
Pin 4	Filament
Cap	Plate

MAXIMUM RATINGS

Peak Inverse Voltage	12,500 volts
Peak Plate Current	200 m.a.
Average Plate Current (D.C.)	20 m.a.

HYTRON TYPE 2E30

Miniature Instant-Heating Beam Tetrode
(Development Type HD59)

The Hytron type 2E30 is a filamentary type of beam tetrode designed for use in higher frequency mobile equipment as a Class A1 audio frequency amplifier, Class AB2 modulator, Class C oscillator, neutralised Class C amplifier, and Class C frequency multiplier in those applications where it is desired to eliminate filament drain during standby period. The oxide coated filament of the 2E30 comes to operating temperature in approximately one second.

Tentative Data

GENERAL CHARACTERISTICS

*Filament	Oxide coated
Potential A.C. or D.C.	6 volts + or — 10%
Current	0.7 amperes
Transconductance for Ib = 40 m.a.	3400 umhos
Amplification factor G1 to G2	6.8
Direct interelectrode cap. (without external shield):	
Grid to plate	0.5 max. uufd.
Input	10 uufd.
Output	4.5 uufd.
Maximum overall length	2-5/8 inch
Effective bulb length (hold-down height)	2-3/32 inch
Maximum diameter	3/4 inch
Bulb	T-5½
Base	miniature button 7-pin
Mounting position	filament plane must be vertical

Beam plates should be connected directly to ground or filament centre tap. In VHF circuits the centre tap should be by-passed to or grounded to a common point to provide lowest effective filament inductance.

A.F. POWER AMPLIFIER—CLASS A1

Maximum Ratings, Design-Centre Values

D.C. plate potential	250	max.	volts
D.C. screen grid potential	250	max.	volts
D.C. plate input power	10	max.	watts
D.C. screen grid input power (max. signal)	2.5	max.	watts
Plate dissipation	10	max.	watts
Typical Operation—Average Characteristics			
A.C. filament potential**	6.0		volts
D.C. plate potential	250		volts
D.C. screen grid potential	250		volts
D.C. control grid potential† (a)	—21		volts
(c)	450		ohms
Peak A.F. control grid potent.	17		volts
Zero signal D.C. plate current	40		m.a.
Max. signal D.C. plate current	44		m.a.
Zero sig. D.C. screen current	3		m.a.
Max. sig. D.C. screen current	9		m.a.
Load resistance	4,500		ohms
Max. signal plate power output	4		watts
Harmonic distortion	10%		

R.F. POWER AMPLIFIER AND OSCILLATOR CLASS C TELEGRAPHY AND FREQUENCY MODULATION

Key down conditions per tube without amplitude mod.

Maximum Ratings, Absolute Values			
D.C. plate potential	250	max.	volts
D.C. screen grid potential	250	max.	volts
D.C. control grid potential	—150	max.	volts
Control grid resistor	100,000	max.	ohms
D.C. plate current	60	max.	m.a.
D.C. control grid current	3	max.	m.a.
D.C. plate input power	15	max.	watts
D.C. screen grid input power	2.5	max.	watts
Plate dissipation	10	max.	watts
Typical Operation—Class C Oscillator—Average Characteristics			
D.C. plate potential	250		volts
D.C. screen grid potential	250		volts
D.C. control grid potential† (a)	—60		volts
(b)	75,000		ohms
Peak R.F. control grid potent.	85		volts
D.C. plate current	55		m.a.
D.C. screen grid current	9		m.a.
D.C. control grid current	0.8		m.a.
Control grid driving power (including bias loss)	0.07	approx.	watts
Power output (useful)	7.5	approx.	watts
Typical Operation—Class C Doubler (40 to 80 Mc.)			
D.C. plate potential	250		volts
D.C. screen grid potential	250		volts
D.C. control grid potential† (a)	—80		volts
(b)	100,000		ohms
Peak R.F. control grid potent.	105		volts
D.C. plate current	55		m.a.
D.C. screen grid current	8		m.a.
D.C. control grid current	0.8		m.a.
Control grid driving power (including bias loss)	0.1	approx.	watts
Power output (useful)	4.5	approx.	watts
Typical Operation—Class C Doubler (80 to 160 Mc.)			
D.C. plate potential	250		volts
D.C. screen grid potential	140		volts
D.C. control grid potential† (a)	—125		volts
(b)	70,000		ohms
Peak R.F. control grid potent.	165		volts
D.C. plate current	45		m.a.
D.C. screen grid current	5		m.a.
D.C. control grid current	1.8		m.a.
Control grid driving power (including bias loss)	0.3	approx.	watts
Power output (useful)	3	approx.	watts

NOTES

* Switching of the filament with plate and screen potentials applied may result in damage to the 2E30.

(Continued on Page 25)

PROPAGATION PREDICTIONS FOR JULY.

The following predictions for the month of July are condensed from the Radio Propagation Bulletin (A.R.P.C. A19), published by the Radio Research Board for the Australian Radio Propagation Committee. Copies of the Bulletin are available from all newsagents and booksellers. Enquiries regarding any of the publications issued by the Committee should be addressed to the Secretary, Australian Radio Propagation Committee, Radio Research Board, University of Sydney, N.S.W.

Zone E.—Latitude 10 degrees South—(Nth Queensland, Northern Territory, Nth. Western Australia):—

28 Mc. is useable for skip distances of 2,500 miles, from 0800 to 1600 hours, local time at point of reflection. These predictions are made with the understanding that the reflection point is in Zone E between latitude 5 degrees South and latitude 15 degrees South.

Zone E covers all the area contained between longitude 30 degrees East and 180 degrees East. This includes Australia, Asia (including the Netherlands Indies, Thailand, Malaya, Burma, China, Japan, The U.S.S.R., India, and portion of Arabia).

Zone E—Latitude 20 degrees South—(Southern Queensland, New South Wales, South Australia, Western Australia):—

Between 0930 and 1600 hours local time at point of reflection 28 Mc. should be useable for skip of 2,500 miles. For shorter skip distances (1,800-2,000 miles) 28 Mc. is useable between 1030 and 1500 hours.

Reflection point should be in Zone E between latitude 15 degrees South and 25 degrees South.

Zone E.—Latitude 30 degrees South—(Victoria, Southern New South Wales, Southern South Australia, and Southern Western Australia):—

Conditions on 28 Mc. in this Zone appear to be deteriorating rapidly. According to the chart published in the Bulletin the maximum useable frequency is 27 Mc. This may explain the reports from Amateurs in New South Wales that a decline on 28 Mc. has set in.

Zone E.—Latitude 40 degrees South—(Tasmania):—

Conditions in this Zone are not conducive to long distance working. The maximum useable frequency given is 24 Mc. which is 2 Mc. lower than last month.

Generally speaking it appears that 28 Mc. is gradually becoming less suitable for DX working, and possibly before long will suffer a complete fadeout.

IN REVIEW

This month sees the welcome re-appearance of an old friend in its new post-war dress, I refer to the popular Amalgamated Wireless Valve Company's publication "Radiotronics." This publication has been vastly improved and is now more comprehensive than ever. An indication of the service that subscribers to "Radiotronics" can expect can be had from the introductory paragraphs to this issue (No. 117). Quote "The last issue of 'Radiotronics' was in September/October 1941, but we are happy once more to greet our readers and hope that from now on the issues of 'Radiotronics' will continue regularly and will prove even more interesting.

"During the past few months, pending the re-introduction of 'Radiotronics' in its proper form, four issues of a small four-page 'Radiotronics Digest' have been made. Some technical data were given in addition to matters of general sales interest, but these were intended only to bridge the gap until circumstances permitted the resumption of 'Radiotronics'.

"Opportunity has been taken to re-arrange the material in 'Radiotronics' so as to assist the reader in finding the items which interest him most. In the normal issue there will be a DESIGN SECTION, which will deal with the detailed design of receivers and amplifiers, giving the reasons for the choice of circuit constants, and curves showing the detailed performance.

"This will be followed by a CIRCUIT SECTION in which (except for this issue) will appear the circuit diagram and such explanatory notes as are needed by the ordinary person who may not be interested in the full technical details of design. These will be arranged with one circuit on each page so that they may be reprinted in leaflet form to meet subsequent inquiries.

"The third section deals with GENERAL THEORY, and as far as possible the material will be arranged to include both elementary and advanced articles including items of general interest.

"The final section will deal with VALVE DATA and will give information on new valve types and particular points in connection with existing types of valves which may not otherwise be available.

"In each issue of 'Radiotronics' it is planned to include a loose leaf supplement in the form of 'Radiotron Service Digest' which will include such matters as the availability, prices and announcements of valve types, sales aids and advertising, followed by a section for Servicemen covering valve testing, faults and their identification, and the replacement of types in short supply by their nearest Australian equivalents."

Included in the current issue are the following articles and information. "Radiotron Receiver RC 52," which is a six valve dual wave receiver using the new single ended series type valves shortly to be released in this country by A.W.V.

"Radio Frequency High Voltage Sources," which is an article describing a method of producing high voltage supplies for Cathode Ray Tube operation.

(Continued on Page 23)

ON THE HIGHS

Although these notes have been appearing for the last two months VK's 3YP and 3CP are still mainly responsible for the compiling of the notes. This month however a few short paragraphs have been cut from Divisional notes for inclusion under this heading.

It is desired that these notes should be representative of all States, and it is up to all readers to forward some of their and others doings on the high frequencies . . . Editor.

28-29 MEGACYCLES

Conditions on ten metres towards the end of this month (June) have taken a turn for the better, for the Europeans are showing up again at the usual time, that is around 7 p.m. in Victoria. Several, however, have been worked at 3YP at 8.15 a.m. This is with the beam on South America giving the contacts the longest possible path.

Taking the month as a whole, the daylight hours have been very favourable and the United States have been consistant from 7 a.m. until 3 p.m.; South Americans from 8 a.m. until 9 a.m. and again round about 11 a.m.; Asian and Oceania at all hours of the day and some VK's have even worked all Australian States in a few hours.

There are many interesting contacts to be had with chaps in the Islands of the Pacific and VR2AB, at Fiji, puts in a beautiful signal from 15 watts to a 3 element beam.

New South Wales reports that the conditions on 28 Mc. show a steady decline, and from their point of view it looks as though it will be next spring before the DX becomes easy to work again. Short skip has been noticeable during the day and the ZL's, VK5's and even occasional VK4's and 3's bob up at near maximum strength, stay for an hour and dissappear quickly.

The majority of fellows are now using the famous 3 element beam for both transmitting and receiving and if the driven element is a folded dipole fed by co-ax cable, the tuning is quite broad and the beam is good for a frequency range of 250 kc. either side of the peaked frequency.

Some of the consistant signals from the States however, use just a half wave dipole. One of the best using this setup is W5KJB who has his dipole 110 feet high on top of an old oil derrick.

For those interested around Melbourne VK3IP at Ferntree Gully makes quite a good contact for beam rotation tests. VK3BW at Port Arlington is also always ready to help.

VP9F from (Beautiful) Bermuda has good fone and is easy to contact on 28120 kc. The best from Mexico is XE1AM; South America, Colombia HK1HB cw 28010, HK3AB fone 27999; Chile CE1AH fone 28700, Venezuela YV5ABX fone 28110; Trinidad VP4TK fone 28050; Curacuo PJ3X cw 28000; Central America and West Indies W8LZK/NY4 mobile around the Cuba Navy Dock Yards; Canal Zone KZ5AA cw 28050; Barbados VP6YB fone 28090; Puerto Rico K4ESH cw 28050, KZ5AB cw 28100, KP4AZ cw 28040. From Guatemala TG9RC, TG9PB fone 28100, TG9FG fone 28160, TG9JW fone 28500; Antigua VP2AP fone 28200; Costa Rica TI2RC, TI2AW fone 28220.

To move over to Asia PK4DA puts through some of the best fone and uses a Y ½ waves in phase antenna with 40 watts. He has now left for home in Holland and hopes to be able to take with him his HQ120 receiver. Korea boasts of AK1LO fone 28600; OQ2AC cw from Lebanon on 28090; VS1BA and VS1BD from Singapore with fone on 28400 and 28350; EQ3W fone on 28300 from Adaban, Persia; with VU2BG in India putting in the best cw.

Europe has PA0UN cw 28020, PA0NW cw 28050, PA0IN cw 28050, F8USA 28000 coming through around 8 a.m. E.S.T. Africa produces ZS's by the dozen as well as a few ZE's; VQ2FP 28040, VQ2PL 28120 fone, ET6MI (old VQ6MI) on 28080, ZD4AR 28590 with good fone from the Gold Coast.

VK2AJX reports hearing an SV round about 5 p.m. and promptly worked him, VK5NR in the Northern Territory was recently heard working VS9MP.

50-54 MEGACYCLES

It seems that with the falling off of conditions on ten more and more of the gang are graduating to "six." In N.S.W. those reported active on this band are VK2's NO, LS, ABS, ZN, WJ, CP, NP, AFO. VK2AFO is located in the valley between Katoomba and Leura and yet his signals radiated from an indoor antenna come in R7/8 in Sydney. VK2LS has gone away for a month's trip in the country and took with him a 50 Mc. receiver, so he may have some interesting reports for the local boys when he returns.

VK3MJ, VK2NO, and VK3AFQ have test sked with New Zealand each week-end, but so far no results are reported. ZL1JJ listens regularly on 50-54 Mc.

In VK3 many are operating on the band but up to date very little of their doings have reached ye Editor.

VK4 report that at last there is some activity on this band, VK4RY and VK4ZU making he first contacts on the 16th June. At 4RY the rig is a 6V6 xtal, 6N7 tripler, 807 doubler and an 807 in the final. The line up at 4ZU is a 6V6 xtal, 6L6 tripler, 6L6 doubler and 807 final, modulated by 6L6's. VK4RC, VK4EL and VK4AW are threatening to join the gang.

166-170 MEGACYCLES

There seems to be very little activity on this band, only one report of activity has been received. However certain members of VK3 intend to break into the band in a big way. With many of the high frequency tubes becoming more readily available it should not be hard to put a really stable rig on 166.

Q.S.L. BUREAUX

FEDERAL AND VICTORIAN QSL BUREAU

VK3RJ R. E. JONES, QSL MANAGER

The following addresses of Dominion and Foreign QSL Bureaux and Managers have come to hand:—

Great Britain—R.S.G.B., 28-30 Little Russell Street, London, W.C.I, England.

New Zealand—N.Z.A.R.T., Box 489, Wellington, New Zealand.

Norway—N.R.R.L., Ernst Firing, LA60, Bentzebrogt 29, Oslo, Norway.

France—R.E.F., 1 Rue des Tanneries, Paris 13e, France.

U.S.A., W1—W1BGY, Jules Steiger, 231 Meadow Street, Willimansett, Mass.
W2—W2SN, H. W. Yahnel, Lake Ave, Helmetta, N.J.
W3—W3WU, Maurice Downs, 1311 Sheridan Street N.W., Washington, D.C.
W4—W4MS, E. J. Collins, 1215 Nth. 12th Ave, Pensacola, Fla.
W6—W6TI, Horace Greer, 414 Fairmount Ave., Oakland, Calif.
W7—W7DXZ, Frank E. Pratt, 5023 S. Ferry, Tacoma, Wash.
W8—W8GER, F. W. Allen, 324 Richmond Ave., Dayton, Ohio.
W9—W9HLF, F. Moore, 1024 Henrietta Street, Pekin, Ill., U.S.A.
W0 (when formed)—W9DMA, A. Smith, 238 East Main Street, Caledonia, Minn.

Canada, VE2—VE2IR, C. W. Skarstedt, 3821, Girouard Ave, Montreal 28, P.Q.
VE3—VE3QB, W. Knowles, Lanark, Ont.
VE5—VE5HR, Henry Hough, 1785 Emerson Street, Victoria, B.C.

Alaska, K7—K7GSC, J. McKinley, Box 1533, Juneau Alaska.

Cards for the following VK3 stations are on hand and will be distributed at the July meeting or will be forwarded on receipt of the usual stamped addressed envelope:—

ABW, AH, AIJ, AJE, BE, BC, CI, CN, CO, CP, DA, ED, EE, EG, EJ, EN, EO, EQ, EZ, GB, GD, HT, IG, IP, JD, JK, JT, JZ, KG, KR, KU, LL, MC, MJ, MR, NF, NW, OP, PG, QE, QN, RW, RZ, SB, SE, ST, TM, UC, UP, UQ, VD, VJ, VQ, VU, WD, WX, WY, XA, XC, XD, XK, YN, YQ, YR, YT, YV, YW, ZD, ZL, ZT, ZU.

The following prewar cards have just arrived (old call signs) and may be had on application:—VK3's DQ, EX, GD, IM, KB, QC, QE, UE, VW, WU, WW, XP, YQ, ZF.

The QSL Manager is working under difficulties until the list of call signs and addresses is published by the P.M.G. and any Victorian country member of the W.I.A. whose call sign is listed above should advise the QSL Manager.

The manager for outward cards (VK3OF) is into his stride and his address is repeated—VK3OF Frank O'Dwyer, 190 Thomas Street, Hampton, Victoria. All outward cards accompanied by charges should be passed to him. Inward cards for VK3 should still be sent to VK3RJ.

FEDERAL HEADQUARTERS

New Executive.—Following on the recent Convention, a new Federal Executive has been appointed. The members are:—President, Vaughan E. Marshall (VK3UK); Vice-President, R. J. Marriott (VK3SI); Secretary, A. H. Clyne (VK3VX); Treasurer, R. H. Cunningham (VK3ML); Councillor E. D. Treharne (VK3AFQ). This Executive wishes to record its appreciation, and thanks to the retiring members, T. D. Hogan (VK3HX) for his work as Vice-President and Treasurer, and C. C. Quin (VK3WQ) as Acting Secretary, during the past year, which was an important one for the W.I.A.

Draft Constitution.—As you may recollect F.H.Q. has been requested to draw up a Constitution for the unification of the Wireless Institute of Australia, so that it really becomes the Wireless Institute of AUSTRALIA. Federal Executive regard this as a most important job and have already begun serious work on a draft constitution which will be circulated soon between the Divisions for comment and suggestions.

Badges.—We have had many requests for lapel badges of the Institute. We have to report that a new set of dies is to be made and we hope we shall be able to make early deliveries. If you wish to have a badge, please advise your Divisional Council as soon as possible. The Divisions have been requested to indicate their requirements to us, so please help them to help us.

Log Books and Members' Stationery.—Federal Executive propose producing Station Log Books and Members' Stationery for sale to members at a reasonable cost. We would appreciate letters from as many members as possible giving us their ideas on the form and layout of these very desirable adjuncts to the amateur station. Don't hesitate, write a letter now. The sooner we have the information, the sooner we produce them.

Frequencies.—No official word has been received at the time of writing regarding the release for amateur use of the 3.5, 7, and 14 Mc/s bands, but we hear it will not be long now. Please do not jeopardise our early return to these bands by carrying out tests on them (some individuals have very foolishly done so and Federal Executive regard this as a serious breach of trust—play the game, fellahs!).

DX Contest.—We have much pleasure in announcing the first International DX Contest to be held after the war of 1939-45. This contest will be next spring (Southern Hemisphere). Please tell your friends here and overseas about it. We shall give you more details next month.

Service Disposals.—We shall have some advice soon regarding the purchase of Disposals Equipment.

DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX, Box 1734 G.P.O. Sydney.

Meeting Place: Science House, Gloucester and Essex Streets.

Meeting Night: Fourth Friday of each month.

There was a record attendance of well over a hundred members at the May general meeting. At each succeeding meeting the roll-up has been greater. No doubt this can be accounted for in some degree by the rapid increase in membership since the end of the war and also by the fact that more and more amateurs are getting back on the air. In this instance, however, many come because they expected an interesting lecture and demonstration by John Moyle, VK2JU—and they were not disappointed.

The lecturer set out to show how he had gone about the job of designing a 50 watt phone transmitter and a receiver to go with it. The transmitter was not presented as the ultimate in design but as one example of a good transmitter that did everything required of it. Starting with the simplest workable transmitter—an E.C.O. followed by a 807 P.A.—2JU dealt thoroughly with every part of the circuit and explained its good points, not omitting to mention its rather considerable shortcomings.

Next the advantages of crystal control were stressed and it was shown how this transmitter was easily converted to a two stage xtal job. We hope that all prospective new hams at the meeting paid particular attention to this part and realised that the cost of a crystal is more than compensated for by the much greater ease wih which correct operation and a good signal can be obtained. An E.C.O. can be made to produce a signal that is indistinguishable from a crystal but it takes painstaking care and experience—qualities not generally possessed by the beginner!

The next step was to add another stage making a three stage xtal transmitter using 6F6G tri-tet oscillator, 6V6G doubler and the 807 running "straight" on 28 Mc. A suitable modulator, using a pair of 807's was described and then the complete transmitter was switched on and demonstrated.

2JU tuned this transmitter up and showed that it really delivered its full output to a 240 lamp as a dummy load. Envelope and trapezoid patterns were shown on the oscilloscope and the modulation capability, around the 100% mark, was clearly demonstrated. Mr. Moyle delivered his lecture in the clear and forthright style for which he is noted and received an excellent hearing. The demonstration of the actual adjustment, testing, and operation of the transmitter was accorded the greatest attention and there is no doubt that this is the type of lecture the boys really want. Council recently appointed Mr. Moyle Technical Officer and it is his job to arrange for lectures at general meetings—not necessarily to give them himself of course—but members can rest assured that there will be more practical lectures and demonstrations of this type.

For the June meeting we have an altogether different type of lecture—on "Developments in Atomic Physics" by John Briton who, during the war, was head of Radiophysics divisions of C.S.I.R. and in charge of radar development. In view of the Bikini Atoll atom bomb tests on the 1st July, this lecture should be of intense interest, especially to the "theory-boys." After all, we all fool around with electrons and electromagnetic phenomena, so shoud try to learn something about these things.

The following month we come down to earth again with a symposium on rotary beam antennas delivered by four or five chaps who have built beams which really work.

Visitors at the May general meeting were VK7LL and W6JQJ. The latter has married a very charming Sydney girl and hopes to be on the air as a VK soon.

"Ignorance is Bliss" Department (Phone Section)

We wonder if those phone men who say "hi!" at the end of each remark realise how silly it sounds.

Heard on the air this week:—VK2 phone man: "No OM, you have no sign of a back-wave there. Of course, your exciter comes through so strongly when your key is up that its hard to tell, but I don't think you have a back wave."—It hardly seems possible, does it?

Sport Department (Outdoor Section)

On Sunday, 26th May, a few of the boys had a golf day at Springwood. The Mountains end of the arrangement was capably handled by Bill Moore, who, of course, lives in this very pleasant spot. Golfers included 2HO, 2BG, 2AM, 2ADV, 2RA, 2BA, 2HZ, 2VN and 2JX, and a good time was had by all.

Rumour Department (Unconfirmed Section)

A lot of rumours are flying around regarding the 7 and 14 Mc. bands. On fairly reliable authority it seems that the W's, G's, and South Africans should be on both bands by the 1st July. Perhaps FHQ will have some glad tidings for us in this issue.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY, Box 2611 W, G.P.O., Melbourne. WM 1579.

Meeting Place: Lecture Hall, Chamber of Manufacturers' Building, 312 Flinders Street, City.

Meeting Night: First Tuesday of each month.

The June meeting, which was held on the 4th June, in the lecture hall, Chamber of Manufacturers, 312 Flinders Street, Melbourne, was attended by 107, clearly indicates the intense interest taken in Amateur Radio. With 3KN in the chair the meeting got away to an early start in order that 3WG, who lectured on the communication systems employed in the R.A.A.F., to be given ample time for the very intesting and enlightening lecture and discussions that followed.

Visitors were VK5IT, Ivor Thomas, President of South Australian Division of the W.I.A., ZL4HS G. Murray Throp, F8SI R. Froidefond, who were warmly welcomed by the Chairman, whilst others present at the meeting included VK3's OF, AJK, XR, ZV, PR, WG, AHO, EA, ZB, BQ, RX, JA, ABA, SZ, ED, WQ, TE, UH, JT, TU, GU, GS, AT, CT, XJ, RN, IK, HS, OV, AGS, FS, XM, QZ, DK, VO, VX, CF, VR, IC, QC, KM, JI, ZJ, TQ, MO, HX, NY, EK, LN, BJ, VZ, JD, ML, UM, RI, LF, QU, XA, AFQ, LX, YZ, AHM, ZC, AV, JO, OJ, AKL, KC, LS, PU, KN, J. S. Teere, J. Mathews, A. W. Oakes, H. Amor, B. G. Sloane, P. Monfries, A R. Herald, E. V. Dow, I. G. Groves, J. C. Belcher, A. G. Smith, K. Maroney, E. Tew, W. A. McLoad, E. C. Barry, H. M. Walsh, D. A. Brooke, J. R. Harris, F. Sullivan, C. M. Fraser, D. Taylor, S. J. Chesterfield, R. J. Pollock, A. D. Hatch, D. G. Clarke, F. C. Baunder, W. N. Titeridge, B. Berdiekin, W. L. Sealey, J. Beggs, R. L. West, R. Curnow, A. McKercher.

In the course of general business the chairman reported that with regard to the suppression of man-made electrical interference the Radio Inspector's Office states that they would appreciate complaints of this nature, so you boys who have QRM other than motor cars communicate with Mr. Nelson, Central 5551.

At the present time negotiations are in progress with

the Electrical Federation of Victoria, regarding trade discounts to members of the W.I.A. VK5IT briefly outlined a system which appears to be parallel with that offered by the Electrical Federation of Victoria, and no doubt at our next meeting you will possibly hear the final outcome.

Considerable debate was held on the question of sales tax with regard to the purchase of equipment by licenced amateurs, the major portion of which was utilised in experiments, and Council will discuss this matter generally and make an approach to the Sales Tax authorities to ascertain their views on the subject.

If your worthy scribe's eyes have not deceived him a photo was published in a Melbourne morning paper depicting a well-known DX hound namely "Snow" Campbell, who was recently launched on the sea of matrimony and all Amateurs wish the happy couple a prosperous future and long life. Talking of marriage, congratulations are in order with 3UK as it is understood that over-worked bird, the Stork, was recently seen visiting the Marshalls.

QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.

Meeting Place: State Service Building, Elizabeth St., City.

Meeting Night: First Friday of each month.

Those members present at the General Meeting of 31/5/46 had the pleasure of listening to a lecture presented by Mr. McNichol of the Queensland University who took for his subject—"The Ionosphere and its relation to Radio Propagation." The VHF men present were interested to hear that 1947 should see a peak in 50 Mc. DX. The writer's ideas received a very definite boost, I must say. Mr. McNichol also expressed his willingness to assist anyone requiring information related to HF Predictions.

The Federal Convention report was read for the benefit of those present and approval duly passed. We are sure this must be a great relief to FHQ who would, I am sure been greatly dismayed by VK4's non-approval!

With regard to the Field Day scheduled for the week-end (7/8th of June) it was decided to post-pone the affair till the end of June as some intending participants had not been able to complete their gear. Rules were announced and the system of alloting points explained. Stations will be divided into 5, 10 and 25 watt classes, with, as is to be expected, the 5 watters getting the highest score. The world is to be divided into zones (we're carving it up with a bread-knife!) about three in number, Australia and S.W. Pacific, the Americas, and Asia Africa and Europe, the multipliers being 1, 2, 3 respectively.

The subject of student classes has been a stormy one as far as VK4 is concerned, but at last night's Council meeting held at the home of 4HR much time and thought was given the matter and we are calling for a lecturer immediately per medium of the local press. A syllabus will be drawn up pronto from the A.R.R.L. and Admiralty Handbooks, and this will serve as a basis for the lecturer to work on (unless he has a system of his own which meets with our approval) and also will comprise a correspondence course for country men desirous of sitting for their tickets. Fees for the course, which will be of 6 or 12 months length, will be about £5/5/- on present indications.

"Local Doings"

4AW, since his return to civil life, finds very little time for Ham Radio. But look at the money you're making Arthur!

4VJ, Vince, is a strong advocate of the series limiter type of noise silencer and has already convinced several of the local lads of its effectiveness, for instance my experience at 4ZU is that phone signals, which are completely unreadable due to auto QRM, can be made to be perfect copy.

4LP not long back from the Darwin area, and is finding it hard to get on the air owing to lack of space.

4CJ is busy with his duties as Secretary, and in between times works at a Radio Station for the P.M.G.

4SN—Haven't heard from you for a while Frank, but I hope the phone goes at Exhibition time.

4PX was observed in the door way at Trittons carrying on an animated conversation with two bright young things. Was in a hurry Arthur and didn't have time to stop.

4VR responsible for a new sky-wire in the Coorparoo district. Should be more like 'em Rick! But not in the Coorparoo district, says you!

4FE heard on 28 Mc. occasionally, and we believe is finding better results from lower power.

4TY, a pre-war memory, but with us in reality again. Welcome OM. Lets have some dope on your activity.

4ES has a beam up, and according to his pre-beam strength will probably burn up the RF coil in my receiver if he ever swings it around Windsor way.

4JU busy erecting a nifty rotary comprising two antennas, a 3 element for 28 Mc. and a 2 element beam for 14 Mc.

4RB—T'was with pleasure that Council heard your application for membership read out Bob. Revived old and pleasant memories.

4KS intends dashing home of a lunch hour to work some of the juicy ones heard on 28 Mc. about midday in Brisbane.

At this stage of the game we'ed like to devote a few lines to some country men, but no dope—no can do! What say, fellers! The address is 4ZU c/o. Box 638J, G.P.O. Brisbane.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD, Box 1234 K, G.P.O., Adelaide.

Meeting Place: 17 Waymouth Street, Adelaide.

Meeting Night: Second Tuesday of each month.

The Annual General Meeting was held on Tuesday, 11th June, at 17 Waymouth Street, there being an attendance of 70. Visitors welcomed by the President included "Snow" Campbell (VK3MR), who was a P.O.W. in Libya and Italy and is mentioned in Rev. Broomhead's book, also Fl-Lt. L. R. Burston (VK3BV, later VK4BV), Fl-Lt. Bill Heinrich (VK5HR) and H. H. Hobcraft (VK5RE).

Nominations to Council for the ensuing year were then read, these being just sufficient to fill all positions, thus rendering a ballot unnecessary. The following were declared elected: "Doc" Barbier (VK5MD), C. H. Baseby (VK5BZ), G. W. Luxon (VK5RX), J. McAlister, E. P. McGrath (VK5MO), Warwick Parsons (VK5PS), I. Thomas (VK5IT), and A. F. Wreford (VK5DW). Mr. J. Kilgariff (VK5JT), a present Council member, preferred not to nominate and it was with regret that members heard of his decision. "Joe" was President at the time of the outbreak of war and, last year, called the inaugural meeting to reform the Institute. The new Council takes office from the 1st of July.

The Treasurer's report, presented by Cecil Baseby, showed that, as at 31st March, finances were healthy. It was mentioned, however, that the financial year ends in September next so that allowance should be made for the fact that, as most members subscriptions have already been received, there would be more expenditure than income in the second half of the year.

The President presented a comprehensive report on the events of the year. At its conclusion there was loud applause in recognition of the undoubted fine achievements since the start from scratch last July to the present membership of 200 plus. A copy of his report has been sent to "Amateur Radio" and will be found in another part of this issue.

Mr. E. A. Barbier (VK5MD), who has been appointed our Federal Councillor, then dealt in detail and at length with the proceedings at the Convention, giving a most comprehensive account of all that had happened. The President proposed a hearty vote of thanks to the delegate, which was carried with great acclamation.

Prizes were presented to the student members who had made the greatest progress in the first series of A.O.C.P. Classes. Mr. Geo. Ramsay was the winner in theory and Mr. Carruthers in the code section. The "loot" consisted of an 807 in each case.

Amongst other business attended to was the appointment of an Auditor, Mr. C. E. Piper, Chartered Accountant, being elected.

Amateurs who signed the attendance book were:—VK3MR, VK3MV, VK4BV and the following VK5's:—AC, AH, BJ, BZ, CB, DM, DW, FL, FM, GB, HR, IT, JJ, JK, JM, JT, JU, KG, LB, LD, LL, LN, LQ, LR, MD, MF, MI, ML, PM, PS, QM, QR, RE, RK, RT, RU, RX, SP, SP, TX, WK, WR.

At the conclusion of the Annual Meeting, a Special General Meeting was held to consider and, if thought fit, adopt the proposed Constitution, of which copies had been available at previous meetings for perusal by members. The complete draft was first read through by the Secretary and discussion then took place on various sections. One provision, on the suggestion of the Auditor, is to hold the Annual General Meeting in December each year, this coming after, instead of before, the end of the financial year in September. This will necessitate the incoming Council holding office for eighteen months to cover the change over. Another provision fixes annual subscriptions at £1/1/- for full Town Members and 10/6 for all other grades. This is a small increase for the country members, but it was pointed out that the subscription to "Amateur Radio" (which comes free to members) plus the Federal capitation fee, together with postages, etc., leaves no margin, at the present rate, for the general running expenses of the Institute. With one amendment, the draft Constitution was adopted in its entirety, the voting being unanimous and the meeting closed at 10.40 p.m.

Thus the whole of a long evening was devoted entirely to business and members are to be congratulated on their patience and close attention throughout.

At the Council meeting held on 27th May, the following were admitted to membership: Town Corporates, Messrs. R. Shortt, A. W. Baker, F. G. Anners, C. R. Sellick, and R. E. W. May. Country Corporates, L. G. Porter, G W. Connon, P. Davoren, T. Welling. Town Associates, M. Bradley, F. L. Johnson, P. G. Harper, L. A. Bull, R. E. Tregilgas, A. W. H. Wright, C. A. Harrison, W. L. West, W. J. G. Bailey, J P. Lysacht, J. Steer, K. D. Broadfoot; Country Associate, A. W. Winter.

Our President (VK5IT) recently visited Melbourne where he found, or, rather, made time to attend to several Institute matters and was present at the VK3 General Meeting. He also finalised the purchase of a particularly good Frequency Meter for this Division **and brought it back with him.**

With these notes is being forwarded a couple of articles which, it is hoped, may be suitable for publication in "Amateur Radio."

Mr. John Allan (VK5UL) continues with his monthly Ionospheric Predictions for this locality and his notes for June were published in the local newspaper on the 25th May and are much appreciated.

The next General Meeting is to be held at 17 Waymouth Street on Tuesday, 13th August.

WESTERN AUSTRALIA

Secretary: H. B. Lang, VK6HL, 42 Ord St., Claremont, W.A.

Meeting Place: Builders Exchange, St. George's Tce., Perth.

Meeting Night: Third Monday in each month.

Since last writing these notes no further meetings have been held, but at this juncture it may be as well to remind members that definite arrangements have been made for the third Monday in each month as the general meeting night of this Division.

Good attendances have been recorded, but they can be improved. Don't let the YF, YL or any L keep you away. The more, the merrier.

Conditions generally in VK6 on 28 Mc. are not so good on the DX but some splendid contacts can be had with VK2, 3, 4 and 5. QSB mars numerous contacts but nevertheless some excellent 100% contacts can be made.

The Island stations and, at times, the W signals break through for short periods. South African signals have been scarce in the past three weeks but have once more re-appeared, though only for short durations. Speculation is rife as to the possible early return of the 14 and 7 Mc. bands or part thereof. South African stations have been officially advised that 14 to 14.3 Mc. and 7.15 to 7.3 Mc. may be used as from midnight on 30th June. At the time of writing, Europeans have been coming through between 0930 to 1000 GMT and their re-appearance is welcomed in VK6.

What The Boys Are Doing!

6DD, at Guilford, worked G on phone. Evidently that 4 section 8JK is doing its stuff, John. 6HL—In and out of trouble consistently but now has nice fone and rig. Harry says if you want trouble go see him, he's got plenty that can be had for the asking hi. 6HT has Albany on the map again. How about some south port news, Harry? 6KW very busy with 7 and 14 Mc. coil winding interspersed with consistent operating. 6RU is also busy on coil winding and QSL bureau duties. For enthusiasm Jim takes top marks. 6WH—very consistent, busy with new final and plans for receiver alterations. 6WS nearly, but not quite; anxiously waiting return of 14 Mc. band. 6LW has 832 working nicely on 53.07 Mc. and has just completed new exciter. 6HM—very consistent, now working two bands. 6AJ—contemplating a change in the final. 6MB—Bill Bolton, a new one on "Ten," has 8JK rotary beam. 6RG has power supplies and modulator all ready to go; hurry up Ross!

No news from Geraldton members but presumably there is some activity at the Northern Port.

6DF—just completing new final; his 3 element rotary sure does a good job. 6FL is enjoying many pleasant VK contacts; busy on Acorn pre-selector. 6DJ keeps the CW boys busy and has raked in some nice DX with his 807 final. 6NL heard testing fone recently; lost his antenna in a gale, but up again now. 6YL has taken out licence but not heard as yet; when and how, Ruth? 6SA is very quiet at the moment, expect to hear the new rig soon Jim. 6MU at Merrdin seems to be doing well as numer-

ous stations are heard calling him; has T40 final modulated by 6L6G's.

No more this month but don't forget its the third Monday in the month and we want to see YOU there. No excuse please!

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.

Meeting place, Photographic Society's Rooms,
162 Liverpool Street, Hobart.

Meeting Night: First Wednesday of each month.

The final Council and General Meeting of this Division, prior to the Annual General Meeting, was conducted at the above address on Wednesday, 6th June, 7.30 and 8 p.m. respectively.

Council—present L. Jensen 7LJ in chair, J. Brown 7BJ, C. Walch 7CW, and A. E. Allen 7PA. Apologies from A. Finch 7CJ, K. Kelly 7LL, M. Loveless 7ML.

Business—To receive report of Dinner Committee, finalise dinner arrangements and general.

New Members—Four applications for full membership were received and passed for general meeting's approval.

General Meeting, as above with F. W. Medhurst 7AH, F. Gee 7RG, A. Morrisby 7VJ, C. Miller 7CM, T. Allen 7AL, E. Nicholls 7RY, T. Connor 7CT, P. Jones 7PJ, D. Watson 7DW, M. Conway 7CL, R. Conrad 7TR ex 2TR, R. O'May 7OM, Koglin, Allenby. Visitors Messrs. Evans, Houston, Chaplin, and Clarke.

The final arrangements for Annual Dinner were announced, meeting 6 p.m., dinner 7 p.m. or as soon after as meeting allows. Dress—informal.

The four membership applications were dealt with and an election by show of hands declared them elected unanimously.

7AL reported on the QSL Bureau, stating that it was receiving reasonable patronage and presented his statement of cards, handled, etc.

Copies of the minutes of the Federal Convention were tabled for general perusal and make interesting reading, it is of particular note that all States were represented by delegates, the individual comments of delegates on the interest in their respective divisions shows a fervor that we sincerely hope will be maintained.

The lecturer for the evening was Mr. Evans, who was previously welcomed with other visitors, subject was the much heard of Radar on which he gave some very interesting information on both its equipment and operation, illustrated with block diagrams on a none too stable blackboard.

This extensive subject's main points were clearly explained from Stacked Dipoles to C-ray Tubes.

In proposing a vote of thanks to the speaker 7LJ thanked him for coming along and for the time he had put into the subject to deal so widely with it in the short time at his disposal, this was carried with acclamation.

Some interesting exhibits were displayed, one, a high power pulse transmitter, triode capable of several kilowatts, the wonder being its small dimensions, another was a Reflex Magnetron, this tube was given a running description by 7BJ who explained its functions, possible applications, and its inefficiency.

A miniature tube of the 1R5 variety, complete with socket and shield, completed these and of this the socket seemed to claim the most attention.

Ten meter conditions were reported as being very poor of late and causing some concern.

7VJ has a 10 tube super performing fb on 10 mx. using standard 455 k.c. I.F's.

7OM—Bob O'May, an old-newcomer, has staged a comeback on 10 and is using a two stage rig, tri-tet oscillator 807 final and a 1D8-GT receiver regenerative detector and audio, reports say that the outfit is doing fb service and sounds ideal for a portable. Welcome back Bob both to the Ham fraternity and W.I.A.

S. Dahl, ex VK4KA, home on a few days spell from the north west coast districts, reports that several of the coast lads will be operating soon; says Doug. Fisher, 7AB, has gear ready for action.

Sincere regret was expressed at the news that Doug's home had suffered the sad loss of their 3-year-old by accidental drowning about February last.

Syd has been in the North on survey work and plans to take to a caravan soon, says too much away from home lately. Maybe he will take out a portable-mobile licence as he will be without a fixed location.

7CM—Soon to depart for Engand to continue his studies, is having a fair run of 10 mx. by the sheaf of QSL's handed into the Bureau last meeting, wait till you are calling back the other way Charlie!

Congratulations go to 7BJ and 7CT, whose ex-YL's have presented them with a junior op each, both boys and doing well. We sincerely hope the gear wont have to go to make room for the bassinettes chaps and that the QRM will be moderate.

IN REVIEW.

It is claimed that there are advantages in using a supply frequency higher than 50 c/s for producing voltages of the order of 2KV or higher, namely, a reduction in the size and cost of the transformer is possible at the higher frequency, and also filtering problems are reduced with a consequent reduction in cost of the filter components.

"Radio Receiver Design" is the first of a series of articles in which it is intended to cover this subject in great detail. This article is devoted to the mechanical problems such as layout, chassis design, wiring, etc. associated with the design of broadcast receivers.

Also contained in "Radiotronics No. 117," is an article describing a hearing aid using the miniature 1.4 volt types 1S5 and 1T4 valves. A chart of frequency ranges, which has been adopted by the Standards Committee of the Institute of Radio Engineers (U.S.A.) and abstracted from Proc. I.R.E. 33.8 (August 1945).

Radiotronics Technical Bulletins are available by annual (Jan.-Dec.) subscription to Amalgamated Wireless Valve Company Pty. Ltd., 47 York Street, (G.P.O. Box 2516) Sydney, N.S.W.

NEW TUBES.

Circuits should be designed to remove high voltage prior to or simultaneously with the filament voltage.

** When D.C. is used on filament, decrease bias by 3.5 volts and return grid to negative filament leg.

† Obtained from (a) fixed supply, (b) control grid resistor, (c) cathode resistor, or by combination of methods.

When the 2E30 is used as an R.F. driver for a tube having a thoriated-tungsten filament, provision must be made so that the driven tube(s) is not operated with plate and screen potential applied but without a bias voltage during the time interval required for the 2E30 to come up to operating temperature.

S.A. ANNUAL REPORT.

time of his death. The other friend was the late Mr. Harrington, Superintendent of Wireless, P.M.G.'s Department. Mr. Harrington was well known to most of us, and took an interest in the Institute both in his official and private capacities. He was a regular attendant at our functions, and was with us as recently as our last Christmas social. The Institute was represented at the funeral of both, and expressions of sympathy were sent to the relatives.

In conclusion, I would like to thank my fellow councillors for the way they have worked from the time of our first meeting right up to date. There has been a vast amount of work to be done, and there is still much facing the incoming council. You will appreciate that we had to start right from the ground and rebuild the complete structure of this division. Much has been done, but much remains to be done. The year ahead will not be an easy one for the new council. While it would be preferable not to individualise, I know that the other members of the council will support me in paying a special tribute to our worthy Secretary and Treasurer. The bulk of the executive work must naturally fall on their shoulders, and I can assure you that in them we have definitely the right men in the right places, and it is my earnest hope that they will continue to fill their respective positions for years to come. I feel also that I should be permitted to make reference to our Vice-President, Mr. Kilgariff. Joe has decided not to accept nomination for next year's council, and I feel that it is only right that we should record our thanks for the work that he has done in the position he has held over a number of years. To the other members of the council I say on my own and on your behalf, "Thank you." Finally, I would say to members generally thank you for your support, continue to give it by regular attendance at meetings, the introduction of new members, and (on behalf of the treasurer) the prompt payment of your subscriptions when due. Given this support the Institute will continue to flourish and will achieve the eminence which you and the council would have it achieve.

IVOR THOMAS, VK5IT, President.

CLEARING THE ETHER.

provide means for monitoring "cathode current" at central control panel, and results in considerable economy in meter requirements. Naturally, jacks may be employed in individual units (quite a common practise) and "through" patch cord employed to connect meter to circuit when desired; however, the system employing common switch facilities quick readings without the untidy appearance associated with the patch cord. Each cathode metering resistor is adjusted to give half scale deflection of 0-1 mA D.C. meter under normal operating conditions, that is, of course, unless off-resonance peaks dictate otherwise.

(f) Bias on buffer amplifier is provided by cathode resistor. As the valve is operating under Class "A" conditions, the grid resistor merely serves as grid-cathode return circuit.

(g) H.T. supply to the screen-grid is taken from a voltage divider to minimize variation when suppressor is keyed. Resistor shown is used merely for decoupling purposes.

(h) The anode circuit of the buffer amplifier is shunt-fed. This removes direct current from the output switch contacts; thus relieving the latter of unnecessary loading and arcing. Another advantage of shunt feed in this case is that the coil units can be directly earthed.

(j) It has been noted in the past that many hams employ sockets as power pick-ups. This is a very dangerous practice indeed; because when the plug is removed from the socket, the prongs are "alive." Safety demands that the process be reversed, that is, the plug should be mounted on the chassis, then when the socket is removed, provided a proper cover is employed on the rear thereof, power on the recessed legs is not so likely to come in contact with other bodies.

Some Electrical Aspects of the Tuning System:—

(a) Scope.—Switching in the oscillator circuit is arranged to provide nine spot frequencies, either crystal or self-controlled, and continuously variable frequencies in two steps, 1.5 to 1.75 Mc and 1.75 to 2 Mc, or such other frequency bands as may be selected, by merely changing coil unit.

(b) Selected spot-frequencies and V.F. Ranges are available by rotating a single knob.

(c) The combination of spot-frequencies available can be altered by changing plug-in crystal, or L-C Units.

(d) Each crystal unit is provided not only with its own tuned circuit, but also a small variable capacitor, shunted across the crystal to permit slight frequency adjustments, to compensate for circuit and temperature conditions.

(e) Each L-C Spot-Frequency Unit is arranged to have correct L/C ratio, and the midget variable capacitor provides small range for final adjustment of operating frequency. Further changes can be effected by altering value of main capacitors.

(f) The V.F.O. Unit also has internal capacitor to provide correct L/C ratio.

(g) The output circuit of the buffer amplifier is arranged so that any one of four tuned circuits may be introduced into the anode circuit, to provide one or more frequencies between 1.5 and 2 Mc, and 3 to 4 Mc as desired. If considered desirable, one position could be arranged to provide continuously adjustable resonance, by using external capacitor similar to that used in V.F.O.; in fact, it could even be "ganged" with the latter. By providing more than one pre-tuned frequency, the output can be levelled over a wide range. This aspect will be covered more fully under the heading of "Harmonic Amplifiers."

(h) Link-coupled output is designed to provide low impedance link to the following stage, and permit the use of "stagger tuning" when necessary.

(j) General.—Maximum flexibility is the main reason underlying the use of completely self-contained plug-in units, a method which of necessity involves a lot of extra minor components; for instance, some hams already possess crystals for the 7 and 14 Mc bands, thus if we restricted the use of B.F.G. to below 4 Mc by the use of fixed components, these crystals would have to be discarded, whereas now a set of units can be plugged in to meet this demand. Selecting the sockets with the shortest wiring for the highest frequencies. The whole subject will receive much greater attention under the heading of "Mechanical Aspects of B.F.G." in part 4 of this series.

FOR SALE, EXCHANGE, WANTED

9d. per line, minimum 2/-.

FOR SALE.—H.T. Trannie, 1,500 volts, five tappings, (pie wound). Two 10 volt filament windings. Sundry gear. VK3GJ, 28 Pickles Street, Albert Park (Cr. Danks and Pickles Streets).

FOR SALE.—813 ceramic sockets 15/6; Dural rod 3/16 inch 10 feet lengths 3½d. ft., 3/8 inch 6d. ft.; C.R. Transformers 2.5 fil., 2,800 H.T., 230-250 input, tropic proofed 27/6; 2.5 and 6.3 fils., 1,130 H.T. as above 22/6; Dural tube 1-1½ inch short lengths, suit concentric lines 1/6 ft. VK3KM, FJ 1339.

VK3ADH is offering for sale a complete 4 stage 28 Mc. 50 w. xtal controlled cw rig (xtal to aerial) and a receiver using 1852's. The lot for £50, or will sell separately. There is also a 902, a quantity of receiving tubes, a fil. trans. and other items for sale. For details phone DANDENONG 402.

FOR SALE.—Burton-Webber Modulated Oscillator, range 140 kc. to 25 mc., A.F. output, battery operated, £12. Also Valves: 210, TBO4/10, 281's, 280's, with low loss sockets. Can Type Electrolytics, Audio Trannies. VK5UX, 21 Railway Terrace, Kadina, S.A.

FOR SALE.—Surplus Taylor T40 (Brand New). Price £2/10/-. VK3FA, BYADUK, Vic.

FOR SALE.—Two button 9002 valves, three 9003, 25/- each, unused, will except two 9001 part or exchange. Stevens, 59 Rochester Road, Balwyn, E.8.

FERROTONE BY KINGSLEY.

From Kingsley Radio this month comes "The new Gangless Superhetrodyne"—"How to build and operate it." A manual of instruction on the Kingsley Ferrotune B/C receiver. This is a manual describing the construction and alignment of a 4/5 valve broadcast receiver built around the new Kingsley Ferrotune Unit, which is a tuning unit which covers the broadcast band 550-1600 Kc. by the variation of inductance brought about by the movement of the iron slugs of the mixer and oscillator coils instead of the more conventional method of capacitance tuning using the gang condenser.

GC PREFIX FOR CHANNEL ISLANDS

As the result of representations made by the R.S.G.B. the British G.P.O. has agreed to the use of the prefix GC by transmitting Amateurs living in the Channel Islands.

AMATEUR RADIO

AUGUST 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

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

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AMATEUR RADIO

Vol. 14 AUGUST, 1946 No. 8

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
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W. J. LEWIS
20 Queen St., Melbourne, C.1.
Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.
Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

Well we have broken back into 40 and 20! Not far yet—not nearly far enough but it is a good start. It wont be very long before we get another slice and an even more satisfactory portion of the pre-war bands and then we will be able really to feel that Ham Radio is again in its stride.

While on this subject of frequencies it is only right that the quite unfounded criticism of the P.M.G. Department concerning the re-opening of our HF bands, should be debnnked. Such questions as—why weren't they re-opened weeks ago? Why did the Hams in such and such a country receive three weeks' notice and we received none? Why did so and so get back 3.5 Mc. band and we did not? Quite naturally these have been asked but in both the Press and certain Radio Periodicals the blame has been laid at the door of the P.M.G. Department. The truth is that the Department made available the portions of the 7 and 14 Mc. bands within a matter of hours after they were released by the Services and the authority to use them was from the time your Federal President left the Chief Inspector of Wireless, not after official Ministerial announcements or after licence endorsement. Nor can blame be attachable to the Services, they are clearing appropriate portions of the spectrum as rapidly as possible, but difficulties peculiar to this area have prevented as rapid a clearance as has been possible in certain other parts of the world.

Your Federal Executive is in the closest contact with the P.M.G. Department and you can be assured of the earliest practicable release of our bands as they are made available, portion by portion. Not only that, we are now hard at work with the Department on those matters raised at the last Federal Convention and will have some announcements of considerable interest and importance to make shortly. Without attempting to make any forecasts we can say that our discussions with the P.M.G. Department have been on as friendly a plane, based upon a clear understanding and appreciation of the Amateur case, as ever existed in pre-war days.

During the period when Ham Radio is getting re-established and the P.M.G. Department administrative machinery is settling down patience and restraint are essential on all our parts. We deplore as much as the unfortunate recipients the immediate suspension of station licences for off-frequency operation without reference to the Advisory Committee, as has recently occurred

Continued on Page 8

IN THIS ISSUE

'AN OUTLINE OF RADAR

By F. J. EVANS, G.I.R.E.

The general idea of Radar is by now fairly well known, so tonight I will content myself with briefly running over the principles involved, and then giving a brief description of the Australian designed and built L.W.-A.W. set.

Radar, R.D.F., or Radio Location, as it has been variously called, may be defined as the science of locating distant objects by the means of radio waves.

The sound analogy serves as an introduction to one of the main considerations—that of range. When a man, standing in front of a wall, gives a sharp shout, his voice will be returned and heard by him as an echo. The time taken for the echo to return will give an indication of the distance involved. Similarly in Radar, we provide a transmitter which gives a burst or "pulse" of energy. This travels outward until it strikes a target, when it is returned to its source, amplified and its intelligence made plain on a suitable device—usually a Cathode Ray Tube.

The Cathode Ray Tube is used principally because it is capable of very accurate range calibration and also because it gives visual indications which are easier to decipher than any other.

The second consideration—direction—can be most easily accomplished by using a directional aerial and rotating it until a maximum signal is obtained, when the azimuth can be read directly.

Another consideration—that of height—is somewhat outside the scope of the L.W.-A.W. set, and although it is possible to obtain some indications, they are rather involved and not very accurate, so will not be dealt with here.

The first of our requirements, then, is a transmitter. This must be capable of delivering a pulse of energy of very short duration. At the speed of radio waves, energy has a velocity of one mile in 5.3 micro-seconds, therefore, depending upon the accuracy of ranging and separation of targets required, the pulse width should not be greater than 20 micro-seconds.

Secondly, it must be capable of high-powered output, if any useful signal is to be reflected. Fortunately, this is easily obtainable, due to the proportionately long time between pulses.

Thirdly, the cycle of operation (pulses and quiescent periods) must be repeated a sufficient number of times each second for the illusion of a steady time-base to be maintained. The number of times per second that the set operates is said to be its Pulse Repetition Frequency (P.R.F.).

Operations are carried out at the ultra-high frequencies for a variety of reasons, some of which are:—

(1) Directional effects. It is well known that the ultra-highs are not subject to the bending effects of the lower frequencies. For normal applications of Radar "line of sight" operation only is required, also the range requirements are limited. Very few sets are calibrated for ranges greater than 200 miles.

(2) By the use of U.H.F., the aerial array is kept more compact, which enables it to be rotated more easily, and a greater number of elements used; which results in a more directional beam.

At this point, it might be as well to reiterate that accuracy required of the set depends upon the use to which it is to be put. Thus, for early warning equipment it is not necessary to have the same accuracy as is required for, say, gun-laying equipment, in which for one particular type of the gear the figures quoted are about 1/10th degree and plus or minus 15 yards. Of course G.L. equipment would have a calibrated range consistent with the range of the gun to be fired.

These factors are governed to some extent by the frequencies and pulse lengths used. The principal characteristics of Radar transmitters are given in the following table:—

Frequency range 50—10,000 Mcs.
Peak Power 30—1,000 K.W.
Pulse length 1—20 Micro Secs.
P.R.F. 25—2,500 per Sec.

The next requirement is the receiver. This is always a super-heterodyne. It is usual to have at least two R.F. stages before the mixer to increase the signal to noise ratio. Four or five stages of I.F. amplification are needed to bring the gain to a sufficient value for use with a

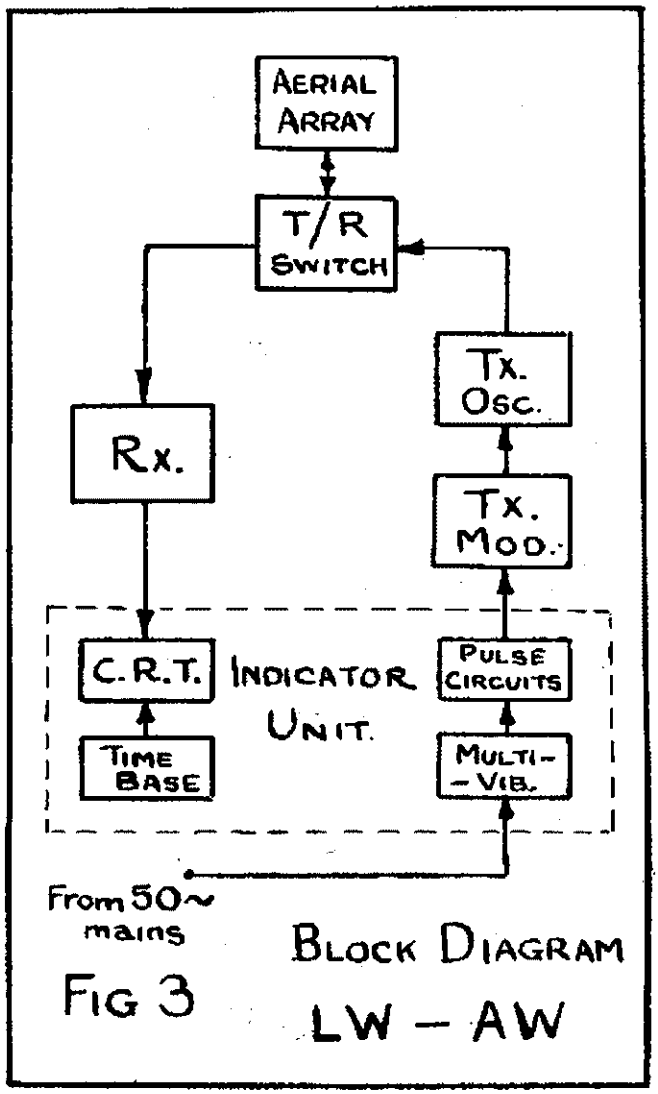
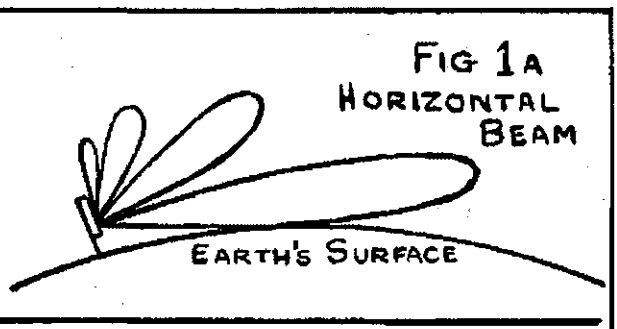


FIG 3 BLOCK DIAGRAM LW – AW



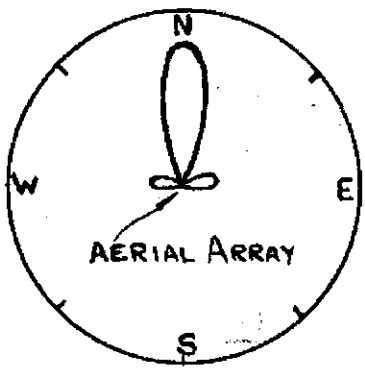


FIG 1B DIRECTIONAL BEAM

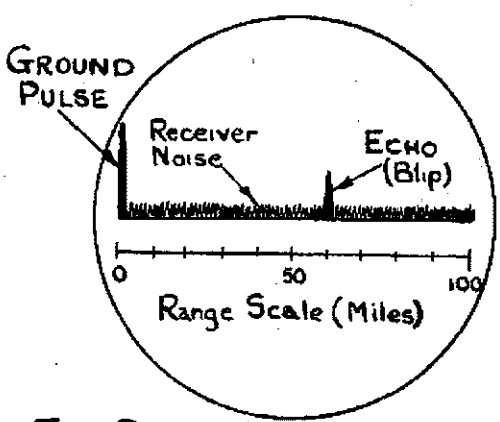


FIG 2

SCREEN OF C.R. TUBE

C.R.T. Owing to the steep-sided wave form of the received echo a very wide band width is necessary, and values in excess of plus or minus 140 Kc. are quite common.

As mentioned earlier, a Cathode Ray Tube is used as the display system and usually takes one of two forms. The first is known as a P.P.I. (Plan Position Indicator) and has a radial time-base with the commencement in the centre of the tube.

The screen is usually marked off as a map of the particular location with the transmitter located in the centre. The trace is then made to sweep round in synchronism with the aerial. A long after-glow tube is used and the echo intensity modulated so that targets are indicated by a bright spot on the screen. After one revolution, all targets within range can be seen in their actual position.

The second is the more common linear time base shown in Fig. 2. In this case, the transmitter is synchronised to pulse at the same time as the time base commences its traverse across the tube.

The L.W.-A.W. Mark IA Early Warning Set.—As its name implies, this equipment was designed to fulfil one purpose only—that of giving warning of the approach of enemy aircraft. A job it performed very ably in the S.W.P.A.

Its characteristics are:—

Peak Power, approximately 30 K.W.
Pulse length, 20 Micro Secs.
P.R.F., 50 c.p.s.
Range, calibrated to 130 miles.
Accuracy, limited.
Frequency, 200 Mcs.

Referring to the block diagram of Fig. 3, it will be seen that the heart of the circuit is the Multi-Vibrator which provides the original wave form for the transmitter and also for synchronising the time base. The Multi-Vi's are of conventional design using a pair of 6J7's which are tied to the 50 cycle mains to ensure that 50 cycle P.R.F. is maintained.

The output from the Multi-Vi. is rich in harmonics and has a more or less square wave form. To make it even more square, the output is passed through a further 6J7 which is heavily overloaded, the result of which is that on the negative peak cut-off is soon reached and no further change in output current can be possible. On the positive peak, saturation takes place so that both top and bottom of the wave are flattened. The amplification makes the sides slope more steeply. A glance at the wave forms of Fig. 4 will enable this to be seen more clearly.

The output from the squarer valve is now passed through what is known as a pipping circuit (i.e. a low time constant Resistor-Condenser combination) the action of which is as follows:—

The negative going wave form from the squarer charges up side (a) of Condenser C (Fig. 5) and holds it steady at full potential until the wave form changes. In the meantime, side (b) has been allowed to discharge through Resistor R in the familiar exponential curve. When the polarity changes, side (a) again follows and is held positive, side (b) again discharging immediately the charging voltage becomes steady. Referring back to (c) of Fig. 4 should make this clear.

The next valve, an 807, is heavily biassed so that only the portion shown dotted has any effect on the grid. The output fed to the modulator is as shown (d) of Fig. 4. So much for the pulse forming circuit.

The modulator consists of an 807 acting as a phase inverter, and another as a Cathode Follower. Positive output from the C.F. is applied to the grid of an 833 valve which is in series with the oscillator valves. The 833 (and consequently the Oscillator Valves) are held highly negative so that oscillation can only take place when the relieving positive signal is applied. The set

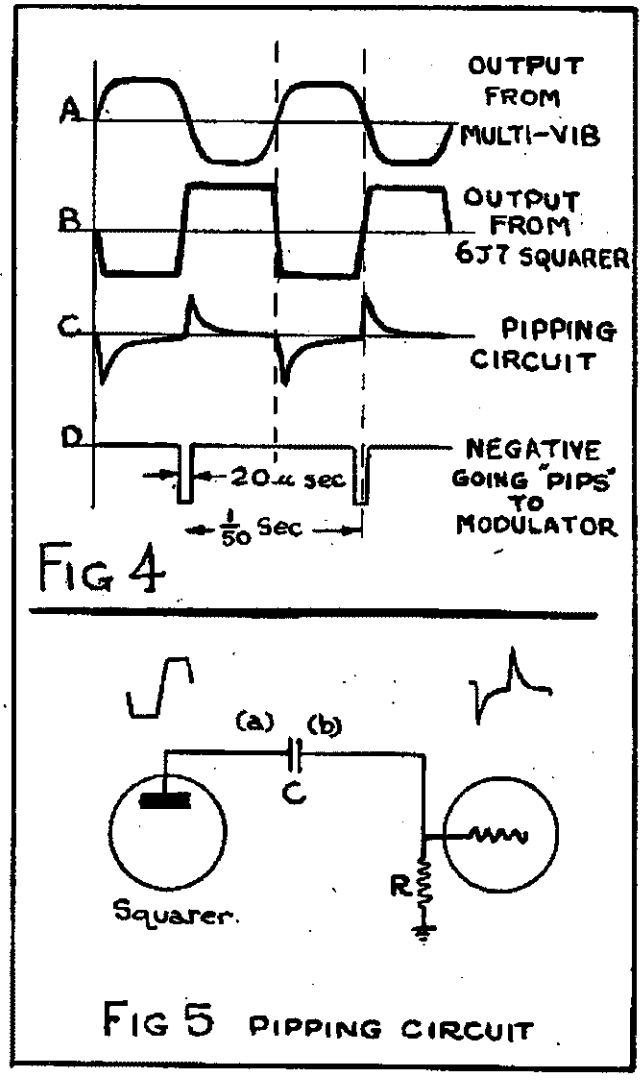


FIG 4

FIG 5 PIPPING CIRCUIT

then transmits for 20 micro seconds at a P.R.F. of 50 c.p.s.

It should be mentioned that the Oscillator Valves—VT90's—were specially designed triodes for U.H.F. operation and work in a conventional lecher-tuned circuit.

The antenna which was designed by Mr. Worledge of the N.S.W. Railways, contains 32 half-wave dipoles arranged in four bays horizontally spaced one wave length between centre lines. A mesh type reflector screen is mounted behind the array at a distance of 1/8th wave length, which gives best back-to-front ratio at 330 Ohms impedance.

The lobe patterns are approximately those of Fig. 1 (a) and (b).

The antenna together with the Transmitter and Receiver cubicles is mounted on a platform and the whole is easily rotable through 360 degrees by means of a hand wheel, thus enabling all-round cover to be maintained.

The Receiver consists of two R.F. stages using 954 acorn pentodes, followed by 955 triode mixer and oscillator. The triode mixer being used to keep valve noise to a minimum. The tuned circuits consist of lumped inductance resonating with its own self-capacity, and are tuned by a brass slug the movement of which varies the inductance.

The I.F. amplifier employs four stages using 1852 television pentodes. I.F. frequency is 30 Mcs.

One section of a 6H6 is used for detection, the other section acting as a limiter on the input of the vidio amplifier—an 807.

Receiver gain is controlled manually by a variable bias Resistor operating on the first three I.F. Valves.

The display is situated on the Indicator rack and consists (together with the Multi-Vi's and Squarer and Pulse-Gen. already described) of an 1802 C.R.T., associate time-base circuit and black-out valve.

The output from the Multi-Vi's is also used to trigger the time-base. It is passed through an 807 (Fig. 6) which is normally drawing fairly heavy current. The negative cycle from the M.V. reduces the Ia and allows Condenser C in the bridge circuit to charge producing the familiar saw-tooth wave form.

It will be seen that by varying the value of the Range Pot the balance of the following 807 time-base amplifier will be upset and the trace moved bodily across the screen. This provides an efficient method of determining

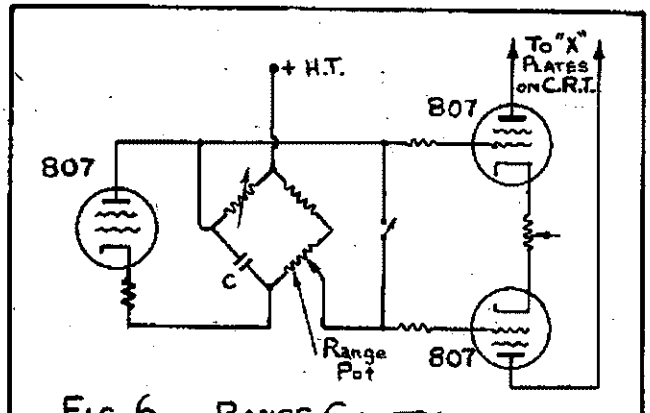


FIG 6 RANGE CONTROL

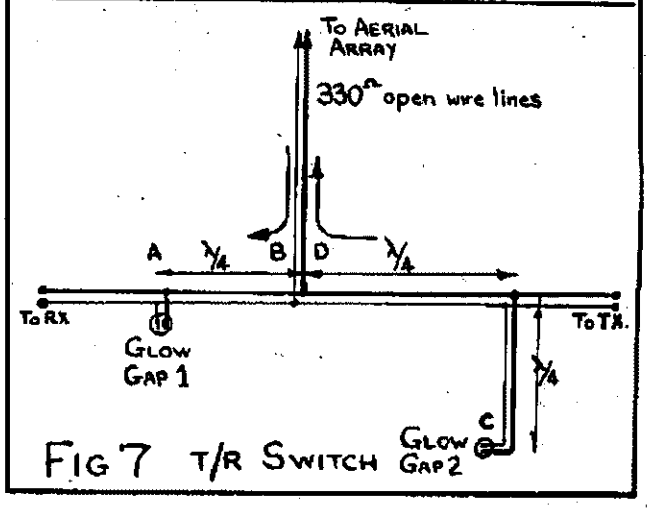


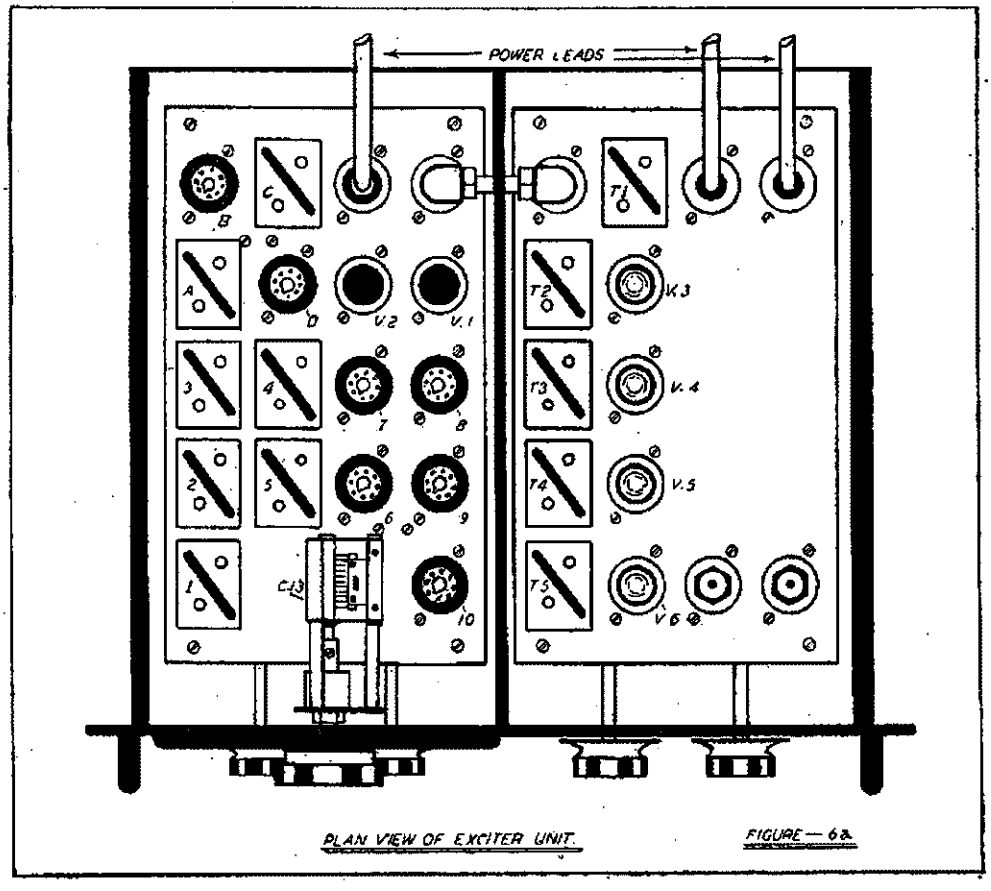
FIG 7 T/R SWITCH

CLEARING THE ETHER, Series II, Part IV

*By G. Glover, VK3AG

This part deals with the construction of Basic Frequency Generator and the theoretical requirements for Frequency Generators and Multipliers.

CONSTRUCTION AND OPERATION OF MODERN TRANSMITTER



PLAN VIEW OF EXCITER UNIT. FIGURE — 6a.

In preceding sub-section, writer dealt with electrical aspects of Basic Frequency Generator chosen as a basis for discussion. In this sub-section the mechanical aspects of the unit will be thoroughly covered.

There are numerous ways in which we can construct our unit to comply with the circuit requirements of figure 5; however, in planning any lay-out we must bear in mind all those points discussed in earlier sections.

The sliding valve section or coil cradle operated by rack and pinion movement, is the utopia in so far as shortness of electrical connections is concerned; but requires far too much space when a large number of tuning units are involved. The circular turret provides the next solution, but like its predecessor requires too much space. Irrespective of what lay-out we decide on we are always faced with the fact that multi-channels require space, and space means longer leads; all we can do is to strike a happy medium.

The design chosen for the purpose of this discussion satisfies the major requirements outlined under "economics" and "standardisation."

In order to convey picture of completed set up of exciter unit, Figure 6a shows plan view of both B.F.G. and Frequency Multiplier set up on tray. While Figure 6b depicts Front Panel lay-out. Some Coil Units have been left out to show socket arrangement more clearly.

The reason for employing a flat plate, with the exception of aprons each side for the purpose of stiffening plate, is so that it is fully accessible for wiring and trouble shooting. A description of its dispositon in actual use will be given later. Socket mounting holes have been arranged on the angle to allow as much space as possible between sockets, and at the same time provide for as wide a range of sockets as possible. The plate itself is constructed of 18 gauge steel, copper plated to provide conductive surface for R.F. and then cadmium plated for appearance.

It must be borne in mind, that while the completed unit is described in this sub-section, it is not necessary to complete the unit before it can be used. Setting up the components required for say, V.F.O. or one channel of Crystal Control (C.C.) will suffice. The advantage of starting off this way and working towards the final goal as finance permits, is that, the only waste incurred, if any, is the wire used to make temporary connections.

The oscillator tuning elements are concentrated around

* Glorad Engineering Services.

the V.F.O. Tuning Capacitor at one end of the sub-panel as shown, sockets 1 - 10, and a three section, eleven position, single pole rotary switch used to effect selection of the units involved. The zig-zag numbering employed reduces leads to minimum length and minimises confusion of wiring.

The output units are likewise associated with a two section, five position, two pole, rotary switch. This switch is mounted in the middle of the four sockets at the rear end of sub-panel and is referred to as "Output Selector." The corresponding contacts on both sections of the switch are bridged, doubling the contact area thereby reducing contact resistance and operating faults.

The two valve sockets and power plug, together with associated components, provide a very compact "valve section." C1, C7, C8 and C12; R1, R4, R7 and R8 are mounted directly on sockets/plug, or in wiring, to reduce the length of R.F. circuits. RFC1 has "Hot" end connected direct to socket leg for the same reason. The remaining Condensers, Resistors and RFC2 are mounted on two Ceramic strips, supported on 2-in. by ⅜-in. Bakelite pillars, directly below the valve sockets. By using insulating material for the pillars, full use can be made of all tags.

The last remaining item is the output socket associated with the links. This item is located in the right hand rear corner of the sub-panel, so placed as to be adjacent to the next unit. A short length of co-axial cable is employed to couple the socket to the output selector switch. The reason for employing standard valve hole punching and adaptor plate for socket, is to facilitate mounting different types of fittings, and at the same time retain flexibility of sub-panel. This latter angle will be better understood when we come to the Frequency Multiplier.

Mechanical Aspects of "Tuning Units"

Each set of tuning elements is mounted in a can 2-in. by 1½-in. at the base and 4½-in. high. The can is equipped with small handle at the top and octal plug at the base, as depicted in Figure 7, which represents a typical crystal controlled unit. "V" and "W" represent small Hammarlund type, air dielectric, Ceramic mounted, Trimmer Condensers, having screw driver adjustments accessible through convenient holes in the top of cans. "X" depicts crystal holder of either miniature or small portable service type plugged into socket. The advantages of mounting crystal in individual "Tuning Units" are two fold: (a) space economy, (b) shortness of electrical wiring.

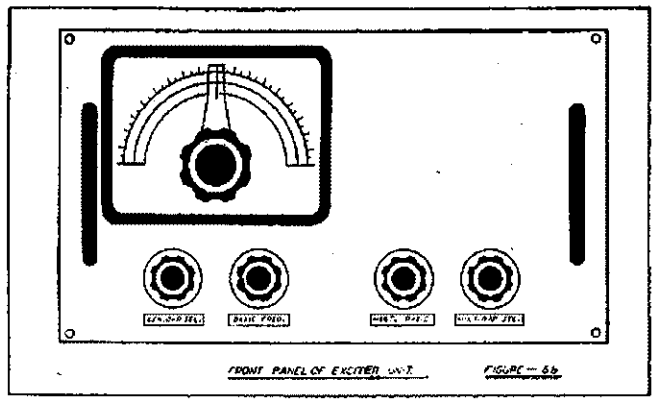
"Y" Coil Former of Ceramic or Polystyrene, except at low frequencies where properly treated Bakelite tubing may be employed.

"Z" Zero or negative temperature co-efficient Silvered Mica Condensers or Ceramic employed as main Tank Capacitors.

Other units are arranged similarly but with obvious omissions. Units should be color coded to enable quick identification.

Actual Electrical Values of Components used by the writer in conjunction with type 6AC7/1852 valves are tabulated hereunder. The 6AC7 valves were chosen mainly because of their socket connections, general characteristics and availability. Other types of penthode are equally adaptable.

R1—0.5 Meg Ohm, 1 Watt Carbon.
R2—50 Kilo-Ohms, 1 Watt Carbon.
R3—10 Kilo-Ohms, 2 Watt Carbon.
R4—100 Kilo-Ohms, 1 Watt Carbon.
R5—160 Ohms Non-Inductive Wire Wound Bobbin.
R6—See text.
R7, R8—1,000 Ohms, 1 Watt Carbon.
R9—See text.
C1, C8—100 Mmfd. Silvered Mica.
C2, C3, C4, C5, C6, C7, C9, C10, C11, C12—0.01 Mfd. Mica.
C13—10-250 Mmfd. Variable.
C14—250 Mmfd. Silvered Mica or Zero Co-efficient.



FRONT PANEL OF EXCITER UNIT. FIGURE — 66

Suggested values of components to be used in "Tuning Units" are tabulated hereunder:—

V.F.O. and E.C.O. 1.5 Mc. to 2 Mc. Oscillator Units:—
Inductance 40 turns 22 S.W.G. Enamelled Copper at 24 T.P.I., Tap at 14th turn.
Capacity (shunt) 500 Mmfd. Silvered Mica or Zero Co-efficient. Add Ceramicons and trimmer for pre-tuned units.

C.C. 3 Mc. to 4 Mc. Oscillator Units:—
Inductance as for V.F.O./E.C.O. above.
Capacity (shunt) 200 Mmfd. Silvered Mica or Zero Co-efficient. Add Ceramicons and trimmer to obtain desired Frequencies.

Buffer Tuning Units:—
1.5 to 2 Mc. Inductance:—120 turns 30 S.W.G. Enamelled Copper at 70 T.P.I.
3 to 4 Mc. Inductance:—85 turns 26 S.W.G. Enamelled Copper at 48 T.P.I.
Capacity in both cases, trimmer plus Ceramicons, to reach desired Frequency.

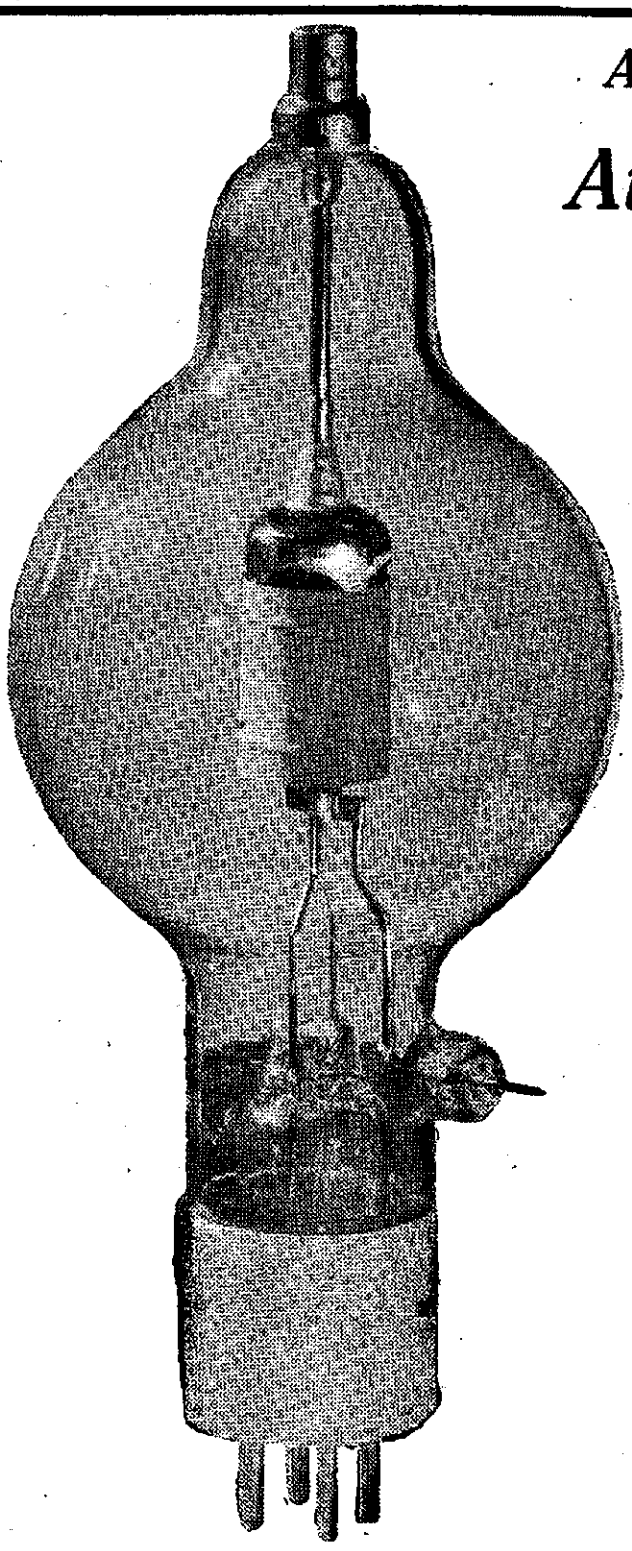
All Inductances are wound on ⅜-in. diameter Former and expansion and compression of end turns is employed as means of adjusting Inductance to final figure. So far no mention has been made of the links. These Coils are wound at the cold end of the main Coil. The number of turns will depend upon the connecting cable used and other factors which will be covered more thoroughly under the heading of Frequency Multipliers.

Points To Watch in Wiring Unit

(a) Keep all leads as short and direct as possible.
(b) Maintain symmetry in heater wiring.
(c) Return circuits should go to common point. Don't run a long loop around the tuning unit sockets and couple them in like Chinese lanterns. Use 16 S.W.G. Tinned Copper Wire and join them in pairs. Sweat wires together to form a wide tape where they converge on common point.
(d) Earth Pin No. 1 on each tuning unit socket by short length of 20 S.W.G. Tinned Copper Wire, under locking nut on the nearest socket mounting screw. The same applies to plugs on tuning units. The idea is to ensure that the tuner shields are at the same potential as adjacent sub-panel. It is possible that spurious oscillations will occur at higher frequencies unless several fingers are employed to earth the can.
(e) All Sockets and Plugs should be mounted so that the locating pin faces the same way, otherwise Coil Units will not line up.
(f) The Variable Condenser C13 should be insulated from earth and direct connections made as shown in the circuit.

Improvements and Variations

(i) If any inter-action is experienced due to coupling provided by socket wiring capacity, this may be eliminated by adding shorting section to switch or



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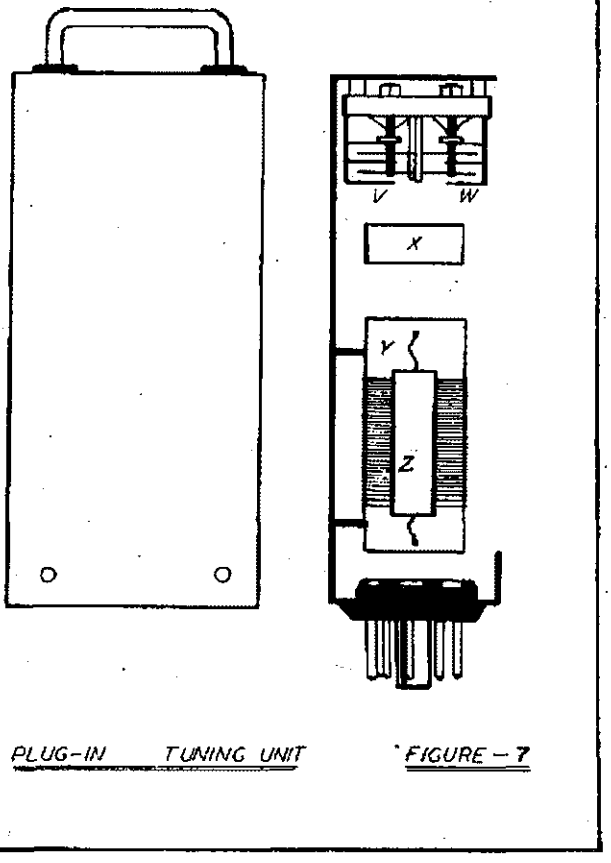
switches. One must bear in mind of course, that the V.F.O. operates on two contacts; therefore, either one range must be sacrificed, or shorting contacts omitted from these positions.



PLUG-IN TUNING UNIT FIGURE – 7

(ii) By referring to Figure 5, the reader will observe that the Variable Capacitor associated with the V.F.O. is connected to pin 4 of the socket. Thus, if normal pre-tuned tank unit is inserted into this socket, the Variable Capacitor will not be connected into the circuit, and this position may be used as a pre-tuned point.

(iii) If a Variable Capacitor is available with a higher capacity than that required to traverse the required band of Frequencies, it can be employed by inserting fixed capacitor in series therewith.

(iv) If considered desirable V.F.O. can be arranged to operate in the 2 Mc. to 4 Mc. range instead of present range, which relies on the harmonic content of the buffer amplifier output for operation in this latter range.

MOUNTING THE BASIC FREQUENCY GENERATOR

As can be seen from Figures 6a and 6b, in actual use the B.F.G. and associated Frequency Multiplier are mounted side by side on a sliding tray. Both sub-panels are mounted on 3¼-in. by ⅜-in. Brass Pillars, four to each plate. The tray is fitted into 10½-in. assembly (6 units) and slides forward until stop pins are encountered, thereby permitting access for the purpose of changing or adjusting coil units. To facilitate this, R.F. and power leads are arranged with a reasonable degree of freedom.

A shield is provided between the B.F.G. and Multiplier in the form of a metal plate. The dust cover associated with the assembly completely encloses the entire unit.

The switch shafts for both B.F.G. and Multiplier are extended through the front panel via flexible couplings and bushes in the panel. The V.F.O. Condenser is mounted on Bakelite plate and coupled to "ABAC" vernier drive equipped with perspex pointer, which operates over a set of three semi-circular scales. Graduated 0 to 100 degrees, 1.5 to 1.7 Mc., and 1.7 to 2 Mc.

FREQUENCY MULTIPLICATION

Having obtained our basic frequency we are now faced with the problem of multiplying that frequency to the ultimate operating frequency required.

For numerous reasons, particularly when cystal control is employed, it is more economical to generate basic frequencies in the lowest band to be employed, and multiply the frequency to the desired degree. Foremost of these reasons are:—

(a) Stability requirements.
(b) Physical limitations of crystals.
(c) Need for lower frequencies.

The major requirements of harmonic generators are:—

(i) Stability.
(ii) Frequency coverage.
(iii) Spot frequencies.
(iv) Compactness.
(v) Minimisation of controls.
(vi) Definite identification of harmonic being used.

(i), (ii), (iii), (iv), and (v) have been covered under the heading of B.F.G. and the rules as applied to Harmonic Generators or Frequency Multipliers are somewhat similar.

Definite identification of harmonics being used:— Wherever Harmonic Generators are employed we are faced with the evils of heterodyne relationships, which become more and more involved the greater the degree of multiplication involved. Sum and difference frequencies not only of the fundamental but also of the harmonics, sub-multiplers, etc., crop up. Admittedly careful guesswork of L and C values, both lumped and distributed, give some clue as to the frequency, but there is always an element of doubt, which can best be settled by using our old friend the "Absorption Wavemeter." The method of listening for even harmonics, although generally helpful, can be misleading if compex conditions exist.

The best method of generating high order harmonics appears to be the Reinartz Generator or similar regenerative circuits; but, all Harmonic Generators must be tuned to resonance. Hence, unless we are prepared to use turret structure of pre-tuned units, we are faced with two tuning controls.

As the object of the present discussion is to reduce controls to a minimum, the writer has discarded the Harmonic Generator in favour of the "Frequency Multiplier" or "Harmonic Amplifier."

The terms "Harmonic Generator" and "Frequency Multiplier" or "Harmonic Amplifier" have been chosen to differentiate between circuits employing feed-back to generate or emphasise selected harmonic, and amplifiers which are operated with very high bias to accentuate the harmonic content in the anode circuit by virtue of assymmetrical nature of power pulses applied to tank circuit, which is tuned to the desired harmonic.

The generous harmonic content of the output from tetrode or beam tube is too well known to need further amplification here.

EDITORIAL.

in one State. But such incidents will speedily be ironed out and our bands as well as the Regulations under which we operate on them will be very much more to our liking in a short space of time if we are all prepared to exercise reasonable patience in the interim.

V.E.M.

PROPAGATION PREDICTIONS FOR AUGUST 1946

The following information is extracted from the Radio Propagation Bulletin for August 1946 No. ARPC-A20, published by the Australian Radio Propagation Committee.

With the release of portions of the 20 and 40 meter bands, more use can be made by amateurs of the information contained in these monthly bulletins. Although day to day variations in conditions are bound to occur the charts contained in the bulletins can be taken as indicative of the general trend of ionospheric conditions.

As has been previously explained, the Charts are calculated for single hop working only.

For multiple hop paths it is necessary to use the working sheet provided with the Bulletin.

Zone E.—Latitude 10 degrees South—(North Queensland, Northern Territory, North Western Australia):—

28 Mc.—In this Zone 28 Mc. seems to be holding up quite well and should be useful for 1500-2500 miles' skip from 0800 hours to 1700 hours.

14 Mc.—This frequency becomes effective at 0700 hours when the skip distance is in the vicinity of 1000 miles. From 0700 till 0900 skip is reduced to approximately 400 miles, which condition holds until around about 1400 hours. After this time skip distance steadily increases until it is at a maximum of 2500 miles at 2200 hours. Best DX time on 14 Mc. in this area should be from 10 p.m. till midnight.

7 Mc.—Doesn't seem to be in the race for DX with possible exception of a short period of 2000-2500 miles' skip which may occur at 0400 hours but will probably not last for more than a few minutes and another period commencing at 2000 hours and lasting for possibly an hour, when skip will be around 500 miles.

Zone E.—Latitude 20 degrees South—(Southern Queensland, New South Wales, South Australia, Western Australia):—

28 Mc.—This band seems to be a wipe off for DX in this Zone with the possible exception of a short period of 2500 miles' skip which may last from 1100 hours to 1500 hours.

14 Mc.—Shows distinct possibilities. From 0001 hours till 0300 hours, skip is 2500 miles, after which time there is a complete fade out until 0600 when skip is approximately 2000 miles. From 0600 onwards this distance will gradually decrease until it reaches a minimum of about 700 miles at noon and will then increase to a maximum of 2500 miles at 2000 hours. This condition will probably hold good until midnight. Best 14 Mc. DX time in this Zone is from 9 p.m. till 3 a.m.

7 Mc.—May show a peak from 0400 hours till 0430 hours when skip will be about 1000 miles, and will gradually decrease until a complete fade out occurs at 0900 hours. However from 1600 hours onwards the band should open up again and reach a peak of around 700 miles at 2200 hours.

(Continued on page 10)

KINKS FOR 807 USERS

By J. Brown (VK7BJ)

Here are a few kinks that may be of use to the large number of Hams who use 807s for their output valve. The basic circuit used is shown in Fig. 1. Owing to compactness being desired, blocked grid keying was ruled out, as opening the grid return is not sufficient to cut off an 807. Cathode keying was not desirable, as the heater supply of the 807 had to be earthed. After trying to suppress clicks when the key was placed in the H.T. lead, the key was tried in the screen. Opening the screen was found to completely cut off the plate current, a negative voltage building up on the screen. The addition of a 0.1 mfd. Condenser from screen to earth, in conjunction with the 16,000 Ohm dropping Resistor, makes a time delay filter which works on both make and break. This eliminates the clicks very effectively. The 0.1 mfd. Condenser, together with the R.F. Chokes and by-pass Condensers (which prevent interference due to sparking at the key contacts from being radiated), is mounted right at the key. See Fig. 2. As the key is alive insulated protection should be provided, or a relay could be used.

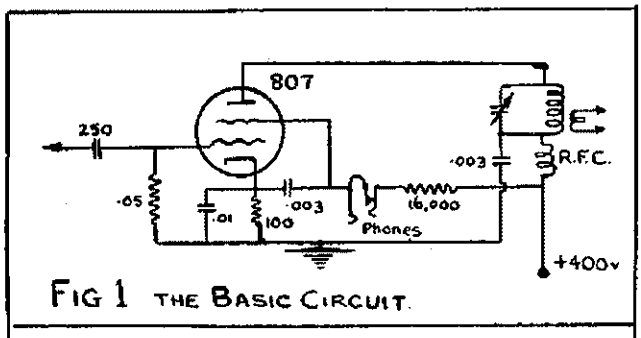


FIG 1 THE BASIC CIRCUIT.

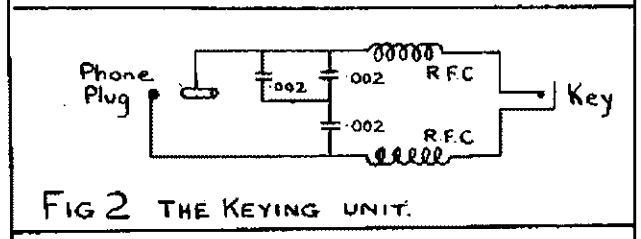


FIG 2 THE KEYING UNIT.

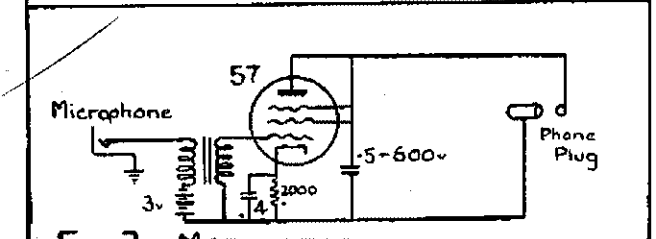


FIG 3 - MODULATOR

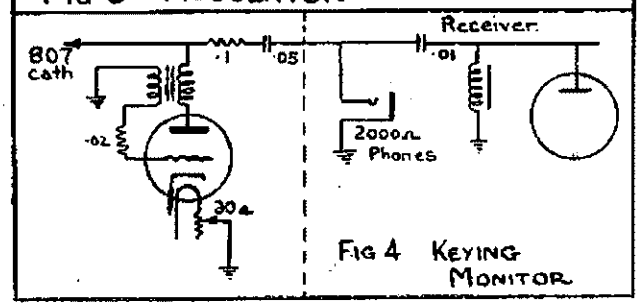


FIG 4 KEYING MONITOR

It was desired to use phone for local work with the minimum of extra parts and trouble, and the modulator of Fig. 3 proved to fill the bill nicely. The 807 is adjusted for CW conditions and the modulator plugged in in place of the keying unit. The 57 (other equivalent types may be used), being in series with the 807 screen supply, drops it to about 125 volts, causing the plate current to drop to about half normal. Speech input to the 57 grid causes its plate resistance and, consequently, the screen voltage of the 807, to vary accordingly and so modulates the output. With a good single button Microphone of the modern inset type, about 80% of good voice quality modulation can be obtained, the plate current kicking upwards slightly at full modulation. It is preferable not to earth the 57 heater directly, but through a large Condenser.

NOTE.—These circuits are only recommended for beam tetrodes, the screen characteristics of pentodes such as 802s being unsuitable.

The third kink, a side-tone note for monitoring keying, is fairly well known now, but the arrangement shown in Fig. 4 is very convenient, as it is entirely automatic in operation. As the 807 is keyed the cathode bias varies in accordance with the keying, and is used as the plate supply for an audio oscillator which is connected, via an isolating Condenser and Resistance to the normal Headphones. The Rheostat in the heater is used to adjust the note (as a heater type valve is used, the adjustment is sluggish). Any old transformer and valve are suitable, in fact, within limits, the older the better. The 0.01 mfd. Condenser used between the Phones and the Receiver was chosen to resonate, with the Phones used here, at about 1,000 C/s. for CW work.

To finish on a somewhat gloomy note, a lot of 807s seem to be subject to a somewhat mysterious complaint, i.e. loss of output whilst still drawing normal current. This is usually due to the heater voltage being below normal, due to line voltage variations. The symptoms are normal output when the key is first pressed, but it then falls off. The best remedy is to see that the heater voltage is correct. If this cannot be managed, I believe that special 807s, tested for operation on 5.5 volts, can be obtained.

PROPAGATION PREDICTIONS FOR AUGUST

Zone E.—Latitude 30 degrees South—(Victoria, Southern New South Wales, Southern South Australia, and Southern West Australia):—

28 Mc.—May, under favourable conditions, have a skip of 2000 miles or so from 1100 hours till 1600 hours, but generally may be considered as unreliable for DX.

14 Mc.—20 meters doesn't really come to life until 0700 hours when skip is 2500 miles. This steadily decreases to a minimum of 800 miles at 1000 hours which condition holds good until 1600 hours when skip steadily increases until at 1900 hours it is once more 2500 miles.

7 Mc.—Shows promise. From midnight till 0600 hours skip is around 1000 miles, after which there is a sharp

fade out which reduces skip to 0 miles at 0800 hours. However at 1600 hours the band opens up once more and may reach a possible peak at 1000 miles at 2200 hours.

Zone E.—Latitude 40 degrees South—(Tasmania):—

28 Mc.—VK7's can forget all about 10 meters for all but ground wave work, although there may be a possible peak of short duration, 2500 miles' skip at 1400 hours. But don't hope for too much.

14 Mc.—Does not seem to be of much use until 0700 hours when skip is 2500 miles. From 0700 hours skip is gradually reduced until at 1400 it reaches its minimum of 1000 miles. After this time it gradually increases to the maximum of 2500 miles at 2000 hours. This condition may last until 2200 hours after which the band will probably fade out. In general, 14 Mc. seems fairly reliable for DX work for VK7's.

7 Mc.—From midnight till 0400 hours, skip is 1000 miles, after which it rises to a peak of 1500 miles at 0530 hours, then gradually fades until at 1100 hours skip is 0 miles. At 1600 hours the band opens up once more and at midnight reaches its peak of 1000 miles.

To interpret all the foregoing in terms of DX working, a few facts must be borne in mind. In the first place, the predictions hold good only when the point of reflection falls in E Zone and within a range of plus latitude 5 degrees to minus latitude 5 degrees from the latitude of the transmitting station. Secondly, the predictions do not take into account the possibility of freakish conditions such as sudden magnetic disturbances, etc. (These statements have been included for the sole purpose of providing me with an alibi should some irate VK7 write in and proclaim that he couldn't work VK4 when the chart says he should, or some equally irate VK4 say that he worked VK7 when the chart said he couldn't—Tech. Ed.)

It is hoped that the publication of these predictions is of interest and use to the reader. Comments upon them would be appreciated. Our copy of the Radio Propagation Bulletin for August 1946, ARPC-A20 by courtesy of The Australian Propagation Committee.

Copies may be obtained from all newsagents and booksellers priced 2/-. Wholesale distributors Gordon and Gotch (A'sia) Ltd.

RADAR

range, as the Pot can be calibrated directly in miles.

The black-out valve is a 6J7 and provides a means of over-biassing the C.R.T. on the fly-back portion of the trace.

The same aerial is used for both transmitting and receiving. This is made possible by the use of an ingenious device known as a "T/R Switch." It makes use of quarter-wave transmission lines which if shorted at one end, present a high impedance at the other, and vice-versa. Elements known as "glow-gaps" are used.

Referring to Fig. 7.—When the transmitter pulses, both gaps light, and since A is now a very low impedance, B (looking towards Rx) shows a high impedance to the transmitter pulse and energy is fed to the aerial with very little loss.

The transmitter becomes quiescent, and the gaps go out. In this case, A is now an open circuit with high impedance, whilst B now presents a low impedance to signals going to Rx. C is also a high impedance, so that D (half-wave length away) is also a high impedance and signals are prevented from going to Tx.

FEDERAL HEADQUARTERS

New Frequencies.—We wish you to know that the frequencies released on 1st July (viz. 7.15 to 7.2 Mc. and 14.1 to 14.3 Mc.) are an interim release and we expect shortly the release of the remainder of these bands in addition to the 3.5 Mc. band, as well as some new high frequency bands. We should also like you to know that the present release has been due to the efforts of Federal Executive to have at least part of the bands restored instead of waiting until the whole of the bands were available. We desire to record our appreciation of the P.M.G. Department and its officers in their splendid co-operation in bringing about the opening of the bands in a matter of hours after their release by the Services Frequency Control Committee.

P.M.G. Department.—You will be pleased to know that the Federal Executive will shortly have a conference with the Chief Inspector (Wireless) concerning many matters of importance to amateurs. We trust the outcome of this conference will be of mutual benefit to amateurs and the P.M.G. Department.

DX Contest.—The VK International DX Contest will be held in November this year. The rules of operation are similar to prewar DX Contests and will be published in "Amateur Radio" shortly. We are receiving much support for this Contest by way of donations from various manufacturers. We should mention also that this VK DX Contest will be held in future years in October.

Log Books and Members' Stationery.—We mentioned last month that we hope to produce Station Log Books and Members' Stationery and we requested letters from members expressing their ideas on the form these should take. To date we have not received one letter. If you are writing, address your letter to Federal Executive W.I.A., Box 2611-W, Melbourne.

Draft Constitution.—The Federal Executive is preparing a Constitution for the Institute and it is thought that members who are interested should forward to us their ideas on this subject. If you have any notions about what the aims, functions or operations of the Wireless Institute of Australia should be, do not hesitate to send them to us.

Traffic Managers.—Traffic Managers have been appointed in N.S.W. (VK2WI), Victoria (J. Tutton), South Australia (J. Kilgariff).

Do you know that attempts were made to use radio signals as navigational aids, some time before they were used for purposes of communication?

Did you know that it is frequently possible to repair tubes which show an open circuit in element connections? It is done by making a saw cut in the leg or legs, close to the base and then filling the cut with solder.

Did you know that in a commercial U.H.F. transmitter, now on the market, the grid leads, Oscillator to P.A., consist of a piece of resistance wire? It is naturally very short and provides connection between stages and at the same time is effective as a parastic suppressor.

Having trouble with "C" "L" and "f" combinations? See page 57 QST for July, 1936.

DX FOR THE MONTH

28-29 MEGACYCLES

Although the ten metre band is suffering from the usual winter decline, conditions have been better than anticipated and WAC has been possible most week-ends.

European contacts around 8 a.m. EST have been made on several occasions with gratifying signal reports.

The exodus to 14 Mc. has quietened the band considerably and brings up the old argument whether the band is dead when no signals are heard. Those of us with rotary beams and a working knowledge of how the band behaves can make a surprising number of contacts out of an apparently "dead" band.

It is felt that, as the weeks go by, more and more stations will return to "ten" from "twenty," where conditions are reasonably good but QRM is the biggest drawback.

With the coming of spring "ten" will rapidly recover and by October and November should provide good daytime and up to midnight DX.

Australia.—VK5NR (ex-VK3NR) up in the N.T. is one of the most consistant VK's and enjoys considerably better DX conditions than most VK's. Europeans are workable most evenings and practically everywhere except South America during the daylight hours. He uses 25 watts on 28000 and 28150, a 3 element rotary and Vee beams. West Australia is well represented by numerous VK6's on both CW and Fone who are often heard working Asian and African stations which are not audible in VK3.

Several VK7's have been contacted and also heard working DX, they are in great demand by the W's.

VK4JP is using a copy of a Police transmitter, 6C5 7 Mc. Xtal, 6A6 doubler, 6A6 doubler, 6A6 as PP final, with 6J7, 6N7 class B modulator, a 3 element beam on 400 foot hills near Brisbane and puts out R8 Fone with only 4 watts input.

North America.—XE1JD, XE1AC are consistant and VE's and W's have been too numerous to warrant any special mention.

Central America.—HH2BL CW 28120, KP4AJ 28100, W4BZA/KP4, W8VRD/KP4, KP4AJ have all been good fone contacts in Puerto Rico.

KZ5AA has now gone home to the States from the Canal Zone and his fine signal and good operating will be missed by all VK's.

VP5RS 28180 Fone, VP5EM 28060 Fone have been fairly regular from Jamaica. TG9PB has a double bi-square beam (if anyone wants to know what that is etc. ask VK3BQ—Ed.) on Australia and puts in an amazingly good signal, S9 plus with 100 watts to PP 807's. W3IKV

mobile marine in the Caribbean Sea worked four VK3's in a row one Sunday morning.

VP9F was contacted on several occasions. VP6YB in Barbados has been heard a few times but not up to his June strength. YN1ZK Managua, Nicaragua, was heard at fair strength but could not be contacted.

TI2RC 28200 Fone has been very consistant and is the loudest signal on the band outside Australia and New Zealand.

South America.—VP4TR 28050 CW and Fone, VP3LF 28300, PY6AG 28040, YV5ABX 28120 Fone, and PJ3X 28000 CW are the only South Americans who appeared in VK3 during July.

Africa.—VQ2PL, ZS6IJ, ZS5BZ, ZE1JU, ZE1JX, VQ3TOM, VQ4ERR were among those from the "Dark" Continent.

Europe.—W8QEN/CT2, G6WY, PAoUN have been contacted around 8 a.m. and G2FZ, SV1KE, VS6DY Red Sea, OZ6WH, G5BJ, G5VB, G6TD, D2DI, SM5LF have appeared between 5 and 7 p.m.

Asia.—VS1BA, VS1BJ, VS4JH, VS9MP Aden, YI2XG, YI2CA, VU2LR, VU2WP, PK6TC, C1SU China have been heard and worked by many VK3's.

The foregoing notes have been compiled by VK3YP and VK3CP and is a very fair indication of the conditions in the Metropolitan Area. It is regretted that more news from country districts and particularly Interstate does not come to hand.—Editor.

Roy Jonasson VK3ND (ex-7NG, ex-4NG) now located in Castlemaine, Victoria, writes that he has been having quite a lot of fun getting and staying on 28 Mc. The rig is at present located in a 66KV sub-station where QRM is very persistant, nevertheless he has managed to tot up a very nice score of DX. Frequencies used are 28528, 28080, and 28020. He suggests that if anyone wants to know how to make a TRF perk on "Ten" they should ask him for he has such a receiver working with a 954 in the RF stage. However he's only waiting to complete a super.

14 MEGACYCLES

The 14 Mc. band opened with a bang and the QRM is now terrific. However there is plenty of choice DX coming through and is being worked by VK's.

From observations in Melbourne, the band fades out from about 10 p.m. until the early morning when the Europeans come through, but again fades out during the mid morning. In the afternoon the W's and VE's are just like locals and are easily worked.

Calls heard, worked and noted down were C3YW, SU1US, PAoNG, F8PQ, G5BJ, G8IP, ON4PZ, EA1D in Madrid, PY6AO, C9BV, VE8AO, VE8AW, XE1AX, HC1FG, VS3JH, PAoFV, VE6CI, XU1RI, XU1MB, and CR9AN.

"FIFTY" AND UP

In the last few issues these notes were included under another heading. Now that other bands have been opened up it has been decided to separate the very high frequency notes from the others. It is hoped that those interested in these bands in the other States will endeavour to forward some details of their doings so as to keep all interested in touch with what is going on.

The main part of these notes come from Ken McTaggart (VK3NW) and goes to some length to outline just what is going on on the 50-54 Mc. band in VK3.

Unfortunately a number of stations that made an appearance on the band have dropped out, the biggest loss being Jack Davies 3JD, who, however is planning to return within a few weeks. We hope it will not be long as Jack runs 50 watts to a pair of 807's, modulated by a pair of 809's class B, and a 3 element rotary beam.

Others who have not been heard for a long time are 3LS, 3NB, 3FT, 3BW (who was only on for two days!! but will soon be going permanently), 3DA, 3TQ, and 3CO. Most active on the band are 3QO, using 2.3 watts to a single tube in a linear oscillator and a stacked array; 3MJ with 50 watts to an Eimac 100TH, a 4 element rotary beam and a super-dooper receiver using ECH35's, EF50's, etc.; 3AFQ, 3GG, 3HK, 3YJ, and self, 3NW. The rig at 3NW consists of 807 Xtal Osc. 6314 Kc., 807 doubler, 807 doubler, 800 PA with 50 watts input, modulated by PP 807's, and a single section W8JK rotary beam. Rx here is 10 tube super with 1852 RF and 1852 mixer—not all that could be desired but it pulls them in on 6 mx quite well.

In order to stimulate interest in the band, especially for some of the chaps outside the City area who may think 6 mx is only good for "line of sight," VK3MJ and myself are initiating some portable tests with a view to determining just how far we can work. The portable equipment which I have built up consists of a MOPA transmitter using a DET3 (6J5 with plate and grid brought out the top), TPTG oscillator and 807 PA, modulated by a 6J5 into a 6V6. Choke modulation is used and a dynamic mike. The input to the 807 is 3.0 watts. The antenna a half wave doublet with co-axial feed and the receiver is a 955 super regen. into the 6J5 and 6V6 that serve as modulator or amplifier for the Rx. The results from the home QTH in Kew were excellent and the first excursion took place on Sunday, 14th July. We loaded up the "Hornet" and went to Belgrave, 22 miles air line from 3MJ at a height of several hundred feet but not "line of sight" because of intervening ridges. The power for the outfit was 180 volts of H.T. B batteries. Contact was made without any trouble. Signals from 3MJ were Q5 R9—just as loud as when only four miles from him! My signals were Q5 R5 on his Rx in Carlton. I then contacted 3QO whose signals were Q5 R5 at Belgrave. My signals at 3QO (Ivanhoe) were Q5 R4/5 on his super regen.

While the distance was not very great we were quite pleased with results especially at the strength of 3MJ's signal on th super regen., it was just pounding in—and also at the strength he got my 3.0 watts. The results with 3QO were also very interesting as in this case the powers were 2.3 watts and 3.0 watts and the receivers were both super regens.

It is now intended to take the portable gear to different locations round Melbourne, gradually extending the distances to see how far we can go and what the influence of intervening hills, etc., are. We plan to go to Woodend and Macedon next trip, then to Ballarat, and then Leongatha. We hope that country hams in some of these places will get interested and come on the air. Incidentally the stability of the little MOPA outfit is quite excellent and no trouble is experienced in copying it on a super using 465 Kc. intermediates and a regenerative I.F. stage.

We hear now that quite a number of W6's are running regular transmissions beamed on VK and we hope that the band will open up shortly for DX. Our tests for the ZL's and VK6's have not been successful as yet, but we anticipate results in the not far distant future. I will try and get some definite information concerning the Americans shortly. Another interesting piece of news is that VK5NR (Noel, ex-3NR) is all ready to do 6 Mx tests from Katherine.

In South Australia there is considerable activity. VK's 5GB, 5QR, 5BQ, 5JU, 5CR, 5GM and 5GF can be heard most times working among themselves and as they all somewhat live in the same area they would welcome more Hams on this band to enable contacts over greater distances, possibly with the I.R.E. Trophy in view.

The greatest distance reported on 50-54 Mc. from the

view point of the contest, so far is Prospect to Port Adelaide, and Prospect to Colonel Light Gardens. These were made before the boys were trying so it may be expected that these contacts will be knocked over any time now.

The pre-war record for the 5 Mx. band still stands at 70 odd miles. Mt. Lofty to the Hummocks with 5HD at the Hummocks and 5GB-5KL at Mt. Lofty. This will take some beating on 6 Mx., but if enthusiasm counts it is as good as beaten.

5CR worked Mt. Lofty to Outer Harbour on 6 Mx., just prior to the opening of the present contest.

Mr. R. Waters, 8 Rourke St., Woollongong, N.S.W. (telephone 1299) wishes to contact any amateurs in his district. He is willing to listen for, and report on, any 6 Mx. transmissions.

VK5GB and VK5KC have been heard testing on the 166-170 Mc. band. The obvious technical and practical efficiency required has probably deterred many from attempting to break in on this band. The same thing was said when we were given our present high frequency bands many years ago, but this did not deter the pre-war Ham and certainly will not stop the post-war Ham.

CORRESPONDENCE

Correspondents are requested to keep their letters short and to the point. The Editor reserves the right to delete anything he may think fit. The views expressed by correspondents are not necessarily those of the proprietors.

The Editor, "Amateur Radio,"

I have just received a QSL card from W9JYF who was operating portable J and he asked me to notify you that he will QSL all VK QSO's. His QTH is Ken W. Young, Woodstock, Illinios, U.S.A.

H. G. WOHLERS, VK3YV.

49 Farnham Rd., Ashford, S.A.

Editor, "A.R."

Having read a current weekly, with its design of a 50 watt Xmitter, I feel something like the enclosed should be published without delay. On top of that, I was able to listen to the plans of four prospective hams—men with commercial tickets and between them and the article referred to, I felt really sick. (You may have noted the article—I have said nothing of the modulator but if it does not provide for modulation of all three stages, I'll give the game away.)

In addition to my little effort, I would like to see some "old reliable rig" described in "A.R." Even if it means going over old ground. We have tons of new readers, new hams and etc. It would be better if we heard over the breeze that "my new rig was taken from 'A.R.'" Don't you agree?

My copy of "A.R." did the rounds at the office yesterday and the boys were most favorably impressed. There are three oldtimers there, 5GA, 5FB/5FBX and myself (now 5JD) and four or five commercials who are taking out Ham tickets. There are three new members at least for W.I.A.

5SP has erected his 60 feet steel tower. If you are interested in a description and fotos . . . in various stages of erection, let me know and will forward.

Yours etc., JACK COULTER,
VK5JD ex-VK3MV.

Why do the manufacturers of coils, I.Fs., etc., spoil the product for a h'peth of tar? Why not supply nuts with the mounting screws?

QSL BUREAU

The following addresses of Overseas Bureaux have come to hand:—

Argentine:—Radio Club Argentino, Av, Alvear 2750 7 Piso, Buenos Aires.

Holland:—V.E.R.O.N. (replacing N.V.I.R.), Postbox 400, Rotterdam.

Great Britain:—The R.S.G.B. has appointed G2MI as QSL Manager and desires that all cards for the British Isles be forwarded to his address in lieu of that of the R.S.G.B. The QRA of G2MI is:—G2MI, Mr. A. O. Milne, 29 Kechill Gardens, Hayes, Bromley, Kent.

Cards for the following VK3 stations will be distributed at the August meeting of the Victorian Division. Those not collected may be obtained by the usual stamped addressed envelope:—

VK3's AC, AH, ABA, ADR, AFO, AFQ, AHB, ABW, ADX, AGS, AJE, AMP, ARH, ADR, BC, BR, CO, CP, CX, DA, DI, DM, EG, EN, EO, EQ, EZ, GB, GD, GX, HK, HT, IF, IG, IK, IP, IU, IW, JD, JK, JR, JE, JT, JZ, KC, KG, KI, KR, KU, MB, MJ, MR, MW, NW, OP, PG, QK, QP, QQ, QV, QW, RW, RZ, SB, TM, UC, UJ, UQ, VD, VM, VP, VU, WX, XC, XK, YH, YP, YR, ZD, and Woollard.

Pete Maplestone (VK3QN) has moved his QTH to the Parafield Aerodrome for six months at least and has hopes of starting up as a VK5 if it's OK with his hotel manager!!

W1DCE/6 C. H. Jackson, Route 1, Box 27D, Palm City, Calif., U.S.A., is an ardent philatelist and desires to contact VK's who pursue that hobby.

Cards are commencing to dribble in from all corners of the globe, and the postwar postman on the Bureau round can't quite make out what's going on!

DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX, Box 1734 G.P.O. Sydney.

Meeting Place: Science House, Gloucester and Essex Streets.

Meeting Night: Fourth Friday of each month.

The June General Meeting was held on Tuesday the 25th and, although the attendance did not equal the record set at the previous meeting, the Lecture Hall at Science House was just comfortably filled, with about 80 members and visitors present. No doubt there would have been a better roll-up if the meeting had been held on the fourth Friday, which is the usual date, but unfortunately the hall had been booked well ahead by the I.R.E. for this night.

No figures are available on the number of hams who turned up at the I.R.E. meeting by mistake but, if there were any, they heard the same lecture that had been given at the W.I.A. meeting three days earlier.

The lecture was titled "Modern Alchemy" and was delivered by John Briton, B.Sc., B.E., A.M.I.E. (Aust.), F.I.R.E. (Aust.). During the war Mr. Briton was in charge of Engineering Development of Radar in the Radiophysics Division of C.S.I.R. and in 1945 was appointed Chief of the Division. He has made a special study of nuclear physics and recently published a booklet on the subject, with special reference to the atomic bomb.

The lecturer traced the history and development of nuclear physics from the beginning of the century, starting with Rutherford's first experiments and Einstein's mass-energy equivalence equation and, continuing through the development of the giant cyclotrons, to the climax of the first man-made atomic explosion in the New Mexico desert.

In lucid style, Mr. Briton succeeded in giving his listeners a clear concept of the structure of the atom in the light of modern theories and went on to describe the enormous task of producing sufficient U235 and plutonium to make the manufacture of atomic bombs practicable. Some idea of the magnitude of the project can be gained by the fact that the Hanford Engineering Works, to produce about a gram of plutonium per day, requires a plant covering sixteen square miles and needs all the water of a large river, continuously flowing through the uranium piles, for cooling.

As evidence of the interest that this lecture created, there were surprisingly few matters of general business brought up by members afterwards. Presumably everyone was still stunned though being bombarded with too many neutrons!

We regret to report the death recently of Bob Fussell, VK2SS, a keen Ham and a highly-regarded member of the Institute. A wreath was sent on behalf of the Council and members of the Division and at the July General Meeting it is intended to hold an auction sale of his gear in order to raise money to assist his widow and young family.

Best news of the month was the re-opening of the 7 and 14 Mc. bands for amateur use. FHQ are to be congratulated on an excellent job well done. Less than a month ago there did not seem to be the remotest chance of these bands being made available until much later in the year. In fact enquiries through the local R.I. seemed to indicate that 3.5 Mc. was the only band likely to be released soon and that 14 Mc. was right out of the question. If there are any amateurs who still feel that the W.I.A. does nothing for them, the good work done by FHQ should convince them of the error of their thinking.

(Continued on page 20)

IN REVIEW

We are pleased to announce publication of the 1946 edition of THE RADIO AMATEUR'S HANDBOOK, the Twenty-Third Edition of the standard manual of amateur radio communication.

Previous editions having fulfilled well its "duration" job as a training text in many military schools and as source data for service-written special courses, the 1946 edition of the HANDBOOK marks a return to peacetime conditions with a special revision to meet postwar activity requirements of amateur radio operators, many of whom themselves are returning from service.

Although work on the present edition, which began in 1945, was along previous wartime lines, the coming of V-J Day and the imminent prospect of resumption of amateur operation pointed to the necessity of a complete revamping or redesigning of prewar equipment. As the foreword states, "although it meant re-doing much of the work and delaying the appearance of the Handbook beyond the anticipated publication date, this revision has been completed."

Designed and written as an amateur communications manual, the 1946 HANDBOOK still retains the unique and original flavor of the previous editions that have been so widely accepted by the civilian and military radio world.

The 1946 edition is divided into three main parts. In addition, there is an Introduction containing an outline of the history of amateur radio, its present status, and prospects for the future.

The nine chapters of the "Principles and Design" section constitute a thoroughgoing textbook of radio principles, fundamentals, theory and design, written in non-mathematical style for busy practical people of average education. From Ohm's Law to magnetrons and pulse technique, the material is arranged in topical sections to make readily possible the selection of information desired, presented concisely with ample cross-references permitting the background always to accompany the subject under consideration, and adequately supplied with diagrams, charts and graphs to illustrate each point.

Also of nine chapters, the section on "Equipment Construction" has undergone complete revision, particularly in the V.H.F. (very-high-frequency) chapters, to become a modern, up-to-the-minute practical manual on construction of all types of amateur receivers, transmitters, antennas and associated equipment. Each design—and there is one for nearly every practical communication problem—includes optional use of alternative components depending upon what might be available, a particularly important feature in these days of shortages.

Perennial features of the HANDBOOK are the comprehensive compilations of data on vacuum tables, a general information section with its collection of formulas and miscellaneous data tables, and the topical index as a means of readily locating every subject discussed in the text material.

The Radio Amateur's Handbook (Twenty-Third Edition 1946), by the Headquarters Staff of the American Radio Relay League. The standard manual of amateur radio communication, revised and re-styled in the light of postwar needs as a radio construction manual and training text for class or home study. 688 pages, 6½ x 9½, including catalogue section and 11-page topical index. 1249 illustrations, including 114 charts and tables, 185 basic formulas.

The W.I.A. got the bands back for the benefit of every amateur in Australia and for this reason every amateur should be a member.

Morrie Meyers, VK2VN, was recently awarded the O.B.E. One of the many Hams who were in the R.A.A.F. W.R. at the start of the war, he rose to the rank of Wing Commander and was responsible for the organisation of advance R.A.A.F. communications in the Pacific theatre. Since his return to civil life he has been elected to the Council of the Division and now holds down the job of Communications Supervisor with Quantas Airways.

The response to our request for lists of countries worked was very poor—in fact the only one received so far is from Ray Priddle, VK2RA. Evidently all the other DX men thought the going was too tough and were frightened off by Ray's formidable total last month. No doubt with the choice DX now appearing on the 14 Mc. band everyone's total will go up by leaps and bounds and there will be a keener interest displayed.

What about making this a nationwide feature, Mr. Editor? An Australian DX Century Club (unofficial) should meet with general approval and would promote healthy rivalry between Divisions for the honour of topping the list each month.

VK2RA's list contained such juicy ones as VQ3TOM, YR5C, YI2XG, CR9AG, VQ2GW, OA4AS, ZACR Greece and XACP Sardinia, all worked on "Ten," and amounted in all to 49 countries, all except the last six being 28 Mc. contacts—not bad at all!

There is not much to report in the way of individual activities of members this month. Everyone (and this includes the Secretary) has been too busy either looking for the old 14 Mc. coils or winding new ones, and frantically digging out any old crystals in the hope that their harmonics would fall somewhere between 14100 and 14200 Kc. Incidentally, those crystals out of "handie-talkies" work quite well and give good harmonic output in a tritet circuit. In our case, it was necessary to increase the cathode capacity from 100 to 200 mmfd. for best results. The two pins of the holder are the same diameter and spacing as the alternate pins in an octal valve base and so two crystals can be plugged into an octal socket.

Whilst modulating our own carrier, it can be reported that at VK2JX's new location two beautiful 40-foot sticks now reach skywards and on the week-end before "20-Day" a start was made at erecting an eight-element 28 Mc. rotary. Needless to say, plans were changed before the next week-end and a 14 Mc. W8JK beam went up instead!

Jack Scott, VK2AJX, reports that, waking up at 2.30 one morning recently, he went on 14 Mc. and worked Europeans continuously for about an hour and a half. The band is only open at this time on comparatively rare occasions, but the signals arrive at the other end when there is not much QRM. Jack was in England before the war and says that at 2100 GMT the QRM from W stations is terrific and that is why you find it so hard to raise those Europeans that you hear so well just around sunrise!

We are beginning to realise that "Ten" was not such a bad band after all. There is no doubt that the band will have to be cleaned up in a big way. Whether anything can be done in the way of segregating CW and Fone stations is something that will have to be thoroughly thrashed out but, in the meantime, some control must be exercised to prevent overmodulated phones splattering over 50 Kc. of the band. There is no excuse for overmodulation and a simple overmodulation indicator, in the shape of a milliammeter and associated diode rectifier, should be an essential part of every plate-modulated phone transmitter. Several phone stations have been heard lately working across town and overmodulating

badly. This is a form of extreme selfishness and one wonders what has become of the amateur spirit that always characterised the game in the past.

Jim Corbin, VK2YC, has been appointed Federal Councillor for 1946. Jim represented the Division at the last two Federal Conventions.

"Ignorance Is Bliss" Department (CW Section)

Doesn't it make you feel good when, after listening to a string of perhaps eight "CQs" followed by "DX," the procedure starts all over again and you have to wait for two or three minutes before this bird finally signs. How is anyone to know whether he is DX or not, until he gives his call? Of course, only VK's seem stupid enough to adopt this practice and so you can bet that he is not DX to **you.**

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne. WM 1579.
Meeting Place: Lecture Hall, Chamber of Manufacturers' Building, 312 Flinders Street, City.
Meeting Night: First Tuesday of each month.

With 3KN "Disposals" Kinnear in the chair the July meeting was devoted to "wax-boring" on matters of great importance, mainly due to the untiring efforts of the Chairman and Secretary, to obtain materials from the Disposals Commission at the best possible advantage. Amongst the items purchased was a small quantity of Class "C" Wavemeters and judging by the numerous disappointed applicants it clearly indicated the value of such an instrument and also the sound judgment of the Institute representatives.

Ere this appears in print many members will have collected meters and other equipment for which they were successful in tendering and eagerly await the arrival of other items from Interstate.

The meeting was again one which displayed the increasing interest and membership in that 160 odd were present of which P. Monfries (VK9RN) and G. Waller were visitors, the remainder being VK3's: OF, OT, AJH, TU, IU, QZ, ST, AJA, IO, OV, IW, TE, UH, ALW, AHO, RX, OK, AKL, KC, QC, CT, JO, RN, XJ, IK, FR, BD, AP, FS, CZ, CP, DM, JI, PU, AGS, RI, LA, TF, VZ, DF, AT, LI, QP, LN, LF, LL, VX, QE, AHM, UJ, AG, AI, AJK, EK, PW, RT, BJ, LS, GU, OP, HB, OZ, ARN, YK, YJ, ABA, PG, RJ, UM, XR, ZC, ADS, SK, LX, EA, ZB, ML, GG, UK, BQ, ZV, VQ, KV, IC, OJ, DN, JA, XK, KM, WY, WQ, CF, KN, NU, and Messrs. Cains, Sloane, Belcher, Gray, Waterman, Bruning, Burdiekin, Moroney, Lancaster, Henderson, McLeod, Raub, Jones, Briggs, Rimmer, Sandon, Sayle, Chesterfield, Marshall, Muir, Siddon, Chalmers, Du Faur, Sloss, Porter, Iliffe, West, Curnow, Zolles, Barnden, Smith, Neilson, Brooke, Groves, Walsh, Mr. X and Mr. XX.

The scribe apologises for any names incorrectly spelt as great difficulty is experienced in deciphering some of the names and members who desire correct spelling of their names to appear please print same.

Last but by no means least was the President of F.H.Q's. advice regarding the partial restoration of frequencies and other matters which were fully covered in the last issue.

The next meeting being the Annual one, a great roll up is expected and provision has been made for the reinforcing of walls to stand the strain both orally and physically.

From the North East we learn that VK3HP, of Springhurst, is on the air at last using CW; VK2OJ in Albury has been rebuilding his rig and making a real dandy job of it too incorporating all his post war ideas. VK3YV in Wangaratta is very happy with the contacts he has made using the old 40 mx Zepp, ZS6DW, ZS6DJ, ZS1AX, ZS2CI, ZS2AZ, TG9PB, CE1AH, XZ2DF, XZ4AR, VS1BJ, VS4JH, OQ5BL, PK4DA as well as most of the Pacific Islands, etc. Has also commenced building a steel tower to hold up a 3 element rotary beam as is VK3JK who blew up two of his 802's.

QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.
Meeting Place: State Service Building, Elizabeth St., City.
Meeting Night: First Friday of each month.

Notes this month are something of a problem, what with power restrictions, etc., and the record low attendance of seven at the last General Meeting as a result of same. General Meetings are a good source of dope and we're feeling the pinch! However happy days are here again and as well as 240 we also have 20 and 40 which is very FB whichever way you look at it.

Then there was the Field Day held on the weekend, 8th and 9th July. Although only three teams participated, everyone had a whale of a time, 4ES, 4JP and 4KS were the stations taking part. The individual operators being respectively 4ZU, 4VJ and 4RC with 4FY and others looking in occasionally. 4JP and 4KS operated from hilltops on the outside suburbs of Brisbane and 4ES from Clear Mountain; a mountain—I beg pardon—a hill about 20 miles from Brisbane. This particular site proved a veritable paradise for reception and with the help of a 3 element beam, the DX rolled in in great style. Unfortunately, our little 4 watt signal didn't roll out to such good advantage, at least as far as DX was concerned. We worked ourselves to exhaustion contacting VK3's however, 4JP and 4KS having the same experience.

What with Herb (4ES) calling CQ DX on phone with the Modulator off, 4KS up on the roof of a shack with 4RC holding up the mike for him to speak into, and 4JP with a steak in one hand and a mike in the other, it was good fun. If any of you fellows are wondering what 4KS was doing up on the above mentioned roof, I forgot to mention that he was holding the Antenna up during a period of slight disorganisation. The show culminated with 4JP having the top score, 4ES second and 4KS third. Good work fellows and we hope that there are more entries next time.

The QSL Bureau is functioning very nicely under the care of 4EN, so there's no excuse for you fellows with stacks of cards waiting for dispatch—you know what to do with them. Mention of 4EN brings to mind the fact that there are now a lot of the local lads working for the P.M.G. in one Department or another. A few are 4CJ, 4RF, 4AH, 4FE, 4LW, 4EL, 4HU, 4HM, 4EN, 4HR and numerous prospective hams.

The 6 metre band is becoming a little more popular with 4AW, 4RY, 4FB, and 4ZU now having a megacycle each to play with. There is plenty of room for anyone else however, as we are quite willing to share our respective megacycles!

The first post-war year of the VK4 Division has passed by and finds the Institute in a firm position although still greatly handicapped by the lack of a permanent room of our own. By the time this appears in print we expect that something will have been done to give some service to country men, at least as far as the Library is concerned, the QSL Bureau is of course available for all who care to use it, CUL 4ZU.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.

Meeting Place: 17 Waymouth Street, Adelaide.

Meeting Night: Second Tuesday of each month.

The Monthly General Meeting was held on Tuesday, 9th June, at 17 Waymouth Street, and a splendid attendance of 100 members was again noted. It will be interesting to watch the future attendance at meetings in view of the fact that new bands have been partially released. Good night time contacts missing on 28 Mc. in the past and now available on 7 and 14 Mc. should be the acid test as far as attendances at meetings are concerned.

The lecturer for the night was Mr. E. L. Andrews (VK5EL) whose subject "YAGI ANTENNAS" was delivered in an instructive and interesting manner, a somewhat difficult feat at times where technical subjects are concerned.

Mr. Andrews explained the advantages of beam antennas in the fact that they gave a directive lobe of increased signal strength and cut out unwanted signals when used for reception. He also described several methods of obtaining a beam antenna, such as stacked array, phased array (long wire) and parasitic arrays, and the advantages or disadvantages of each. Two parasitic arrays in the "YAGI" and "WYNDHAM" were described at length with particular reference to the effect of adding elements. The methods of feeding and adjusting these elements including a discussion on the merits and demerits of co-axial cable rounded off the lecture. Question time found Mr. Andrews besieged with queries, the number of which demonstrated the effectiveness of the lecture.

A vote of thanks to the lecturer was proposed by Mr. W. W. Parsons (VK5PS) and carried with acclamation.

Regarding "off frequency" reports which increased with the release of the new frequencies, several amateurs, although aware that their crystal was close to the edge of the bands, were foolish enough to take a chance. When we remind you that one "Ham" was reported 3 Kc. off frequency it will be realised that more than ordinary care must be taken. P.M.G. frequency checks are not of the hit or miss variety.

It is with regret that the resignation of Mr. Ted McGrath (VK5MO) from the Council is announced. Ted has been a solid and enthusiastic worker for many years and during the war period did much to keep the W.I.A. from sinking into oblivion. Pressure of business is the reason and it is unfortunate that the Council has lost the services of a member of such high standing in the Professional and Amateur Radio world.

The trophy donated by the I.R.E. to the Institute is to be presented to the licensed amateur who produces satisfactory confirmation of the greatest distance contacted on 50 Mc. or the higher frequencies during the twelve months ending 31/7/47. The competition will be open to members or non-members of the Institute and the Council is to be commended on its attitude in this respect. Prospect to Port Adelaide is the greatest distance covered so far in this competition, 5GB and 5QR were the participators.

The membership of the South Australian Division is now 213 members and enthusiasm is still at a record peak. The few licensed hams who are not members probably do not realise that as an organised body the amateurs are strong, disorganised they are at the mercy of those who may feel like having a shot at them. What about it?

The Institute Frequency Meter is expected to be available for calibration purposes in the near future. Several simple rules have been drawn up and any member who wishes to avail himself of the facilities available should contact Mr. A. F. Wreford, VK5DW, who has the imposing title of "Custodian of the Frequency Meter." Don't let the title scare you, he is an extra good scout. No checks over the air are as yet contemplated as sufficient bench work on members' apparatus is expected to keep the "C. of the F. M." busy for a long time.

The first meeting of the new Council was held on Tuesday, 2nd July, and the following appointments were made:—

President: I. Thomas (VK5IT).
Vice-President: J. Kilgariff (VK5JT).
Secretary: E. A. Barbier (VK5MD).
Treasurer; C. H. Baseby (VK5BZ).
QSL Officer and Programme Organiser: G. W. Luxon (VK5RX).
Membership Organiser: J. McAlister.
Publicity Officer: W. Parsons (VK5PS).
Instrument Custodian: A. F. Wreford (VK5DW).

The office of Assistant Secretary has yet to be filled.

WESTERN AUSTRALIA

Hon. Secretary: H. B. Lang, 42 Ord Street, Claremont, W.A.

Meeting Place: Builders' Exchange, St. Georges Ter., Perth.

Meeting Night. Third Monday in each Month.

The June General Meeting of the Division was held as usual on the Third Monday of the month and quite a representative gathering of members were present.

Council members met at 7.30 p.m. Present were 6GM in the chair, 6HL, 6FL, 6WS, 6KW, 6TX, 6WH and 6LW. Several new nominations were dealt with and essential business prepared for the General Meeting which commenced at 8 p.m.

Quite a deal of discussion centered around the Convention report, and it is to be hoped that Major J. Squires (6JS) will be present at the next General Meeting to give us his personal impressions.

During the course of the evening, Capt. M. Murray (6MY) gave a very interesting lecture on "Army Transmitters and Receivers." Mal has a style all his own and the way he delivered this lecture was no exception. A very hearty vote of thanks was carried in the usual manner.

Western Activities

6AJ is leaving us for the land of VK4. Transferred to Townsville. Remember VK6 when you fire the rig Jack.

6DJ still key punching and landing some choice ones with his 807 final. Latest, AC4YN.

6WH.—Building new final and spending a great deal of time on 7 Mc. band. How's DX Ted?

6KW—Chasing from band to band. Still favours "Ten" though heard frequently on 14 Mc. fone.

6RU.—Mostly CW on 20, but still getting some nice DX on "Ten." What price the QRM Jim?

6BW.—Still at the "Golden Mile." No activity as yet. Doesn't like 220 volts D.C. mains! (hi).

6DN and 6RS both new ones on 14 Mc. band. Ron had bad luck with Xtal. Just out eh Ron?

6HL.—Having a good spin with the rig but you ask him about contacts (hi). Well Harry if its not one thing it must be another.

6NL.—Silence on 14 Mc. (maybe under the QRM). Very busy at new QTH. Has plans for rotary.

6LW is still busy as a bee. Is now on 168 Mc. having had contacts on 7, 14, 28, and 50 Mc. bands. No luck as yet on 168. Here's hoping Wally, and I hope you make it soon.

6JS.—Back in town and threatens activity soon.

6WZ asking awkward questions per telegram. You wouldn't be the only one Harry! Look for the lads on 7 Mc. Sunday mornings.

6MU.—Very active on "Ten" but nothing as yet on 7 or 14 Mc. Sunday for you too Mal.

6RG having trouble with P.P. 807 final. Should be active on 7 and 28 Mc. bands soon.

6PJ.—Very active and nice signal. Waiting phone permit. Having little or no luck with 14 Mc. DX.

6DF.—Rebuilding. I have heard, but must see. Believe this to be something really good.

6DD.—Very active, and pulling off some nice contacts, latest is TI2OC. Putting up Vee Beam.

6RW.—Glad to know you are out of hospital Bob. Maybe some activity here soon.

6GM.—No sign yet. Better get the required gear and make good use of that "A" licence.

6SA.—Still silent. That new rig should be just about ready Jim.

6MB.—Heard on 14 Mc. but still has his troubles. What is doing on "Ten" Bill.

6HM has FB signal on 50 Mc. band also has the 832 going nicely on 168 Mc. Not heard on the lower frequencies lately. How about a three-way on 168 Chas.

6FL mostly on 14 Mc. CW and fone. Considering 14 Mc. rotary, but not as yet.

No news of the Port boys this month. Maybe they are doing things and going places.

Conditions generally in VK6 at the moment are very patchy. Not enough activity on 50-54 Mc. band as yet. "Ten" still holding up rather well with some nice contacts available; and at times Europeans breaking through round 1000 G.M.T. on 14 Mc. (200 Kcs. of it). What a band, what a bedlam, but it's good to be there just the same. If you can't copy CW through QRM here's the chance to learn. On 7 Mc. there are plenty of VK and W signals but little local activity as yet.

Country members! We are interested in your activity.

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.

Meeting place, Photographic Society's Rooms,
162 Liverpool Street, Hobart.

Meeting Night: First Wednesday of each month.

At the meeting held on 3/7/46 as above, the Council present were L. Jensen (7LJ) in the chair, J. Brown (7BJ), A. Finch (7CJ), C. Walch (7CW), F. Gee (7RF), A. Allen (7PA). Apology from T. Connor (7CT) who was later present at the General Meeting. All possible general business was cleared in readiness for the General Meeting.

Three new membership applications were received and recommended to General Meeting for acceptance. Correspondence from P.M.G's. Department advising of the opening of part of the 7 and 14 Mc. bands was read, also letters from F.H.Q. advising of the intended early issuing of badges and asking for information re members' interest in the old 200-Metres broadcasting permits. All were left for discussion at the General Meeting.

As this Division had not as yet elected a Federal Councillor it was decided to do so immediately and to recommend to the General Meeting that the Secretary be elected forthwith to this office. This being all the Council business, the meeting closed.

General Meeting.—Present, all as at Council, F. E. Nicholls (7RY), T. Connor (7CT), R. Conrad (7TR), Hughson, K. Kelly (7LL), A. Russell, Clark, M. Loveless (7ML), A. Morrisby (7VJ), R. O'May (7OM), C. Miller (7CM), D. Watson (7DW), W. Watson (7YY), W. T. Hooker (7JH), D. Hildyard (7DH), Koglin, and apologies from T. Allen (7AL) and O. S. Dahl.

Three new members were elected unanimously by show of hands.

As an outcome of the correspondence, members welcomed the news of the 7 and 14 Mc. bands being partly available, general anticipation is a lot of QRM until they expand more. The supply of new badges is eagerly awaited.

Not a great deal of interest was expressed in the matter of reviewing the old custom of a limited number operating on 200-meter phone as in pre-war days, although several of the old 200 gang were present. The general impression was that, if this concession again became available, several would possibly have another go at it.

The election of a Federal Councillor was discussed and the Council's recommendation was accepted and the Secretary, J. Brown, was duly nominated and elected to the office.

The President welcomed our old friend and ex-President, W. T. Hooker (7JH), to the meeting. This is Jack's first appearance since the war and all were glad to renew acquaintances. In replying, 7JH apologised for not being able to attend meetings regularly but pointed out that Waddamana was a bit far away unless he happened to be in the City on meeting nights as he was tonight, he hoped to be able to take advantage of the opening of the lower frequencies to keep in touch. Ten meters had been hopeless in his present location.

The Treasurer drew members' attention to the fact that the New Year had begun and the books were open for subscriptions. Under the Articles, there is a limited time in which to meet this obligation, so members are advised to become financial at their earliest opportunity.

The talk was given by C. Miller (7CM). Bass Suppression and Audio Band Pass Filters was the subject and Charlie took it in his stride, no doubt these lads who devote themselves to study can master these subjects and those present went away with some good practical information on this subject as it was clearly put and well detailed on the "Oscillating Blackboard." To complete the evening, Charlie gave a short talk on his experiences with rotary beams—horizontal, vertical and "accidental" (should a halyard break for instance). At the conclusion he was accorded a hearty vote of thanks by acclamation in appreciation of such a practical and interesting lecture.

Comments in the VK7 June Notes re the Convention have, since the perusal of the Official Minutes, shown to have no foundation and I trust that those who may have read these comments will also study the official minutes and accept any apologies thought necessary. I regret the unjustifiable inferences. 73's de 7PA.

TASMANIAN ANNUAL GENERAL MEETING AND DINNER

The Annual General Meeting of this Division was conducted at 6 p.m. on Saturday, 15th June, at 162 Liverpool Street.

Present were Messrs. A. E. Allen (7PA), T. Allen (7AL), R. Conrad (7TR), T. Connor (7CT), Clark, S. Dahl, A. Finch (7CJ), F. Gee (7RF), N. Hopwood (7GJ), Hughson, L. Jensen (7LJ), M. Loveless (7ML), F. Medhurst (7AH), A. Morrisby (7VJ), C. Miller (7CM), E. Nicholls (7RY), N. Nielson, G. Richardson, R. O'May (7OM), C. Walch (7CW), D. Watson (7DW), apologies from C. Oldham (7XA), R. Bulman, K. M. Kelly (7LL), and T. Moore.

Business.—Election of Officers for ensuing 12 months and Presentation of Reports.

T. Connor and A. Morrisby were elected scrutineers.

The President's report gave a glowing account of the Division's activities and rapid return to strength in the short year that we have been active since resuming. The membership now stands at 46 and is steadily increasing.

The Treasurer's report showed a most satisfactory period, for with a bank balance of £1/16/7 carried forward from pre-war days, we have been able to meet all commitments including per Capita payments and show a balance of £8/10/2.

Two only nominees had failed to become financial.

The Secretary stated that his part had been generally very satisfactory and thanked the Treasurer for assistance rendered at meetings. He also attributed a lot of his success, shall we say, to the energetic work of the President which had eased his burden considerably.

The past fortnight had just about made him a nervous wreck though—he claims—that arranging an Annual Dinner is worse than anything he has yet encountered, particularly to get the necessary speakers for toasts. At this juncture the scrutineers turned up with the ballot results thus avoiding an inevitable total collapse. No doubt though Joe, self consciousness and lack of experience makes most of us want to "pass the buck," hence the dearth of speakers.

The ballot resulted in Messrs. A. E. Allen (7PA), J. Brown (7BJ), T. Connor (7CT), A. E. Finch (7CJ), D. H. Fisher (7AB), R. F. Gee (7RF), L. R. Jensen (7LJ), C. A. Walch (7CW) being elected Councillors.

The position of Councillor for Launceston and districts is unfortunately still vacant. Office-Bearers were elected as under:—

Patron: F. W. Medhurst (7AH).
President: L. R. Jensen (7LJ).
Vice-Presidents: A. E. Allen (7PA), C. A. Walch (7CW).
Hon. Secretary: J. Brown (7BJ).
Treasurer: A. E. Finch (7CJ).
Publicity: A. E. Allen.
QSL Bureau: T. A. Allen (7AL).

During the President's report he made mention of the work done during the war years by 7PA in maintaining contact with F.H.Q. on behalf of this State.

As an outcome of this, 7PA replying, asked that a minute be put on record acknowledging the assistance he had received from L. P. Hyland (7LP) who, up to his death, had shown himself to be a most enthusiastic and energetic amateur, and W.I.A. member and one who would have been an asset to the Division at all times. Overwork and self-sacrifice reduced his health to such a degree that pneumonia with complications following a chill, found him unable to withstand it and thus the end came to one of VK7's relatively new hams, but nevertheless one who had proved his worth.

At the conclusion of this meeting an adjournment was made to Hanton's Cafe where the Annual Dinner was scheduled to take place at 7.15 p.m.

ANNUAL DINNER—21st BIRTHDAY

This, the first annual celebration of W.I.A. in VK7 since the end of hostilities, was also the 21st Anniversary of the Division's incorporation. Hotel catering being so rare these times, it was found necessary to accept a cafe as the next best place, and a most pleasant evening was spent and little fault could be found except in liquid refreshments, which, per force, had to be limited.

Present were:—Visitors, Messrs. K. Burbury and C. Carroll (P.M.G's. Department), W. Nicholas (7WR) broadcasting stations, T. Weeks VIH commercial and Sharland Press. Members: Messrs. F. W. Medhurst (Patron), L. R. Jensen, J. Brown, A. Finch, M. Loveless, T. Allen, T. Connor, C. Walch, F. Gee, A. Morrisby, C. Miller, W. Watson (7YY), D. Watson, R. Conrad, Hughson, Clark, R. O'May, N. Hopwood, E. Nicholls, G. Richardson, O. S. Dahl, N. Nielson, A. E. Allen.

The evening kicked off to a good tempo with all making the best of things. The fare was good and the appetites, not to be denied, did justice to that which was forthcoming.

Toasts appropriate to the evening were then indulged in and were drunk with all the zest possible and although, with one or two possible exceptions, there were no public speakers amongst the gang, those responsible did a creditable job. A few anecdotes tacked on here and there in the responses covering experiences both civil and services, were very interesting and, in some cases, humorous.

A brief session of "ragchewing" brought a very successful evening to an end in the typical Ham spirit and the time being not yet 10 p.m., those so inclined retired for an extra couple of tiddlies ere wending their way homeward.

AMATEUR RADIO

SEPTEMBER 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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

KP3

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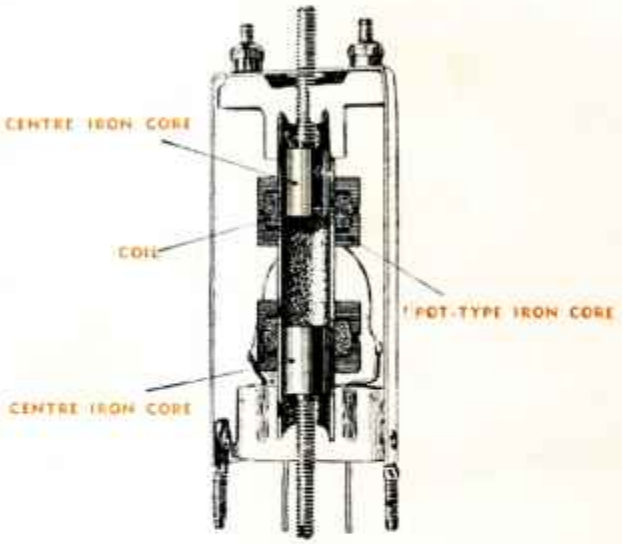
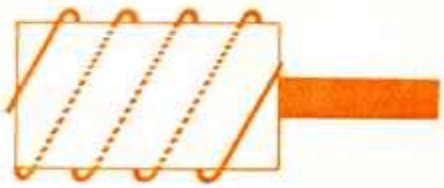


The above diagram is a cut away sketch of a PERMACLAD I.F. Tuning is done by the two centre iron-cores.



FERROTUNE

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KINGSLEY QUALITY RADIO PRODUCTS

KINGSLEY RADIO

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AMATEUR RADIO

Vol. 14 SEPTEMBER, 1946 No. 9

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

With the re-opening of a fair proportion of the 3.5 Mc. band we can feel at last that the amateur portion of the spectrum is assuming a familiar pre-war appearance again. While we now have portions of each of the pre-war bands back again, some of them are only token allocations and we are still the worst off of any country in which Amateur Radio has been re-instated. Your Federal Executive is doing everything possible to improve this position and on that score there is nothing the average amateur can do to assist.

However on the more general side of Ham activities there is a job, and an urgent one, for every licenced amateur worth his salt. The present outbreak of "piracy" is a very real menace to our hobby and it cannot be eliminated too fast. By no stretch of the imagination can Amateur Radio be blamed for the situation, the gear in practically all cases is Disposals equipment and lack of adequate publicity concerning relevant portions of the Wireless Telegraphy Act is, to some degree, responsible for transmitting equipment being sold to unqualified persons. This aspect has been cleared up satisfactorily and while this should reduce the number of unqualified people buying such equipment in the future, it still leaves a considerable number of active pirates to be dealt with.

So long as these pirates sit down in our bands we have a definite responsibility to eliminate them. Some are active in ignorance of the position, others understand their position perfectly but choose to continue breaking the law. Whether we take it or not so long as they operate in our bands they are a potential danger to us and can only bring disaster on the whole amateur movement. With an attitude of "I might as well be hung for

(Continued on Page 14)

IN THIS ISSUE

CLEARING THE ETHER, Series II, Part V

*By G. Glover, VK3AG

CONSTRUCTION AND OPERATION OF MODERN TRANSMITTER (Continued)

Electrical Aspects of Frequency Multiplier:—

(a) The circuit is as illustrated in Figure 8.

(b) Frequency Range.—Unit provides multiplying factors of 1, 2, 4, 6 and 8 covering 1.75, 3.5, 7, 14, 21 and 28 Mc. bands. Frequencies from 1.5 to 4 Mc. are covered with 1 : 1 ratio.

(c) Band switching is effected by three section, 5 position, 2 pole Ceramic switch. Action of switch being as follows:—

Section 1(a) Connects R.F. input direct to output for 1 : 1 ratio and to transformer socket (T.S.I) for remaining ratios.

Section 1(b) Completes V.3 cathode circuit in positions 2 to 5.

Section 2(a) Energises V.4 in positions 3 and 5.

Section 2(b) Completes V.5 cathode circuit in position 4.

Section 3(a) Selects input and output of V.3, output V.4, output V.5 and output V.6 in that order, commencing from position No. 1.

Section 3(b) Energises V.6 in position 5.

(d) A separate single section switch is employed to "Select Output," that is to say, exciter output can be diverted from one channel to another (two channels are incorporated but others may be added if desired), so that more than one set of output stages can be set up. For example, one output may be connected to H.F. Final Stages and the other to V.H.F. Final Stages.

(e) Connections to Ceramic sockets are arranged to provide for use of various types of coupling units, which will be discussed later.

(f) Input circuits of all tubes are arranged so that grid circuit is complete even if the transformer is out of socket.

(g) Cathode circuits of all tubes are opened to render tube inoperative when not required.

(h) Cathode circuits are arranged so that meter shunt is always earthed and not thrown into the air when cathode circuit is opened; otherwise the meter would have practically the full anode voltage applied to it when metering switch was operated.

(j) All by-pass condensers must be capable of withstanding full H.T. voltage while cathode circuit is open. All leads should be as short as possible.

(k) Cathode resistors provide cathode bias to limit anode and screen currents when excitation fails or transformer is absent.

(l) Grid resistor provides bias more or less in proportion to excitation once the positive region has been reached.

(m) All grounded components should be returned to common point associated with each tube, and only one direct earth should be made to metal plate unless the presence of parasitics demands otherwise.

(n) Should parasitics be encountered correct treatment will readily eliminate same. This subject will receive special attention under the heading of "Final Amplifiers."

(o) The switching of links will vary the tuning of the transformers slightly; but as the frequency is merely adjusted for operation in optimum sector of the band, the alteration in resonant frequency should not affect operation.

* Glorad Engineering Services.

Mechanical Aspect of Frequency Multiplier

Remarks in connection with B.F.G. regarding shortness of leads, general set up, etc., apply equally as well to the Frequency Multiplier, and Figures 6a and 6b illustrated set up and lay out of the mounting plate.

Electrical Aspects of Tuned Transformers

This calls for a discussion regarding means of obtaining band-pass. A subject which is usually associated with receivers in the minds of most Hams.

There are various ways of securing uniform transmission of a band of frequencies, namely:—

(i) Near Resonant Choke.
(ii) Coupled Circuits (Cascade).
(iii) Circuits damped by shunt or series resistance.
(iv) Very low L/C Ratio.
(v) Insertion of series resistance in link or capacity coupled circuits.
(vi) Use of band-pass filters.
(vii) Stagger tuning of circuits and stages.

Near Resonant Choke (i).—Strictly speaking we can hardly classify this method as "Band-Pass," but it represents a very economical method of achieving transmission of wide band of frequencies at low efficiency. In practice choke is inserted in the anode circuit of one tube and capacity coupled to the grid of the next stage. The inductance value of the choke is so chosen that, the distributed capacitance of the circuit, inter-electrode capacities of both tubes, and inherent capacity of the choke iself, cause the circuit to resonate at a frequency twenty per cent. lower than the lowest frequency to be transmitted. Under these conditions the circuit present slowly falling impedance to all frequencies above the resonant frequency. Thus output, although not very high in the first place, decreases slowly over a wide range of frequencies. In other words, circuit acts as low Q single section high-pass filter.

Coupled Circuits (ii).—The double peak caused by the interaction of two coupled tuned circuits provides another means of securing band-pass. In this case the band width is determined by the tightness of coupling; but the useful width is limited by the sag in the centre of curve as the coupling is increased.

Circuit Damped by Shunt or Series Resistance (iii).—Reference to the formula for determining the Q of circuit, namely, $Q = XL/R$, indicates that the higher the effective series resistance, the lower the Q, hence the "flatter" is the resonance curve. A shunt resistance loads or damps the circuit and its effect is equivalent to that of increasing the series resistance. Sometimes coils are wound with resistance wire to achieve this effect.

Very Low L/C Ratio (iv).—This effectively reduces the Q of the circuit and can be likened to (iii) in its result.

Insertion of Series Resistance in Link or Capacity Coupled Circuits (v).—This method has been successfully employed to damp output over wide range.

Use of Band-Pass Filters (vi).—Band-pass filters consisting of two or more shunt circuits in cascade, series of "Pi" or "T" Sections. As these types are beyond the scope of this series of articles, we will not dwell on the subject.

Stagger Tuning of Circuits and Stages (vii).—Undoubtedly many Hams have at sometime or other found it necessary to stagger tune the primary and secondary of an I.F. transformer associated with a super-heterodyne receiver, for the purpose of curing oscillation, that is to say it has been necessary to reduce the Q of the circuit. By employing this method of reducing the Q we also increase the band-pass, by virtue of the fact that we move

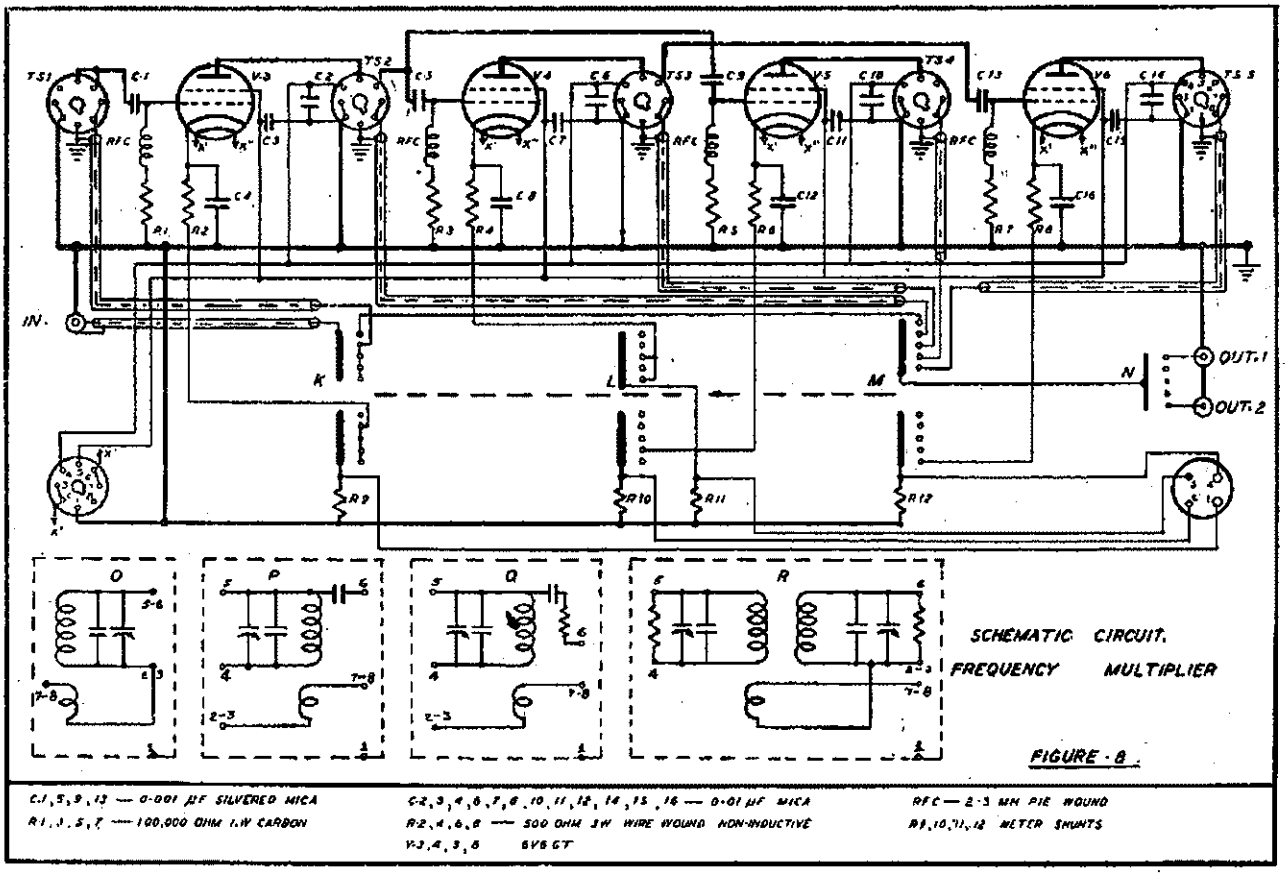


FIGURE · 8 .

the resonant frequencies of primary and secondary further away, and on opposite sides, of the centre frequency. Where several stages are used in cascade we are able to further enhance this effect by stagger tuning the stages. This is accomplished by keeping pass bands of each stage to width where centre sag is small and adjusting each stage around different centre frequencies, spread over the band we desire to cover.

Mechanical Aspects of Coil or Transformer Units

All units follow the same general design as units employed with B.F.G.

Resume'

Before leaving the subject of Exciter Unit, the writer would again stress the point, that the unit used as an example represents one method of attacking the multi-channel problem. The reader should incorporate those ideas which appeal to him, in a unit adapted to both his purse and existing equipment, bearing in mind the ultimate aims of the unit.

The main object of this series of articles is to bring before the reader various methods of attacking a problem and the pitfalls likely to be encountered with each method. As an experimenter the Ham should plan his equipment with a view to carrying out the maximum number of experiments with minimum expenditure of cash and energy. For this reason inserts O, P, Q and R of Figure 8 depict various types of circuits suitable for application to the unit described. O is the input and output transformer, P standard capacity-coupled unit, Q series resistance damped capacity-coupled unit, and R tuned primary and secondary loaded with shunt resistances, suitable for stagger tuning if required.

POWER AMPLIFIERS

Having obtained the final excitation frequency in the exciter unit, the next consideration is how to amplify the desired frequency and apply same either to the aerial system or a further stage of amplification. For the purpose of this discussion we will assume that a further stage of amplification is to be employed. This will enable us to investigate a multiplicity of problems, namely:—

(a) Inter-stage Couplings.
(b) Harmonic Amplification.
(c) Harmonic Elimination.
(d) Parasitic Suppression.
(e) Output Couplings (to aerial and feeder systems).
(f) Neutralisation.

(a) Inter-stage Couplings

In previous sub-section we covered the problem of securing uniform transmission of a band of frequencies, the object being to reduce the number of controls to a minimum, and at the same time secure a wide range of excitation frequencies. In the case of power amplifiers, however, the object is to secure the maximum amplification of the desired frequency, and maximum attenuation of all unwanted components; therefore, inter-stage couplings must provide efficient transfer of power from one stage to another at resonant frequency.

Broadly speaking, coupling methods may be divided into three general classes, Capacitive, Inductive and Transmission Line.

The governing factor in the coupling of one stage to another is the difference in impedance of the anode circuit of the driving stage and the grid circuit of the driven stage. The problem is further complicated if push-pull stages are employed.

Capacity Coupling.—This method is the most simple. Figure 9 depicts various methods of coupling two stages. In Figure 9a the coupling capacitor C has two functions:—

(i) To isolate the grid circuit from D.C. voltage of series-fed anode circuit.
(ii) To provide R.F. coupling. R.F. Choke isolates the

grid from ground and provides channel for operating bias.

The coupling condenser must be capable of withstanding H.T. voltage, plus grid bias, plus super-imposed R.F. current—refer to remarks covering condenser ratings in Part 2.

Figure 9b illustrates the use of shunt-fed driver anode circuit. In this case the tuned circuit is in the grid circuit of the driven stage, and as in the case of Figure 9a excitation is adjusted by varying the location of tap on the coil.

Both circuits quoted to date have one very bad inherent fault, that is, the inter-electrode capacities of both tubes are connected across the tuned circuit, as a result, L/C ratio of driver tank must be reduced thereby lowering the efficiency at V.H.F. Furthermore, the variable tap is often responsible for parasitic oscillation in the amplifier. High harmonic content in the output is also a common occurrence in amplifiers employing this method of coupling.

Figures 9c and 9d employ circuits designed to avoid the paralleling of input and output capacities of driven and driver stages. In both cases the mid-point of the tank circuit is "cold," in so far as R.F. is concerned; hence, the tank is "hot" at both ends and by connecting the tubes to opposite ends of the coil the respective inter-electrode capacities are across opposite ends of the coil. As these two capacities are then effectively in series, considerable improvement in L/C ratio results.

The main differences between Figures 9c and 9d is the method of splitting the tank circuit. In the former excitation is varied by moving the tap on coil, whereas in the latter excitation is controlled by the ratio of C1 to C2. Total capacity being kept constant so as to maintain resonance.

By balancing the driver circuit as shown in Figure 9e a push-pull amplifier can be used. The centre of the balanced circuit is at zero R.F. potential and the ends are at 180 degrees phase difference, the basic requirements for push-pull operation.

Figure 9f shows method of employing split-stator capacitor to furnish balanced ground in driver stage, while an R.F. Choke feeding H.T. to the coil permits coil to assume balanced operating conditions.

In the case of both Figures 9e and 9f adjustment of excitation is effected by varying the position of taps while maintaining equi-distance from centre—more accurately determned by applying Vacuum Tube Voltmeter (V.T.V.).

Figure 9g depicts method applicable to V.H.F. where copper tubing can be employed for coils. This mode of application dispenses with the necessity for coupling condensers, and provides series feed for both driver anode and driven amplifier grid circuits. The inner conductor must have insulation capable of withstanding same stress as the replaced coupling capacitor.

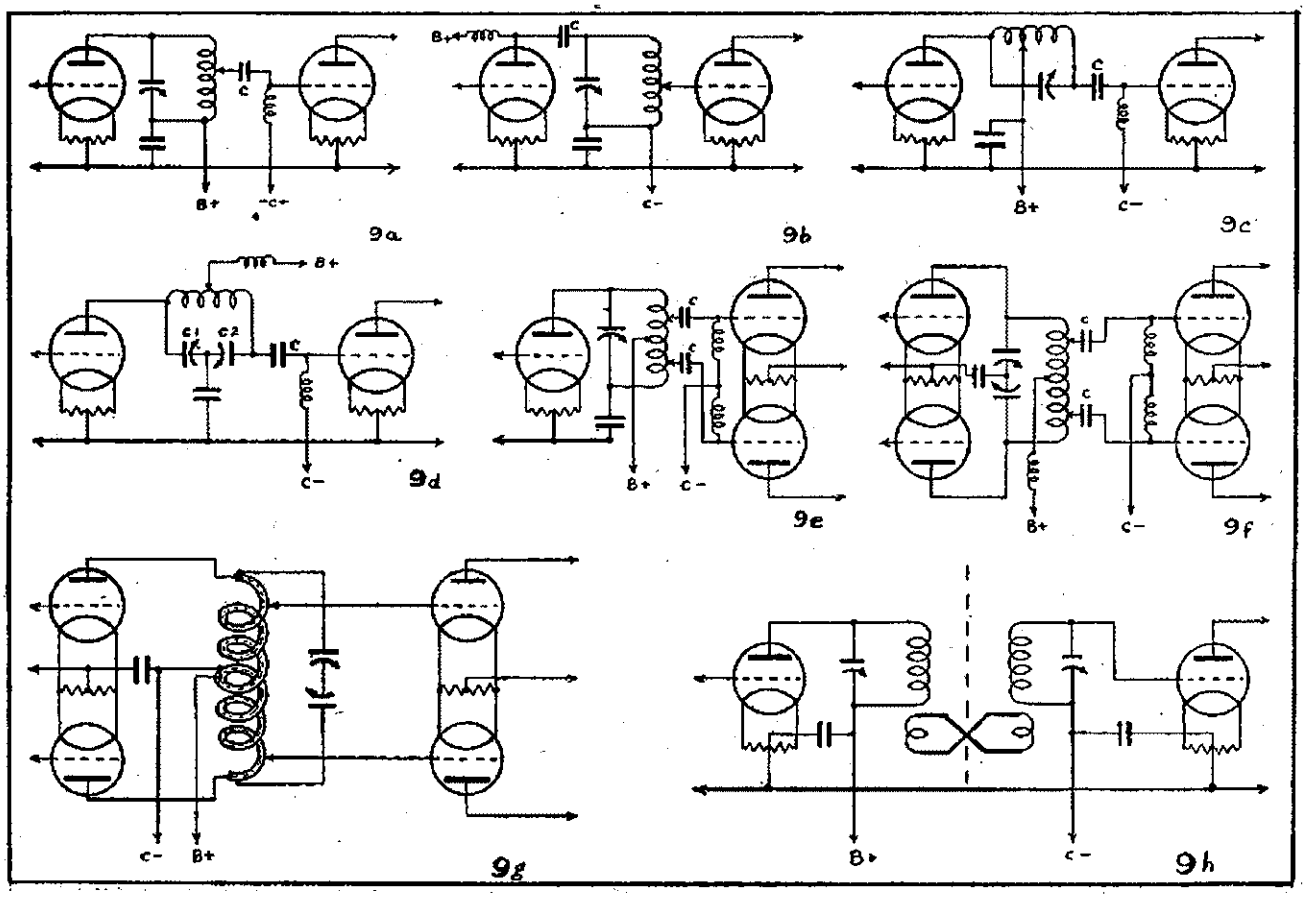
Excitation is varied in the same manner as for Figures 9e and 9f.

Figure 9h illustrates link coupling as used with twisted or balanced pair. The link has many advantages, the foremost of which are:—

(i) The ability to transfer energy between isolated stages without appreciable loss of power.

(ii) Low impedance of link reduces R.F. potential, removing the necessity of conveying energy at high voltage.

(Continued on Page 32)



A SIMPLE CIRCUIT FOR THE 166-170 Mcs. BAND

A. F. Nickson, VK3NB*

To those interested in higher frequency work, the band 166-170 Mcs. offers interesting possibilities, as the highest frequency band before the war was 56-60 Mcs. Unfortunately, however, inspection of the various Handbooks and current articles appears to indicate that, while no new technique would be necessary to reach this frequency band, the common type of receiving valve cannot be used satisfactorily. The reason for this is that the electrode capacities of the standard receiving valve are greater than those of the midget type, and as a result it is impossible to reach high values of frequency without using extremely small values of inductance. This leads to further difficulty as all valve leads possess appreciable inductive reactance at high frequencies, which necessitates the use of a smaller value of inductance than appeared necessary at first. This means that both the external capacity and the external inductance must be less than given by the relation—

$$f = \frac{1}{2 \text{ pi } \sqrt[2]{L C}}$$

by an amount depending on the type of valve used. By the use of midget valves, the effect of valve capacitance and valve lead inductance is reduced, resulting in external values of inductance and capacitance more nearly in accord with the above relation. After reading of the two stalwarts in Sandringham who have despaired of hearing anyone else on the band it was felt that it would be generally useful to determine whether some of the more common types of receiving valves could be used to attain the desired frequency range with ease and reliability.

Because of unforseen difficulties that might arise in attempting to reach the 166-170 Mcs. band, it was decided to make the circuits as simple as possible. To this end, consideration was given to a single valve circuit that could be used as a self-excited oscillator, or as a super regenerative receiver.

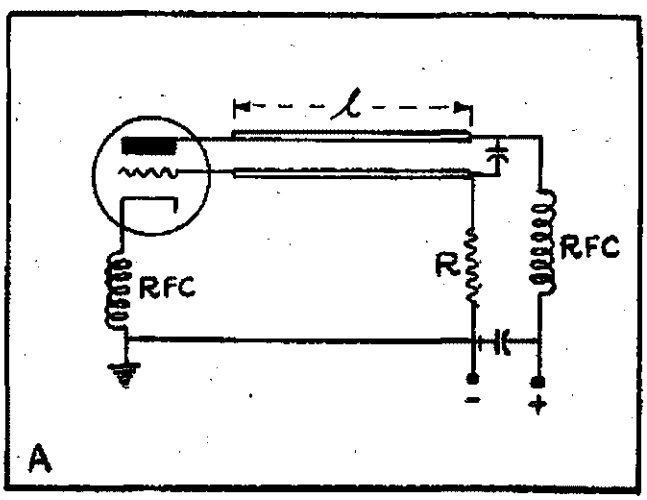
Now there are several advantages obtained by doing this that make this decision not such a retrograde one as many people might think. The most important one appears to be that in pioneering a new band it is often felt that, in view of the uncertain results that may be obtained, the expense of installing a quantity of new equipment may not justify its cost. Consequently if one can use standard valves and parts considerably more interest is likely to be taken in exploring the new band, particularly if the parts can be found in most experimental stations.

The super regenerative receiver is sensitive and does not tune sharply, which is a definite advantage for pioneering work. The modulated oscillator, not heavily modulated is easy to operate, and a useful companion for the receiver. The whole of the equipment for such a transmitter and receiver need not tie up any equipment used normally on the lower frequency bands, resulting in the possibility that those who would like to try the 166-170 Mcs. band but are not willing to rebuild their low frequency transmitter to do so, can now do so with a minimum of outlay.

It is not suggested that modulated oscillators and super regenerative receivers should be used consistently on any band, but solely for pioneering attempts to investigate a new band. When the band is definitely occupied and some of its characteristics are determined, then comes the time for the crystal controlled transmitter and the superheterodyne receiver.

* 18 St. Andries Street, Camberwell, E.6, Victoria.

The simplest circuit that suggested possibilities is shown below. This circuit has the merit that it is about as simple as can be, and because of this is susceptible to mathematical analysis.



For the simplest explanation the circuit can be reduced to an equivalent capacity C and an equivalent inductance L, of such values that

$$C = Cv + Cl$$
$$\text{and } L = Lv + Ll$$

where Cv is the capacity of the valve
Cl the capacity of the line of length l
and Lv is the lead inductance of the valve
Ll the inductance of the line of length l.

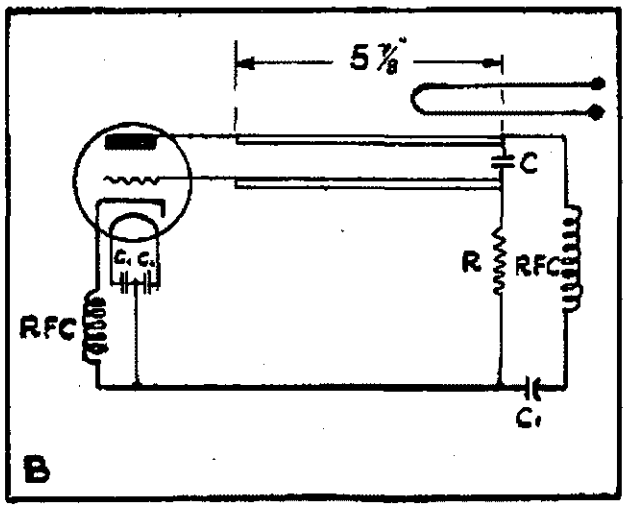
Now Cv can be shown to be equal to—

$$Cpg + \frac{Cpf \times Cgf}{Cpf + Cgf}$$

where Cpg, Cpf and Cgf are the respective interelectrode capacities of the valve. Thus for a start in selecting a suitable type of valve, one is chosen in which Cv is as small as possible. The table gives some interesting comparisons for different types of valves.

Valve	Cfg	Cgp	Cpf	Cv
955	1.0	1.4	0.6	1.77
HY615	1.4	1.6	1.2	2.25
2C22/7193	2.2	3.6	0.7	4.13
56	3.2	3.2	2.2	4.50
6J6	2.2	1.6	0.4	1.94
800	2.75	2.5	2.75	3.88
35TG	1.9	1.9	0.2	2.08
10	4.0	7.0	3.0	8.7
2A3	7.5	16.5	5.5	19.7
834	2.2	2.6	0.6	3.07

It is seen that the 56 is not much worse than some of the accepted special valves used for this high frequency range, AS FAR AS THIS CIRCUIT IS CONCERNED. As the 56, or its 6 volt equivalent, is readily available, this valve was chosen for a start. Of the other factors in the equations for C and L, Cl and Ll are to be found in most advanced text books, and Lv is somewhat indeterminate. For the purposes of this article, the values for Cl and Ll can be written



$$C1 = 0.706\ l\ /\ \ln \frac{2D}{d}\ \text{mmfd.}$$

$$L1 = 0.01016\ l \left\{ \ln \frac{2D}{d} - \frac{d}{l} \right\}\ \text{microhenries}$$

where the conductors used for the line of length "l" inches are "d" inches in diameter, and distant "D" inches between their centres. The logarithms involved are those to the base "e." For the experiment under review, the copper rods used were 1/4-inch diameter, and separated 1/2-inch between centres. Thus, for a line of length "l" inches—

$$C = 4.50 + 0.706\ l\ /\ \ln 4\ \text{mmfd.}$$

$$L = 0.01016\ l \left\{ \ln 4 - \frac{1}{41} \right\} + Lv\ \text{microhenries}$$

For C mmfd., and L microhenries, $f\ \text{Mcs.} = \frac{159}{\sqrt{L\ C}}$.

There is no easy way of estimating Lv. It is best obtained by choosing a certain length of line and calculating the frequency. The oscillator is then constructed and its frequency of oscillation measured. This will be lower than the estimated value. Using this measured value of frequency, it is possible to find L. Knowing Ll, then Lv is determined. As an approximation, Lv might be expected as about 25% of L.

An oscillator was constructed in this way using rods 5 7/8-inch long. It was found that its generated frequency, as measured using Lecher wires, was 176 Mcs. Its estimated frequency was 200 Mcs., and from this Lv is valuated at 0.030 microhenries. This was the equivalent inductance due to the valve leads. The rods 5 7/8-inch long were butted and soldered on the ends of the grid and plate pins of the 56, thus the 0.030 microhenries includes the inductance of the pins themselves. Since the generated frequency was 176 Mcs., the effect of longer rods was not tried, but to bring the frequency into the band would require lengthening slightly the rods, or increasing the spacing between the rods. Increasing the spacing lowers the frequency as it increases the inductance more than it reduces the capacity of the circuit as a whole. No valve socket was used for the 56.

The calculations above show that it is quite possible to use a standard 56 to generate frequencies in the range 166-170 Mcs. How did the circuit work in practice?

(a) As an oscillator, the circuit used is shown below.

(Continued on Page 30)

WIRELESS INSTITUTE OF AUSTRALIA

INTERNATIONAL DX CONTEST

MANAGED AND CONTROLLED BY THE W.I.A.

VK INTERNATIONAL DX CONTEST, 1946

At the direction of the 1946 Federal Convention of the W.I.A. the Federal Executive has arranged an International DX Contest to be staged over two week-ends of November.

This contest is similar in nature to those previously arranged and which are very familiar to the pre-war gang with the exception that allowance has been made this year for single band operation in addition to the "open" all band trials. By this we mean that, if a Ham chooses, he may participate only on one or any number of individual bands or in the whole range as a participant in the open event. It was felt that the time lag in getting started after the re-instatement of the licences would not permit all stations to build multi-channel transmitters and receivers in ample time to contest the open stakes. Then again we think that previous contests have not encouraged entries from Hams with limited equipment facilities and our objective is to create fun for all.

To provide for single or individual band operators in both the receiving and transmitting sections there is to be a contest for each amateur band and all that is necessary for paricipation therein is a notation of the band concerned at the top of the log.

Attractive prizes have been generously donated by our advertisers for the winners of the "open" transmitting and receiving contests as well as for the top scorers in the single band entrants in Australia. In addition F.H.Q. is working on the design of a super certificate for all section winners in VK and the top scorers in each State of the Countries of the world.

Single band operation entries will be accepted from DX stations of course.

We sincerely regret that the ZL boys will not be joining us again this year in this international contest but, owing to the time factor at our disposal in organising this test this year and the fact that both countries have not received equal band assignments back again, as yet, we feel that there are too many difficulties in creating an equal contest for all at the moment.

It hardly seems necessary to have to explain the formulation of serial numbers, but, without this knowledge, some few Hams might miss the enjoyment of the contest, so here is a brief resume of the method. Each participating station allots himself three figures, anything between 111 and 999. These figures form half the six-figure serial number that he hands over to the station he contacts. The other half, at the first QSO, consists of three noughts, 000. Therefore, for example, 453,000 may be a station's number that he passes on to his first con-

tact. In exchange, he will receive a similar number, say, 687,989, which shows that that station has worked another station before, because the three 0's have been substituted by 989. The second half of the six-figure serial number is taken from the first three figures of the number received at the previous QSO, and is added on to a station's own three figures. Then this combination is given to the next contact, and so on throughout the test. Always retaining the first three figures, adding the second and transmitting them in that order.

The executive of the W.I.A. invite amateurs all over the world to participate in this contest and can guarantee you some thrills—especially as the U.H.Fs. should be opening-up around this time of the year!

RULES AND CONDITIONS

1—There shall be two contests:—
(a) Transmitting.
(b) Receiving.

2—Contestants may participate in the "open" events, that is, on all licenced amateur bands, or, in any one or more individual bands by submitting a log for each band. There shall be awards for the "open" section as well as for the winners of each band.

3—The Wireless Institute of Australia Contest Committee shall be the sole adjudicators, and their rulings will be binding in the case of dispute.

4—The nature of the contest requires the world to contact all States of VK.

5—The contest is to be held from 1700 GMT, Saturday, 2nd November, till 1700 GMT Sunday, 3rd November, 1946, and will be continued over the following week-end, 9th and 10th November.

6—The contest is open to all licenced transmitting amateurs and receiving stations in any part of the world. Unlicenced ship and expedition stations are not permitted to enter the contest. Financial members of the W.I.A. and its affiliated societies only will be eligible for awards in VK.

7—Only one licenced operator is permitted to operate any one station under the owner's call-sign. Should two or more operator's operate any particular station, each will be considered a competitor, and must enter his own call-sign and submit, in his log, the contacts established by him. This debars persons from entering who have not a Ham licence.

8—Each entry must be signed by each competitor as a declaration of the above statement.

9—Each participant will assign himself a serial number of three figures, as detailed in the contest description. When two or more operators work the one station, each will assign himself a separate number.

10—All amateur frequency bands may be used.

11—Only one contact with a specific station on each of the bands during each week-end will be permitted.

12—Contacts may be repeated on each of the succeeding week-ends with the same stations in accordance with Rule 11.

13—Each contact must be accompanied with an exchange of serial numbers and signal strength reports, including readability, strength and tone.

14—**Highly Important.**—The judges reserve the right to disqualify any station whose tone report is consistently given less than T8.

15—Scoring.—Three points will be allowed for every contact completed with an exchange of serial numbers and signal reports.

16—Australian stations will multiply their total score by the number of continents worked on each band and the stations outside VK by the number of Districts worked on each band in Australia; there being eight in all, VK2, 3, 4, 5, 6, 7, 8, 9.

17—No prior entry need be made for this contest, but each contestant is to submit a log at the conclusion of the test showing: date, time (in G.M.T.), band, station worked, in and out serial numbers, in and out signal reports, and points claimed for each QSO.

18—Entries from VK stations must reach the W.I.A., 191 Queen Street, Melbourne, C.1, not later than 1st January, 1947, and the foreign logs no later than 31st January, 1947.

19—Awards.—Attractive certificates will be awarded to the station returning the highest total in each State of each participating Country. Special prizes, donated by our advertisers, will be awarded to section winners in Australia. There will be no world winner.

20—Foreign stations should call CQ VK and the VK stations, CQ DX TEST.

RECEIVING

1—The rules for the receiving contest are the same as for the transmitting contest, but is open to members of any Short-wave Listeners' Society in the world. No transmitting station is allowed to compete in the receiving contest too.

2—Only one operator is permitted to operate only one receiver.

3—The dates, scoring of points, and logging of stations once on each band per week-end are subject to the same rules as for the transmitting contest.

4—To count for points, the call-sign of the station being called, and the strength and tone of the calling station, together with the serial number and signal strength report sent by the calling station, must be entered on the log.

5—The above items must be filled in before points can be claimed, that is, it is not sufficient to log a station calling CQ or TEST. Verification of reception must be made in accordance with the conditions in Rule 3 above.

6—VK receiving stations cannot log any VK stations—only foreign stations. Foreigns stations will enter up VK stations heard only.

7—The awards for the receiving contest will be similar for the winners in the transmitting test.

8—Receiving logs are to be similar to transmitting logs.

DX CONTEST

A.R.R.L. and R.S.G.B. confirm dates as OK.

The world is receiving full particulars and publicity by air mail—co-operation assured.

See article on contest for rules and details.

All licenced bands may be used.

There's a contest for all—transmitting and receiving. Prizes for the "open" event as well as for individual band operation available to members.

The following advertisers in "Amateur Radio" have generously donated valuable trophies:—

Rola Co. Pty. Ltd.—One G12 speaker.

Philips Electrical Industries.—One Philoscope L.C.R. bridge. Two TB1/100E (HF100) Transmitting Valves. Two TB1/50E (800) Transmitting Valves.

Standard Telephones and Cables.—Two 4242A medium frequency triode transmitting valves. Two 4282B high frequency transmitting valves. Two VT90 V.H.F. transmitting triodes.

Trimax Transformers Pty. Ltd.—One type TA907 Universal Modulation Transformer.

Keith Harris and Co. Pty. Ltd.—Eddystone components to value of £5.

Amalgamated Wireless Valve Co. Pty. Ltd.:—Transmitting Valves to be selected.

Technical Book and Magazine Co.—Three subscriptions to either QST or CQ.

Swales and Swann.—Transformers and chokes, etc., to value of £5.

Radio Equipment Pty. Ltd.—One "University" A.C./D.C. Multimeter.

Further contributions will be announced in the "stop press" section of the October issue of "Amateur Radio."

SIMPLIFIED DESIGN OF TANK CIRCUITS FOR R.F. AMPLIFIERS

By W. T. S. MITCHELL, VK3UM

PART 1—DESIGN OF L/C RATIOS

This is the first of two articles dealing with the simplified design of R.F. tank circuits. This article was originally written in 1939, but due to further information being co-related, it has been left till now. However, as so many newcomers are "opening up," and this article is initially for the beginner, now is a good time to present it. It will further serve as a check for the oldtimer.

A—General

The general theory of the basis for the calculations can be found elsewhere, but just a brief outline showing the derivation of the tables will be given. When the newcomer is starting up he is generally inclined to rush things and slap a rig together, but by the use of the following tables, he can be sure that his R.F. tank circuits are working efficiently. The writer has drawn a series of ABACS for the following tables, but it is thought that the tables do the job, the only mathematics required being a knowledge of square roots, multiplication and division.

B—Power Amplifiers

Let us make a start by taking the most commonly used Class C Amplifiers.

There are three generally used circuits in use, namely:

(a) The single ended unbalanced P.A.

(b) The single ended balanced P.A.

(c) The push-pull balanced P.A.

Now since we know the operating voltage and current for the particular tube or tubes in use (from Manufacturers' Data), we can determine the input power. The average efficiency of a Class C Amplifier at frequencies down to 30 Mc. can be taken as 70%.

Thence $Po = .7\ Ep\ Ip$

where Po = output in watts
Ep = DC voltage
Ip = DC current

Now Reinartz has shown ("How Much C," QST, March, 1937) that the loaded tank impedance is related to the power output, as shown:—

$$Z = \frac{E^2}{Po} \text{ (Fig. 1)} \qquad Z = \frac{2E^2}{Po} \text{ (Fig. 2)} \qquad Z = \frac{4E^2}{Po} \text{ (Fig. 3)}$$

where Z = loaded tank impedance in ohms
E = R.M.S. voltage
and Po = power output
also E = n × Ep × efficiency
where n = a factor depending on angle of flow of plate current (for an angle of 135 deg., a good compromise, n becomes .8).

therefore $E = .8 \times .7\ Ep = .56\ Ep$

$$\text{thence } Z = \frac{(.56\ Ep)^2}{.7\ Ep\ Ip} = \frac{.448\ Ep}{Ip} \text{ (Fig. 1)} \quad \ldots\ (1)$$

$$Z = \frac{2(.56\ Ep)^2}{.7\ Ep\ Ip} = \frac{.896\ Ep}{Ip} \text{ (Fig. 2)} \quad \ldots\ (2)$$

$$Z = \frac{4(.56\ Ep)^2}{.7\ Ep\ Ip} = \frac{1.792\ Ep}{Ip} \text{ (Fig. 3)} \quad \ldots\ (3)$$

since $Z = Q\ Xc$

$$= \frac{Q}{2\ pi\ f\ C}$$

$$\text{therefore } C = \frac{Q \times 10^3}{2\ pi\ f\ Z} \quad \ldots\ (4)$$

where C = capacity in mmfds.
f = frequency in Mcs.
Z = impedance in ohms
Q = circuit magnification factor

It has been shown that the operating Q of a circuit is the ratio of circulating power in the circuit to the power delivered from the circuit. This ratio or Q determines the harmonic content of the output. For amateur transmitters, a Q of 12 for amplifiers is considered desirable, striking a happy medium between maximum impedance transfer and "flywheel effect," (which reduces the harmonic output). In other words, we require high L/C for maximum transfer, and high C/L for that "flywheel effect."

So now, substituting (1) for Z in (4), we get:—

$$C = \frac{12 \times 10^3 \times Ip}{.448 \times 2\ pi\ f\ Ep} = \frac{4263\ Ip}{f\ Ep} \text{ (Fig. 1)} \quad \ldots\ (5)$$

where C = capacity in micromicrofarads
Ip = DC plate current in milliamps
Ep = DC plate voltage in volts
f = frequency in megacycles

similarly $C = \frac{2131.5\ Ip}{f\ Ep}$ (Fig. 2) ..... (6)

and $C = \frac{1065.7\ Ip}{f\ Ep}$ (Fig. 3) ..... (7)

Now all that remains to be done is to substitute the particular frequency we are to use in either (5), (6), or (7). This is shown in the Table, the frequency taken, being the centre frequency for each amateur band.

It is important to know now that the capacity obtained is the ACTUAL capacity required to tune the given inductance to resonance. We must realise that we have the output capacity of the tube or tubes also in parallel across our coil. This will not worry us unduly providing our coil is designed to give us the inductance calculated from the Table.

Another important point to note, is that if the capacity obtained for Fig. 1 be say 80 mmfds., the capacity required for Fig. 3, for same conditions and output, will be ½ of Fig. 1, or 40 mmfds. per section of the split stator. For Fig. 2, the total capacity required would be 40 mmfds., or 80 mmfds. per section of split stator. (A single stator used in this circuit would have capacity of 40 mmfds.)

Now let us get down to business again and find what our factors will be for L.

$$L = \frac{25330.3}{f^2\ C}$$

Now substituting our value for C from (5) inductance becomes:—

$$L = \frac{25330.3 \times f\ Ep}{f^2 \times 4263\ Ip} = \frac{5.942\ Ep}{f\ Ip}$$ (Fig. 1) ..... (8)

where L = inductance in microhenrys
f = frequency in megacycles
Ep = DC plate voltage in volts
Ip = DC plate current in milliamps

similarly $L = \frac{11.884\ Ep}{f\ Ip}$ (Fig. 2) ..... (9)

and $L = \frac{23.767\ Ep}{f\ Ip}$ (Fig. 3) ..... (10)

L/C CONSTANTS "K" FOR AMATEUR FREQUENCIES

Freq. Mcs.	P.A. or H.G.*	Fig. 1 and 4		Fig. 2 and 5		Fig. 3	
		C	L	C	L	C	L
3.75	Amp.	1137	1.584	568	3.169	284	6.338
	Dblr.	548	3.286	274	6.572	—	—
7.15	Amp.	597	0.831	298	1.662	149	3.324
	Dblr.	288	1.723	144	3.447	—	—
14.2	Amp.	300	0.418	150	0.837	75	1.674
	Dblr.	145	0.868	72	1.735	—	—
28.5	Amp.	150	0.208	75	0.417	37	0.834
	Dblr.	72	0.432	36	0.865	—	—
52	Amp.	82	0.114	41	0.229	21	0.457
	Dblr.	40	0.237	20	0.474	—	—

* Power Amplifier or Harmonic Generator.

$$C = K \frac{Ip}{Ep} \qquad L = K1 \frac{Ep}{Ip}$$

where C = capacity (mmfds.)
L = inductance (microhenrys)
Ip = DC plate current (milliamps.)
Ep = Dc plate voltage (volts)
K = constant for C (from table)
K1 = constant for L (from table)

Since C can be varied, we must have an accurate value of L, so that our L/C ratio will be the value we are calculating for. The second part of this article will provide a simple means of obtaining this calculated value of L.

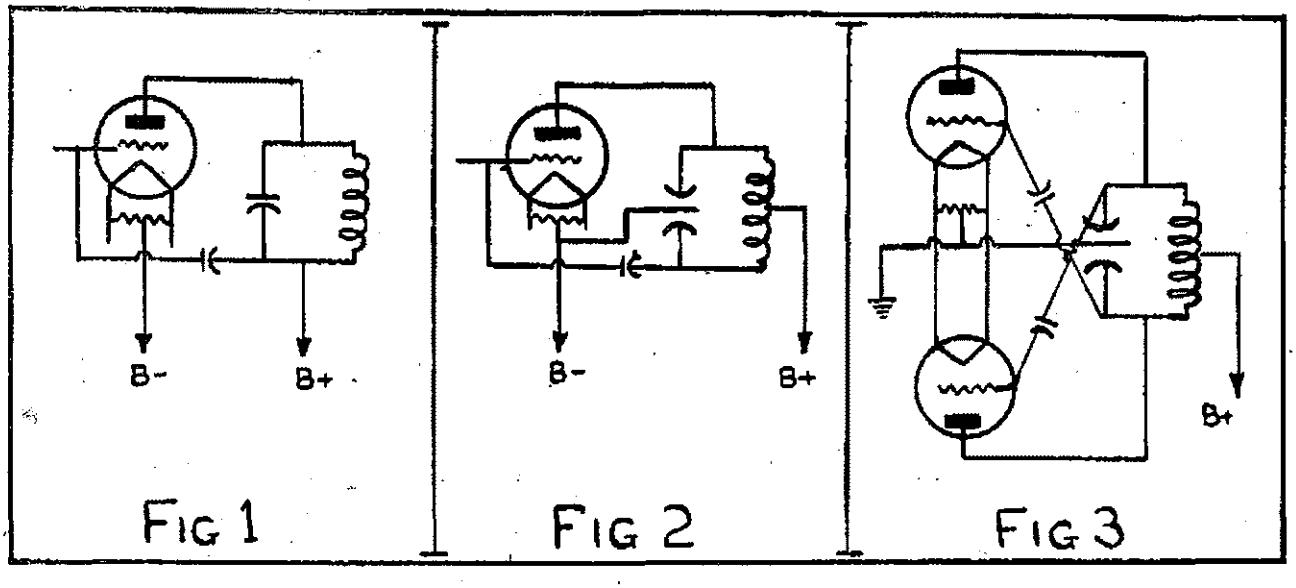


FIG 1 FIG 2 FIG 3

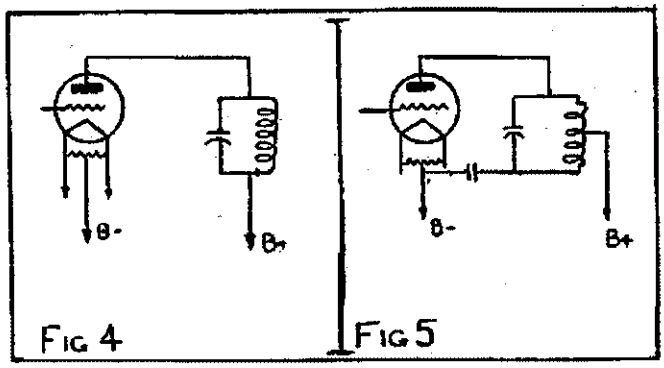


FIG 4 FIG 5

C—Frequency Multipliers

Circuits for frequency multipliers, i.e. doublers, triplers, quadruplers, etc., are similar to Figs. 1 and 2, but need not be neutralised if used for this purpose only.

The same formulae that apply to P.A. apply to frequency multipliers, with the exception that the tube efficiency is reduced to approximately 50% (average, for modern tubes).

Also our value for "n" now becomes .787 corresponding to an angle of flow of 120 degrees. This value of "n" gives slightly greater output, but with a slight increase in driving power. By using the modern beam tetrodes for doublers, we can generally obtain ample driving power to run them.

Referring to (1) and substituting these new values we obtain:—

$$Z = \frac{(.787 \times .5\ Ep)^2}{.5\ Ep\ Ip} = \frac{.31\ Ep}{Ip} \text{ (Fig. 4)} \quad .. \quad (11)$$

$$\text{and } Z = \frac{.62\ Ep}{Ip} \text{ (Fig. 5)} \quad .... \quad (12)$$

Now, as it has already been pointed out, by assuming a small value of Q our "flywheel effect" is decreased, thus increasing the tendency to generate harmonics, which is what we require. A value of Q of 4 will give us this result, so our equation (4) now becomes:—

$$C = \frac{4 \times 10^3 \times Ip}{.31 \times 2\ pi\ f\ Ep} = \frac{2055\ Ip}{f\ Ep} \text{ (Fig. 4)} \quad .. \quad (13)$$

$$C = \frac{1028\ Ip}{f\ Ep} \text{ (Fig. 5)} \quad .... \quad (14)$$

Substituting these values in:—

$$L = \frac{25330.3}{f^2\ C}$$

We get:—

$$L = \frac{12.322\ Ep}{f\ Ip} \text{ (Fig. 4)} \quad .... \quad (15)$$

$$\text{and } L = \frac{24.644\ Ep}{f\ Ip} \text{ (Fig. 5)} \quad .... \quad (16)$$

These values for variations of "f" are also tabulated. To show how simple is the operation of the table let us take two examples.

1.—Find L and C for P.P. 809's operating at 750 volts and current 150 mills (total) on 20 metres.

$$C = K \frac{Ip}{Ep} \qquad L = K1 \frac{Ep}{Ip}$$

$$\frac{Ep}{Ip} = \frac{750}{150} = 5 \qquad \frac{Ip}{Ep} = \frac{150}{750} = .2 \qquad K=75 \qquad K1=1.674$$

therefore $C = .2 \times 75 = 15$ mmfds. (approx. 30 mmfds. per section)

$$L = 5 \times 1.674 = 8.37 \text{ microhenrys}$$

(Note:—This value of C of 15 mmfds. is TOTAL capacity across L.)

2.—Find L and C for single ended unbalanced 807

operating as a tripler on 10 Metres with 500 volts on the plate at 25 mills.

$$\frac{Ep}{Ip} = \frac{500}{25} = 20 \qquad \frac{Ip}{Ep} = \frac{1}{20}$$

therefore $C = \frac{1}{20} \times 72 = 3.6$ mmfds.

and $L = 20 \times .432 = 8.64$ micrihenrys

(Note.—It can be seen that the above value of C is almost unobtainable, unless the voltage to current ratio is reduced.)

If Ep is reduced to 250 volts, then—

$$\frac{Ep}{Ip} = 10 \qquad \frac{Ip}{Ep} = \frac{1}{10}$$

$$C = \frac{72}{10} = 7.2 \text{ mmfds.}$$

$$L = 10 \times .432 = 4.32 \text{ microhenrys}$$

Of course, reducing our voltage will lower our output but if we have an amplifier stage following, this may not be a great disadvantage. However, the Table has its merit in the fact that it is intended primarily for frequencies down to 14 Megs. and is accurate over this range. Below 14 Megacycles however, values of C obtained cannot usually be realised with a variable condenser, so actually we must sacrifice our L/C ratios to some extent here. It can also readily be seen that it is not practically possible to use the same condenser in the final, over all ranges.

The second part of this article will deal with the design of transmitting coils, from the value of inductance obtained by the above Table.

EDITORIAL.

a sheep as a lamb," their methods, procedure and conduct on the air are characterised by none of the restraining influences felt by the average Ham who is proud of his hobby, his station and his operating ability.

The subject is now under review by the Federal Council and your Institute is going to take vigorous action to clean up the position. In the meantime any person reading this statement who does not hold an A.O.C.P. or station licence and who ion which he is using or contemplates using for has radio transmitting equipment in his possess-communication purposes on the Amateur Bands is advised to get in touch with the Secretary of the W.I.A. Divisional Headquarters of the State in which he resides. He will then receive all possible assistance towards obtaining his ticket if he desires to become a Ham, or of disposing of his equipment at a reasonable price if he does not. Otherwise if he is of that irresponsible type who considers he cannot be caught and carries on "pirating" he will find his "Indian Summer" remarkably short and retribution swift and by no means painless.

Every licenced amateur can assist in locating these pirates and advising his Divisional Council of the details for subsequent action. Your personal interests are directly at stake.

DX FOR THE MONTH

28-29 MEGACYCLES

The ten meter band is again coming into its own and can you wonder after the terrific QRM one gets from that factory on 20 Mx., in other words the boys are finding that a complete QSO on 10 Mx. is far more enjoyable than the struggle on 20.

Conditions in general are again settling down to what experience has taught us regarding the best times for the various Continents, and the following times should be of interest to newcomers on 10. 7 a.m. until 3 p.m. for contacts with the United States and islands in the Pacific with K6 often as late as 6 p.m. Central Americans from 10 a.m. till 1 p.m. South American LU around 8 a.m. and the northern parts, i.e. Colombia, etc., from around 8.30 a.m. until 11 a.m. South Africans from 3.30 p.m. until 6 p.m. with the Central and North Africans from 5 p.m. till 6.30 p.m. The Europeans from 5.30 to 7 p.m. with an occasional station as late as 11 p.m.

The position regarding the DX with anything but a beam type antenna need not be stressed, for so often they just are not there if one changes to a good long wire antenna—so get along with that three element rotary if you want to enjoy the pleasures of ten.

Noel of VK5NR (ex-VK3NR) informs us of some of his work and it's a pity that Katherine is in the Northern Territory; evidently it's an ideal location (for radio only) and the following were worked in one night with 25 watts input to the final 807—G3FJ, GI5TK, I2KN, G5RF, OK1FF, F8ME, YR5C, HB9BZ, YI2CA, SU1KE, VP9AP, AC4YN. Noel also helped SU1KE to make WAC in 1½ hours on 1st August, i.e. VU2WP, VQ4MM, VK5NR, G5DF, PY2QK, and a W2.

United States.—W0ULM was the earliest QSO at 0645, W5EHM is interested in making 6 Mx. skeds with VK; W8CRA, of DX fame, is now W3CRA. W5CXS has added a director above and below the director of his three element rotary making it a five element job with greatly improved low angle radiation. W6HIM is using only 17 watts input to an 807 final and a new four element rotary will outshine any of those so-called Californian KWers.

South America.—VP3LF has never heard a VK and TG9PB is trying to convince him to put up a three element rotary. VP3LF is up to R9 every Sunday morning.

W8AIE/ss Cape Dacato on 28050 CW with 20 watt input made a good contact when off the coast of Colombia, S.A., Central America and the West Indies. TG9RC, 28110 and 28180 fone, is workable from 0800 to 1400 hours. TG9RC fone is good and is using a vertical ¾ wave extended Zepp type antenna.

Asia.—XZ2DA 28100 fone with 40 watts to an 807 and a two element rotary. VP9AP at Aden, Arabia, on 28300 fone worked VK3JD and VK3YP, has a crystal detector and four stages of audio—considering the number of unsuccessful callers!!!!!

AC4YN on 28290 CW in Tibet is a hard one to contact.

Africa.—Every Sunday afternoon the band is full and

the following are probably the best. ZS6ID CW, ZS6BT CW, ZS6EJ fone, CR7AD CW on 28075, ZE1JJ CW, ZS6HS CW, ZS5LK, ZS2X, ZS5BZ, ZS5BS. SU1MW from 1800 E.S.T.

Europe.—F8ZR 28300 CW, G5PP 28120 fone and at good strength, G2AIW 28075 CW.

We have just heard that VK3BW has landed a 40 ft. steel windmill tower also that VK3JK, at Wangaratta, has a windmill tower on the way up although Jim is doing very well with his three half waves co-ax fed flat top which he is using at present.

"FIFTY AND UP"

"Fifty" and Up certainly covers a lot of ground, however, the main activity, at least in VK3, which these notes mostly cover, concerns the 50-54 megacycle band. Once again the main contributor has been Ken McTaggart (VK3NW) and covers operations from his station. There are many more, both in VK3 and other States, who could make these notes very interesting reading. Nevertheless the request in last month's magazine did little to bring forth notes from other places.

New signals heard are 3ZO in Balwyn, who is using his 10 Mx. outfit and doubling in the final, which I believe is a TZ40, his receiver being a conventional 10 Mx. super with plug in coils wound for 50 Mc. and his antenna a half wave 40 Mx. 3GB, who has a receiver consisting of 954 R.F., 954 Mixer and 955 Osc. feeding into a conventional super and whose transmitter at the moment is his exciter unit using an 807 doubler into a co-ax. fed dipole. 3BW, in Portarlington, was heard testing his new outfit on Sunday, 11th August, and by the time these notes appear he should be a regular worker on the band. His sig was Q5 R6/7 at the writer's station. He is waiting for his converter to be finished—a job being done by a well-known Melbourne firm, and incorporating an RL7. He will be using a beam antenna.

The strong winds caused a mishap at Dave's place (3MJ). He woke up one morning to find his four element rotary a tangled mass on the roof top. However he has a brand new one functioning again which appears just as good as the other. No other damage reported although I was sure my beams would go too during some of the strong gusts.

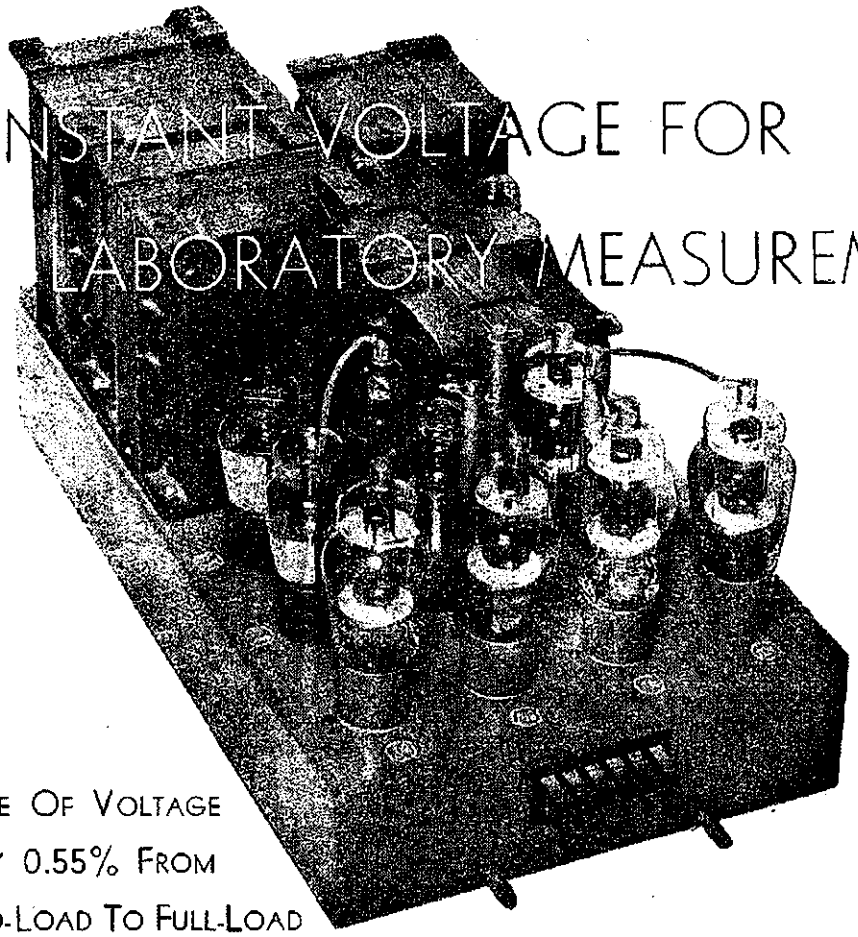
The most consistent signals heard on 50-54 Mc. are still 3MJ, 3QO, 3YJ, 3AFQ, 3GG, 3HK and 3NW. VK3IZ at Red Hill (43 miles from Melbourne), is becoming very interested and some time ago reported hearing signals from 3MJ and myself, using a 56 super-regen. and two stages of audio. 3MJ worked him "cross band" using 40 Mx. and 50 Mc. On Friday, 9th August, I packed the portable outfit into the "Hornet" and went down to Jack's place (3IZ) for the evening. His shack is several hundred feet high on the Mornington Peninsula but is about 100 feet down the far side of a ridge from Melbourne and is well screened by a thick belt of large gum trees also. Although our dipole was only four feet above the flat galvanised iron roof and about 16 feet from the ground, no trouble was experienced in contacting 3MJ with signals at Q5 R5 both ends. We regarded this effort as quite a triumph for the 50 Mc. band and it certainly shows that the signals reach out quite a long way. Signals also heard on the portable receiver were 3GG, Q3 R4; 3QO, Q1/2 R2/3, and the tone signal from my own home transmitter, which unfortunately was only being modulated about 50 to 60% and so did not cause much noise in the super regen, although one could hear that the carrier was knocking back the hiss. We are now hoping that 3IZ will be on shortly as he will provide a good "DX" contact for us. He plans to use either a fixed beam of the three element type directed on Melbourne or possibly a V beam. The transmitter will have a T55 in the final using E.C.O. and doubling stages. A very pleasant evening was had with Jack, Rex (2nd op.) and Gwen who is Rex's XYL and QSL manager for the station!!

On the way home I stopped at Frankston (23 miles) and contacted 3MJ again. This time the signals from the portable were Q5 R7 at 3MJ while his were Q5 R9 on the super regen. This great increase in the signal strength from the portable over that obtained during the Belgrave trip (Q5 R5, also 23 miles) was probably due to the fact that I have "hotted up" the DET3-807 combination somewhat and increased the depth of modulation. Also my antenna by a most unfortunate error(!) was nearly 10% too long on the Belgrave test. When this was corrected a considerable increase in signal strength resulted. The power input is still only 3 watts however.

These results will show any Hams who live round Melbourne that good 6 Mx. work may be done at least up to 40-45 miles and those within this radius of the city need not feel that they will be wasting their time putting in a rig. Our next trip will be to Ballarat on 31st August. where we will test from VK3SE. After the results from Red Hill we feel confident that no trouble will be found in putting signals between here and the "Golden City." There are several chaps up there who are working on 50 Mc. and we see no reason why we should not contact them. However it will be necessary to have polarisation of antennas the same and probably fairly stable transmissions also.

Some considerable stir was caused during the month by a report that VK4CG and VK2ANN had both heard 50 Mc. signals from VK3. Many and varied were the accounts given by the various Hams who had got the information from "so and so" who got it from "such and such," and no two versions agreed. We have written to 2ANN and 4CG but to date have received no replies. Until these come in it is idle to make any speculations at all and we must just be patient. It may possibly be

CONSTANT VOLTAGE FOR LABORATORY MEASUREMENTS



CHANGE OF VOLTAGE
ONLY 0.55% FROM
NO-LOAD TO FULL-LOAD

MANY testing processes require constant voltage to be applied to valves or other equipment during the time that the test is in progress. It is useless to have instruments correct within 1% or less if the voltage is going to vary while the current or other feature is being read.

This is particularly important in the testing of radio valves in which some of the characteristics are critically dependent upon the applied voltages. An example of this is the Characteristic Tester recently constructed in the Laboratory of Amalgamated Wireless Valve Co. Pty. Ltd. at Ashfield. This equipment is used for the checking of a percentage of all valves manufactured each day, to see that the accuracy of the factory testing is maintained, and to carry out other tests not normally applied to the whole production owing to their complexity.

The equipment uses an electronic voltage regulator on the plate, screen and grid supply voltages. The input is from the 240 volt A.C. mains, the output is variable in voltage from 0 to 300 volts with a maximum current of 200 mA. With the maximum output voltage, the percentage voltage drop is only 0.55% for a change of load from 0 to 200 mA.

The equipment uses Radiotron type 807 valves, four of which carry the current of 200 mA. between them. The 807 is probably the most satisfactory type of valve for this purpose owing to its high current capability (72 mA. per valve maximum) and its high amplification factor. This is only one of many applications in which Radiotron type 807 may be used with every satisfaction.

Radiotron
MADE IN AUSTRALIA

Advertisement of Amalgamated Wireless Valve Company Pty. Ltd.

that it is merely a rumour but this type of signal reception is what we expect from now on as the band begins to open up. I might say that if anyone listens on the band and hears signals would they report immediately to 3MJ or myself giving full details of times, calls, etc., as well as details of their own receiver and antenna system.

At 3NW a new receiver is being built and will be in operation shortly. It will consist of an 954 R.F., 954 mixer, 955 osc., two stages of 1600 Kc. I.F. amp. using 6K7's, a 6H6 2nd det., 6J5 B.F.O., 6H6 noise limiter, 6J7 and 6V6 audio. It will be used for portable work also. I hope to be on 166 Mc. by the time these notes appear, using an acorn 955 osc. in a concentric grid line set up. The concentric line is already in operation with the 956 attached and is 7-inch diameter. This gives a Q of 10,000 which is somewhat better than crystal control. The 955 will drive an 832 which will be modulated by a 6A6 Class B with about 20 watts input. The receiver for the time being will be the present portable 50 Mc. with 955 super regen. 6J5 and 6V6. I would be glad to hear from those operating on the band with a view to arranging tests.

During the last week-end 3BW Portarlington made his "come back" on the band using his new Kingsley converter (experimental) with RL7 and ECH35G. His signals are R7/8 in Melbourne and he gave the writer R9+, 3GG (long wire antenna) R8 and 3MJ (four element beam) R9+. Arch will be most active on the band from now on and will be a very good contact for us here.

Also during the week-end Fred (3YS) of Box Hill, put a good signal on the band and worked 3QO, 3MJ and myself. He was adjusting his Rx. which consists of a 9003 R.F., ECH35 mixer, 6K7 I.F. on 1200 Kc., 6U7 2nd det., 6U7 triode B.F.O., and 6V6 audio. His antenna is a half wave vertical co-axial dipole but he intends putting up a horizontal beam shortly. His Tx. consists of a 6A6 xtal osc. (8.4 Mc. xtal) and tripler, 6L6 doubler and 807 final and the speech line up is a Dynamic mike, 6C6, 6J7G and pair of 6V6's.

3GB, Harry, was also operating on phone.

You might care to have a couple of descriptions of good(!) 50 Mc. rigs for the edification of possible participants in the work so here is an account of 3MJ's gear. Rx. is RL7 R.F., EF50 R.F., EF50 mixer, 6J5 osc., 6AC7 1st I.F., 6AC7 2nd I.F. (6 Mc.), 6B6 2nd det, 6C8G B.F.O. and R meter tube, 6H6 noise limiter, 6V6 output and VR150 voltage regulator. Tx. is EL3 tritet doubler (6.375 Mc. Xtal), Taylor T21 doubler, 807 doubler, 100TH final. Modulator is a pair of 6L6G's.

PARASITICS

It is regretted that several errors were made in the circuits accompanying the article by Mr. J. Brown, VK7JB, entitled "Kinks for 807 Users," which appeared on page 10 of "Amateur Radio" for August. Unfortunately these errors are such that satisfactory operation of the circuit would be impossible. The corrections are as follows:—Figure 2, the value of the condenser which connects from the phone plug to the junction of the two 0.002 condensers should be 0.1, and not 0.002 as shown. The junction of all three condensers should be earthed. Figure 3, the negative pole of the microphone battery, and the cold end of the 0.5 mfd. by-pass condenser should be returned to earth, and not to the common cathode return as shown. Figure 4, the choke in the plate feed to the tube in the receiver should obviously be connected to HT, and not to earth as shown. The 0.1 meg. resistor in the lead to the 807 cathode should be connected to the plate of the tube, and the condenser in series with it should be 0.01 and not 0.05 as shown in Figure 4.

Federal and Victorian QSL Bureau

R. E. Jones, VK3RJ, Manager

U.S.K.A. (Swiss) QSL Bureau is again functioning from its pre-war address.

Cards for VU2WP and SV1EC should be routed via R.S.G.B.

The Postmaster General's Department advises that the list of Australian Experimental Licencees, which was expected to be issued in July, will not appear until early in September. The list, which will be in printed form with quarterly amendments will be issued by the Wireless Branch of the Department at a fee of 2/- per annum.

Several State QSL Managers have requested that the call sign of the station for whom the card is intended should be shown on the reverse side of the card as well as on the face. This little act will save your QSL Manager a lot of precious time, fellows.

Some interesting cards are to hand from Rusty Smith W6ONK, confirming contacts he made with VK stations whilst he was located at Bikini Atoll in the Marshalls, using the 28 Mc. band. So far none of the cards have evidenced "radio activity." Rusty's home QRA is 52 Oakvale, Berkley, Calif, U.S.A. to which address cards should be sent.

Another interesting bunch of cards arrived from W0NVF, W3SB/KG6, W. J. Sulser presently located at Guam, Marianas Islands. Sulser retains pleasant memories of Melbourne (and probably other VK capital cities) which he visited in April, 1942, when he was aboard the U.S.S. Boise. His full QRA is W. J. Sulser, A.C.R.M., Com. Air Pac. Pool (F.F.A.) Navy No. 939, c/o F.P.O. San Francisco, Calif.

The following was copied at VK3RJ, 9th August, from W1AW, A.R.R.L. H.Q.:—

"F.C.C. recently announced a further revision of amateur frequencies above 25 Mc. for proposed international allocation. The amateur band 5250 to 5650 Mc. is divided into two sections and relocated—now consisting of 3300 to 3500 and 5650 to 5850 Mc. Amateur micro wave allocations have not yet been altered to accord with the above but this may be expected to occur in the near future. This change is brought to the attention of amateurs to assist in planning equipment contemplated for use on micro wave bands."

Russ Coleston, VK3XK, writing from Cape Wickham, King Island, bemoans the fact that he will be off the air most of August, whilst in the location quoted. He is overhauling the Radio Beacon and other lighthouse equipment and is having a tough time with the boisterous weather.

Another note comes from Eric Trebilcock, once a VK5 and VK8. He is presently situated in Wynyard, Tas., and until the housing situation there improves, he cannot bring over his transmitter and the rest of his domestic goods and chattels including his YF. He is Op at the local airfield and occasionally puts in a burst at VK7AB in Burnie. Eric has itchy footed it around VK since 1940. Up to 1942 he was in VK9, thence VK4 until 1944, VK5 until 1946, and now VK7 until ???. Prior to 1940 he spent two years in VK8 and two years in VK2. I note that he has yet to sojourn in the premier State VK3.

Cards for the following VK3 stations are on hand and will be distributed at the monthly meeting on 3rd September, or on application to this Bureau:—

3AB, ABA, AC, ABW, ADR, ADX, AE, AFO, AGS, AKL, APM, ARH, ART, AV, BC, BG, BH, BR, CO, DA, DR, EF, EH, EJ, EM, EO, EQ, EZ, FA, GC, GM, GT, GX, HP, HV, IF, IG, IK, IP, IT, IU, JD, JR, JZ, KG, KU, KS, KT, LZ, MJ, MW, NB, ND, NF, NW, OP, PG, PZ, QD, QH, QI, QM, QN, QQ, QR, QW, RW, RZ, SD, SQ, ST, TD, TU, TZ, UC, UI, UJ, UO, UQ, VD, VE, VM, VQ, VV, WX, XA, XJ, XK, XN, YC, YG, YH, YP, YQ, YR, YU, ZJ, ZR, Woollard.

The QSL Manager would be grateful if any country members of the Victorian Division whose call is contained in the above list, would advise him of his address.

VK3 Hams please note that outward cards go to VK3OF, F. O'Dwyer, Thomas Street, Hampton, and inward cards to this Bureau, 23 Landale Street, Box Hill, E.11, Vic.

BOOK REVIEW

RADIO HANDBOOK

The long-awaited Tenth Edition of Radio Handbook is at last available, having been held up in production and due to shipping difficulties for some months.

First reaction on looking through this new edition was one of disappointment that it differed in no great degree from the previous edition. That this impression was false was apparent upon more detailed examination. Since almost half of the text is devoted to consideration of fundamentals, the presentation of which was so excellently done in the Ninth Edition, it is obvious that no drastic changes could be expected in this section. The chapters on Receiver and Transmitter construction, together with those covering other practical work have been revised and brought right up to date, indeed, in comparison with other similar books, this Handbook is, as in the previous edition, ahead of its time.

Particularly interesting is the stress laid upon Automatic Modulation Control in the chapters devoted to Phone Transmitters. As a phone hound the writer feels that this feature should be incorporated in every high frequency phone rig, a point of view with which the brasspounders will, for once, find agreement with me. The elimination of (negative) overmodulation which this system, when properly adjusted, can effect is of benefit to all users of the amateur bands, while the prospect of higher average modulation percentage (without increase of heterodyne QRM) should have much appeal to phone operators.

There are many other interesting items to be found in the RADIO Handbook, notable among these being a plate-cathode phase inventor with appreciable voltage gain. The treatment of co-axial tank circuits in V.H.F. receivers and transmitters is outstanding, and a chapter devoted to elimination of B.C.L. interference will be read with interest by all VK Hams in view of the stringent regulations imposed (at present) on us in this connection.

In 28 chapters the RADIO Handbook covers the whole field of Amateur Radio, and includes very comprehensive tables of Receiving and Transmitting Tube Characteristics, these by the way, are set out very clearly and in easy readable form, also much space is given to Workshop Practice and Tests Measuring Equipment.

As previously stated, the treatment of fundamentals is very thoroughly done, a matter of great importance in any such Handbook, whether it is to be used by the student, the established Ham or the old-timer. In all the science of radio, as in any other field of endeavour, there can be nothing so important as a clear understanding of fundamentals, a fact which, sad to relate, does not seem to be as widely accepted as it should.

The RADIO Handbook (Tenth Edition) is a must.

RADIO HANDBOOK.—Tenth Edition (Editors and Engineers, Los Angeles, Cal., 1946) compiled by W. W. Smith, Ray Dawley and others, 9½ by 6½ inches, 590 pages and index, 90 pages catalogue section, numerous illustrations, cloth bound, 17/-.

Our copy by courtesy of Technical Book and Magazine Co.

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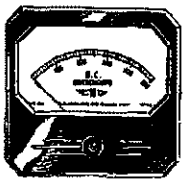

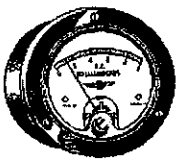

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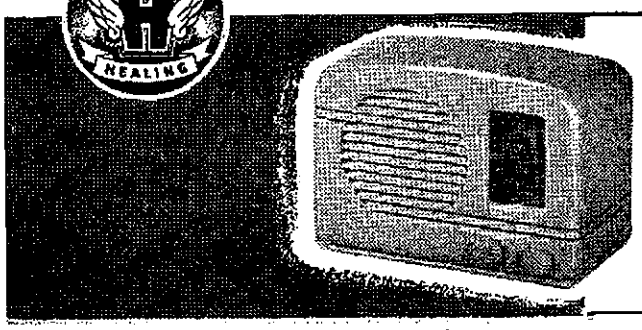

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DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX, Box 1734 G.P.O. Sydney.

Meeting Place: Science House, Gloucester and Essex Streets.

Meeting Night: Fourth Friday of each month.

The July General Meeting was well attended, about 80 members and visitors being present. It was expected that there would be a large amount of general business and for this reason it was decided to leave the lecture until last.

Members were disappointed to hear that Wal Ryan, through ill health, had been forced to resign from the Council and from the office of President of the N.S.W. Division. Wal has devoted the past eleven years to the Institute and his sterling efforts kept the N.S.W. Division going during the war period.

Bill Moore, VK2HZ, has now been elected President and John Moyle, VK2JU, now becomes Vice-President in company with Harold Peterson. Bill Moore, who was Federal President for a term in the old days before the war, needs no introduction and is without doubt the best man that could be found to fill the vacancy. Bill is still living up at Springwood and this necessitates about four hours travelling per day but he has hopes of finding a house nearer Sydney very shortly.

There was considerable discussion on the Victorian Division's proposal for FHQ to endeavour to obtain a 200 meter allocation for amateur use and a motion was passed supporting this proposal.

A lively interest was shown by those present in the possibility of obtaining gear suitable for amateur use from the Disposals Commission. Harry Kinnear has been doing a good job as liaison between FHQ and the Commission and there is no doubt members will be in a position to buy some excellent gear in the near future. Full particulars, including prices, where possible, will be given in the Monthly Bulletin and country members shoud send in their orders as soon as possible. A good proportion of all gear on offer will be held in reserve for country members so that city members will not get an unfair advantage, but you must send in your order promptly, with cheque or money order, as stocks cannot be held for any length of time.

There was an animated discussion on the desirability, or otherwise, of a division of the 14 and 28 Mc. bands into phone and CW sections but in the end it was generally agreed that as the bands, as at present constituted, must be regarded as temporary only, there was no point in seeking to make any division until the full bands were available again.

At the conclusion of general business Mr. M. Lusby, B.Sc., B.E., VK2WN, delivered an illustrated lecture on "Electronics in Industry." Morrie is an engineer with the Westinghouse organisation and has had wide experience with industral electronic equipment. He covered an extremely wide range of electronic devices but unfortunately, as time was limited, some of these could only be touched on, and only those of special interest to amateurs were given detailed treatment. The lecture proved most interesting as most of the audience previously had only a sketchy idea of the operation of the many electronic devices described.

It has been decided to reintroduce the Zone System and Zone Officers are now being appointed. This will permit the Council to keep in much closer touch with country members. Zone Notes will appear in this section of "Amateur Radio" each month and country members are asked to keep their Zone Officer posted regarding their activities.

It is difficult to keep track of the doings of all active Sydney members and it would be appreciated if any members with anything interesting to report would drop a line to the Secretary. Any item of news value will be included in these notes.

Ray Priddle, VK2RA, is apparently the only member interested in working DX—at least he is the only one who sends in his list of new countries regularly each month. Perhaps the others are too busy on the air to have time to write in, but, unless more interest is shown, there is no point in keeping this section going. It's up to you, chaps.

2RA has now brought his total to 60 countries, some of the good ones being CT1JS, SM5OH, VS2BF, UO5VW and VS7AX.

One week-end recently 2VN found that he had a few surplus petrol tickets and so he and 2HZ decided to visit the boys in the Newcastle and Coalfields areas. They visited a number of ham shacks and from all accounts were accorded the hospitality that is traditional in these parts. It seems that a lot of DX is being worked from up there—mostly with relatively simple equipment. The local boys will have to look to their laurels when the DX Contest comes along.

In last month's notes it was stated that VK2JX was planning to put up an 8 element 28 Mc. rotary! In case anyone is wondering how such a contraption could be suspended between two 40 foot masts, it should be mentioned that the word was ARRAY not rotary.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY, Box 2611 W, G.P.O., Melbourne. WM 1579.

Meeting Place: Lecture Hall, Chamber of Manufacturers' Building, 312 Flinders Street, City.

Meeting Night: First Tuesday of each month.

The Annual General Meeting of the Victorian Division, which was held in the Lecture Hall of the Chamber of Manufacturers, 312 Flinders Street, Melbourne, on the 6th August, 1946, was attended by 180 odd and proved to be a very successful and record one.

With President Harry Kinnear, VK3KN, in the chair the following visitors were warmly welcomed—VK7YL and husband (VK7JB), VK5RO, ZL4HS, VK2BN, "Nit Face" Hardie, Laurel Emil, the XYL of VK3AJE, also accompanied by her husband. The others present were VK's 3WQ, 3WY, 3KU, 3WG, 3DH, 3ET, 3LI, 3BD, 3WC, 3YS, 3ABA, 3LX, 3JX, 3QE, 3EK, 3GU, 3OP, 3TE, 3XJ, 3WO, 3VQ, 3XN, 3ZV, 3TF, 3QU, 3LA, 3AHM, 3MQ, 3AJK, 3YH, 3LM, 3ZT, 3VD, 3UO, 3WW, 3ADS, 3PA, 3TZ, 3IU, 3TJ, 3QA, 3EO, 3TQ, 3ARN, 3ZS, 3UR, 3VJ, 3ES, 3ZJ, 3IG, 3HK, 3UM, 3MN, 3UH, 3IK, 3RN, 3FJ, 3HB, 3PW, 3QP, 3KC, 3DM, 3CT, 3LS, 3JI, 3NM, 3ZB, 3SK, 3NW, 3MM, 3HC, 3IW, 3GS, 3ED, 3PC, 3AHJ, 3OF, 3OT, 3AJH, 3XM, 3RX, 3OC, 3OV, 3AJY, 3HS, 3JO, 3DF, 3AG, 3TU, 3AE, 3LN, 3ZC, 3QV, 3YJ, 3JD, 3ADR, 3FT, 3CF, 3JF, 3WF, 3EN, 3CR, 3VX, 3ALW, 3AFQ, 3YX, 3RJ, 3MX, 3EA, 3NY, 3HX, 3AP, 3SZ, 3YK, 3NU, 3SQ, 3OJ, 3QC, 3PG, and Messrs. Bander, West, Curnow,

VICTORIAN DIVISION A.O.C.P. CLASSES

The next series of A.O.C.P. Classes to be conducted by the Victorian Division of the Wireless Institute of Australia will commence in the first week of November. The Course comprises complete tuition in theory, morse code, and regulations up to the standard required to pass the examination for the A.O.C.P. Licence. The fee for the course is Five Guineas which includes text books. Intending students are advised to communicate with the Class Manager, Wireless Institute of Australia, Victorian Division, Box 2611W, G.P.O., Melbourne, as soon as possible.

Potter, Yeomans, Olsson, Iliffe, Porter, Sloss, Taylor, Fraser, Praidwood, Elliott, Gray, Sloane, Gauntlett, Neilson, Pollock, McLeod, W. E. Davies, Lancaster, Viney, Hampshire, Hatch, Smith, Groves, Chalmers, Henderson, Titheridge, Griggs, Matthews, Oakes, Clarke, Brooke, Barnes, J. A. Quinn, McLean, Gilbert, Strickland, F. Gee Wah, O'Brien, Lee, Maroney, Cox, Sandon, and Hogkinson.

The President's address regarding the progress of the Division during the first post-war year was very enlightening and is in condensed form hereunder:—

"The past year has been a most important one for this Institute. During that time we have seen the W.I.A. rehabilitated from its war-time existence to an organisation much bigger and stronger than it was in previous days. Membership is soaring (now over 400) and it is safe to say that over 90% of the Hams in Victoria are now members of the W.I.A. Victorian Division.

"Primarily you have to thank an enthusiastic band of 'old timers' for holding things together during the war years. Secondly, your Council for the past twelve months has been considerably encouraged by the enthusiasm you have all displayed by the record and sometimes embarassing attendances at meetings.

"This brings up the subject of new premises and as the building in which we hoped to obtain space is no longer available, any information in this connection will be greatly appreciated by the Council.

"During the past year you returned to your activities 'on the air,' you have not got all that to which we think we are entitled, but I can assure you from the knowledge I have of F.H.Q. efforts that 'it won't be long now.'

"The Convention at Easter was most successful and for that and the subsequent work done you are fortunate in having such excellent F.H.Q.

"As you know F.H.Q. is, since the Convention, a VK3 responsibility and it is a big one, nevertheless, it is a great honour for VK3 to have had this responsibility vested with us.

"'Amateur Radio,' your Institute Magazine, is making wonderful progress, thanks to the solid effort expended by its staff.

"New equipment has been added to the Institute Library in the form of a Bendix Frequency Meter, also a Philoscope; details of which you may have read in the pages of 'Amateur Radio.' I submit that you acquaint yourselves with these and other equipment available for your use, by referring to the Technical Committee.

"A.O.C.P. Classes have started and we should soon have a flock of new Hams on the air and, I hope, some new members therefrom.

"Your Council has arranged with the Radio Trade for special buying privileges, the details of how it will operate should be in the hands of financial members in a short time.

"In concluding I would like to thank those who have given their help for various functions throughout the year—to thank and congratulate the Magazine Committee for their efforts—to thank the outgoing Council for the support and help in determining various problems and especially to thank your Secretary and your Treasurer for the sterling manner in which they handled a record busy period. And finally, I have personally had considerable pleasure in my position as President and also as Chairman of Council, but most of all I have appreciated the honour of being your President during our first post-war year."

In the absence of the printed copies of the balance sheets, from the auditors, a statement of the financial positions was given by the Treasurer.

Three nominations, namely, those of VK3KN, VK3XD, and VK3QS were received for the office of President and in honour of the past year's work as President, the assembly, by an overwhelming majority, returned VK3KN to the chair for another year.

Of the thirteen nominations for Council the successful candidates were Dick Dowling (VK3XD), Bill Gronow (VK3WG), Harry Kinnear (VK3KN), George Manning (VK3XJ), Dave Medley (VK3MJ), Ivor Morgan (VK3DH), Charlie Quinn (VK3WQ), and Herb. Stevens (VK3JO). With such an energetic President and new blood in the Council it is felt that they will be hard worked in implementing the wishes of the meetings.

One of the major items of interest during the evening was that relating to the report of the Disposals Committee and judging from the number of questions put to that Committee it clearly indicates that the Ham is a very keen buyer.

Murray Thrcp, ZL4HS, gave an interesting few minutes on the activities of the New Zealand amateurs also the range of frequencies on which the ZL's are permitted to operate. You should have heard the sighs when mental comparisons were made with those here in VK.

Dispenser of QSLs, Ray Jones is one of the most popular officials at the monthly meetings where he distributes up to 400 cards. His colleague, Frank O'Dwyer is also busy with the outward QSL cards.

On excellent authority it has been learned that the official list of licenced stations in the Commonwealth is now in the hands of the printer, who no doubt is very busy in view of the forthcoming elections, but it is anticipated that lists will be available for distribution towards the end of September, 1946, price 2/-.

WESTERN ZONE CONVENTION

The Western Zone will hold a Convention at

HAMILTON

During the Week-End—

OCTOBER 26 AND 27

It is proposed that Saturday evening will take the form of a Dinner and Smoke Night, and the main Convention Business will be held on the Sunday.

Those interested should contact:—

M. RILEY, VK3TN, Hamilton
G. WELLS, VK3TW, Hamilton
B. PLOWMAN, VK3QC, Terang

Further particulars will be published in the October issue of this Magazine.

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QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.

Meeting Place: State Service Building, Elizabeth St., City.

Meeting Night: First Friday of each month.

Those members present at the July General Meeting were entertained by the screening of some interesting films, two being "Frequency Modulation" and the "Battle of Britain." A further showing will be made at the coming meeting. This will of course be subject to sufficient time being left after the election of a new Secretary as Cedric Marley, 4CJ, has been forced to relinquish the job owing to a transfer to Rockhampton. The number of fellows who offer their services for this job is really amazing. Sherlock Holmes complete with Dr. Watson and magnifying glass couldn't find them.

It is hoped shortly for a visit to be made to the Radio Research Laboratory of the Queensland University. We recently had the pleasure of a lecture on Ionospheric Predictions by Mr. McNichol of that branch. Reverting again to 6 meter work, for the benefit of interested parties in other States, there are always 4 or 5 VK4's operating on the 50-54 Mc. band every Sunday night between 7 and 9 p.m. We are also on at sundry other times—4CG on Thursday nights plays around in the hope of making a contact—but Sunday night is a regular. The rigs are Xtal controlled and several supers are in use. At a very recent meeting of the Experimental Advisory Committee the representatives of the R.I's. Department emphasised that something would have to be done about certain out-of-band operation. If "something" is not done, well—I'd rather not frighten you. It must be remembered that a phone man on 14.1 Kc. for example, has a side-band of anything of 2 to 5 Kc. out of the band.

The news re the organising of a DX contest later in the year was received with some gratification by the DXers in Brisbane. What with the way ZL's pound through on 20 however, QRM will certainly be terrific.

Now for a few local oscillations.

4CJ—All the best Cedric, and many thanks for the job you've done. May Rockhampton be a less QRM'y location for you.

4AW—Busy with new houses, speedway P.A. jobs, and I nearly forgot—Ham Radio.

4RQ—Bob is a busy man as President of the Longreach Bowling Club, but hopes to be on 7 Mc. soon.

4XG—Doing his darndest to get on 6 Mx., but striking a few snags.

4HR—The local DX authority and the man behind an FB 6 Mx. signal.

4KS—Has a very snappy system for switching the rig on and the rx. off. Invaluable for checking the other fellows' channel before going over.

4KH—Has yet another receiver—this one looks like being the final however. How's DX Bill?

4EL—Finding the transformer shortage a bit of a problem. Still uses the famous "vertical."

4RF—Has one of the neatest rigs we've ever set eyes on. Doing a bit of "junk" service for the boys.

Well, for this month that's the lot, so until next month the best of oscillations and radiations, 73's de 4ZU.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.
Meeting Place: 17 Waymouth Street, Adelaide.
Meeting Night: Second Tuesday of each month.

The Monthly General Meeting was held on Tuesday, 13th August, at 17 Waymouth Street, and a splendid attendance was again noted. Visitors were VK5DQ, VK5JB, Mr. S. W. Wardle, Mr. A. J. Broadbent and three others who apparently desired to remain anonymous judging by their signatures. VK5FQ brought his Dad along and it was hard to see who was the more interested of the two. The lecturer for the night was Mr. A. W. Taylor (VK5AT) who discussed "Super Receivers for the Ultra Highs." Mr. Launce Deane (VK5LD) moved a vote of thanks to the lecturer which was received with acclamation.

Mr. Taylor, in his lecture, enumerated the various types and methods of frequency changers with particular reference to pentagrid converters and their unsuitability for use above 15 Mc. By means of circuits and graphs he proved theoretically that in an attempt to eradicate the inherent disadvantages of various frequency changers the constructor only succeeds in shifting the operating position of the tube along its conversion conductance curve. Suitable itermediate frequencies were discussed and the lecturer showed a decided preference for an I.F. of 1600 Kc. or higher. Mr. Taylor pointed out that the choice of an intermediate frequency was a matter of compromise between various conflicting factors. The lower the I.F. the higher the selectivity and gain with a consequent reduction in the image ratio. The low I.F. also increased the "pulling" effect between the oscillator and mixer. A high I.F. improves both image ratio and "pulling" with a reduction in gain and selectivity. The gain is of least consideration. The question of interelectrode capacities was explained at length with reference to the fact that at very high frequencies these capacitances became a larger part of the usable tuning capacity and the effect is further aggravated by the fact that the input loading increases rapidly at very high frequencies, so that ordinary tuned circuits have a very low effective Q when connected to the grid circuit of a valve. This was demonstrated by the fact that at 54 Mc. an inch of wire possessed an impedance of 10 ohms.

Two points in the lecture upon which Mr. Taylor lay stress are repeated here for those interested. The only satisfactory test of pentagrid converter efficiency is to insert a M.A. Meter in the oscillator grid circuit and, having obtained the current flowing through the grid resistor, by means of ohms law, the operating position of the oscillator on its conductance curve can be checked.

Lastly, when the oscillator is internal with the mixer the best setting of the oscillator condenser is on the low frequency side of the mixer whereas for external oscillators the high frequency side of the mixer is preferable.

The recent paragraph in the papers regarding the proposed lighting of an electric lamp in the U.S.A. by means of the light from a star, calls to mind the occasion about 12 years ago when a pre-arranged signal on 7 Mc. transmitted by Mr. Fred Carter, VK5GK, was used to automatically switch on all the lights in a large country hall in America thus officially opening a scientific convention.

The Custodian of the Frequency Meter, Mr. A. F. Wreford (VK5DW), announces that he is avaiable on Friday nights for frequency checks on the 40 meter band. Other times may be made by mutual arrangement, ring L 9677 (daytime only) for schedules.

Two new appointments to the Council are reported this month, Mr. Ross Harris (VK5FL) to the position of Assistant Secretary, and Mr. J. Kilgariff (VK5JT) as W.I.A.

Traffic Officer. Joe's experience in traffic handling made the Council's choice a logical one and Ross will relieve the Secretary of a good deal of work and help "Doc" to fully recover from his recent indisposition.

The present A.O.P.C. Classes are drawing to a close and anybody interested in the new classes which may possibly be starting in October are requested to contact the Hon. Secretary immediately.

Overheard one Ham mention that he was operating from his wife's pantry. In these days of housing shortages there must be many other unusual station locations. How about yours?

A new recruit to the Ultra Highs is Bob Keddie, of Woodville Park, who was heard contacting VK's 5RT, 5QR, 5KC, 5GB on 1.8 metres.

The same signals can be heard on 54 Mc. at various times and more stations would be welcomed on these frequencies because most 6 meter Hams reside in the northern suburbs which somewhat limits the DX.

WESTERN AUSTRALIA

Hon. Secretary: H. B. Lang,
42 Ord Street, Claremont, W.A.

Meeting Place: Builders' Exchange, St. Georges Ter., Perth.

Meeting Night. Third Monday in each Month.

The August General Meeting was held on Monday, the 19th, and will be remembered for the excellent attendance of members. If further increases are in evidence at future General Meetings it is obvious that more commodious rooms will have to be obtained.

The President, in declaring the meeting open, extended a very hearty welcome to VK3FW and PA0PX. General business was quickly dealt with and the rest of the evening was devoted to a lecture by Mr. I. Ginby, VK6IG.

The lecturer took as his subject "Navy Radio." It was evident that Mr. Ginby had devoted much time to the preparation of his lecture, which was highly instructive and was delivered in an interesting manner.

A vote of thanks was proposed by Mr. W. E. Coxon (VK6AG) and was carried in the usual manner.

The meeting closed at 10.45 p.m. and by 11 p.m. most members had departed for home.

Western Activity

VK6RG.—Ross now making a noise on "Ten." Getting some nice DX and has ideas on beam.

VK6MU.—Beautiful signal on 7 Mc. band. Mal sure packs a punch with his T40 final.

VK6HT.—Of Albany, is working both 10 and 20 Mx. Advises DX not so good. Intends changing antennas.

VK6RU.—In between DX contacts, extremely busy as QSL officer. Recently popped in on Jim and had an eyeful of the rig—commercial appearance. Excellent construction and decidedly effective. A real credit to the owner-operator.

VK6HL.—Has put up two element rotary on 10 Mx. Harry is convinced from the word "go." Still "burning" a channel between N.S.W. and VK6 with his daily sked with VK2AFE.

VK6KW.—Busy on rotary beam construction; has steel tower up 40 feet and it sure is a "honey." Ron still manages to be consistent on all bands despite the extra work.

VK6WH.—Still keeping 7 Mc. band alive in VK6. Has dozens of ideas on beam rotation and they sure work too—whose next Ted?

VK6WS.—Heard now and again on 14 Mc. fone. Has nice tower ready for beam. Incidentally "Skipper" was 72 years "Young" on 18th July—congrats OM.

VK6WZ.—Very QRL at the moment—not enjoying the best of health, but sure can find time to be active on 28 Mc.—mostly listening in vain for answers to his "plaintive" CQs. Thinking of adding another 807 to the final for P.P. and more power. Doesn't like D.C. mains—MUCH! (hi).

VK6EL.—Broken hearted over loss of three acorns overnight—no cause—no reason. Can manage 18 watts C.W. and about 16 fone.

VK6HM.—A real "sticker" for the "ultras." If we had more locals like Charlie, 20 Mx. would swap places with 50 Mc. so far as QRM goes.

VK6LW.—Very busy lately, but can usually be found on some band when time permits.

VK6DF.—Making some nice contacts on 10 Mx. and confining activity to this band.

VK6DD.—Still knocking them over on 14 Mc. Now has three antennas in operation, but as yet no rotary. Will you ever be convinced Johnny?

VK6PJ.—The latest to be on with fone permit. Reports DX very poor to date.

VK6SA.—Has been heard again on 14 Mc. C.W. and still busy on new Rx. and completing transmitter.

VK6MB.—Worked his first W! Is he pleased? Has keying troubles at the moment.

VK6KS.—Reappears with nice fone on 14.295 Mc. Is putting up 8JK rotary beam.

VK6XI.—Operating portable with 6V6 tritet and 807. Has nice fone on 14.250 Mc.

VK6RL.—Reports activity on 10 Mx. Rig is powered from 220 volts D.C. mains but still manages some nice DX even on QRP.

Conditions generally in VK6 have been very spasmodic. 10 Mx. is beginning to show its "teeth" once more. W signals in the early mornings are at excellent strength, but unfortunately the period is only short. Europeans break through every now and again to provide locals with some choice contacts. 20 Mx. provides some excellent QSOs with W and Island stations predominating. Europeans, in early afternoons, are weak but workable. Few contacts however can be classed as 100% QRM free. 7 Mc. band provides reliable and easy contact with the Eastern States, but here again QRM is the dominating factor. Fifty and higher has scant support in VK6. Those locals working these bands make up for the lack of numbers by their enthusiastic activity. Their efforts to popularise 50 Mc., which should be the ideal "local" band, is to be commended. How's about it fellows? Let's have more of you on 50 Mc.

Country members could assist greatly in compiling these notes. Drop a card to Box N1002, G.P.O. Perth, with some information on your activity.

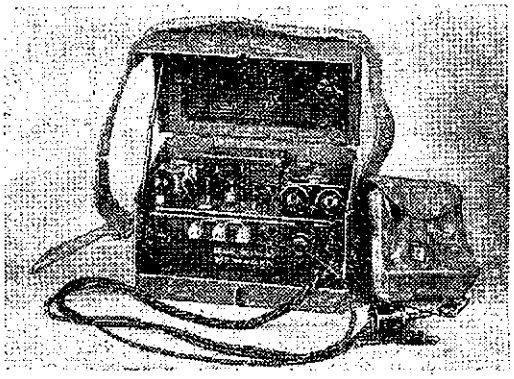
WALTHAM TRADING DO. PTY. LTD.

Registered Office:

Viaduct Buildings, 393 Flinders Street, Melbourne

'PHONE: MU 4719.

REMOTE CONTROL UNITS



These are complete with 3 plugs and cards, with bag for same, and a carrying handle—£1/1/- each, complete with Stromberg Carlson Microphone and Headphones—£2/2/- each. Ideal for children's rooms, sleep-outs, garages, shops, in fact for all inter-communication purposes.

WE ARE PLEASED TO BE ABLE TO ANNOUNCE

That we have a small stock only of 101 Transceivers, exactly similar in appearance as the FS 6 illustrated on the opposite page.

These are priced at £10/10/- each including completely self-contained Power Pack which gives 225 volts.
We can supply country customers with Pack only, £5/5/-.
We can supply city customers who wish to make their own AC Pack for this receiver, transceiver complete with valves, thermoampmeter and Morse Key for £5/5/-.

ARMY SURPLUS BARGAINS

Westinghouse Metal Rectifiers, full wave at at 7/6 each.

Westinghouse Metal Rectifiers, ½ wave 30 mill., 5/- each or 2 for 7/6.

Carbon Hand Microphones, 9/6 each, complete with trigger switch, cord and plug.

Respirator Carbon Hand Microphones, 7/6 each complete with cord, trigger switch and plug.

Army Plotting Double Protractor, in handsome leather case, graduated 180 degrees. Cost at least £5. 17/6 complete with case.

Matching Transformers for Carbon or Moving Coil Microphones, 6/6 each.

Morse Keys, 5/6 each.

Olympic Cab Tyre Flex, any length, 6d. yard.
12 V. Ferrocart Vibrators, 15/-.

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.

Meeting place, Photographic Society's Rooms, 162 Liverpool Street, Hobart.

Meeting Night: First Wednesday of each month.

The August Monthly Meeting of the Division was held on Wednesday, the 7th. At the Council Meeting at 7.30 p.m. those present were L. Jensen (7LJ) in the chair, J. Brown (7BJ), A. Finch (7CJ), C. Walch (7CW), F. Gee (7RF), and A. Allen (7PA).

A wealth of correspondence was dealt with as was proposed constitutional alterations, these having been prepared previously at a special meeting of the Council held for that purpose and are now to be submitted to a special general meeting summoned to precede the next monthly meeting.

Five membership applications were received and recommended to the general meeting for acceptance.

General Meeting, 8 p.m.—Present; L. Jensen (7LJ) in the chair, other councillors as above, E. Nicholls (7RX), T. Allen (7AL), M. Loveless (7ML), D. Watson (7DW), R. O'May (7OM), W. Watson (7YY), C. F. Johnston (7AR) and son, M. Conway (7CL), Weeks, Clarke, Koglin, Richardson, Hughson. Apologies from F. Midhurst (7AH), R. Conrad (7TR), O. S. Dahl, A. Russell, T. Connor (7CT).

Correspondence on Disposals, Contest, R.S.G.B. representative, etc., from F.H.Q. read and received.

The five membership applications were put and elections were unanimous.

The chairman announced that owing to an unexpected change in arrangements Chas. Miller (7CM) had left hurriedly en route for England to take up his Rhodes Scholarship and that the presentation that was scheduled for this meeting had been made at short notice on the railway platform the morning he left.

It was not learned until the day before that he was to go next day and the Secretary made a hurried purchase of a clock, as had been suggested, and with one or two other members, summoned in a hurry, they duly presented it as stated on behalf of the gang. Regret was expressed at not being able to make it a general gathering and all expressed appreciation at the action taken under the circumstances.

An inscribed plate is to be prepared and forwarded for attachment as time did not permit this being done here.

One of the most interesting lectures to date was then given by Mr. Hughson—"Centimeter Radar in the Silent Service." Having lectured and instructed on this subject for a long period during hostilities the lecturer found no trouble in holding the interest of all throughout.

In tracing its progress from 1935 onwards he detailed the difficulties encountered, particularly for shipboard installations—space, weight, etc.—and the expedients used to overcome them, such that special gear had to be developed in most cases.

The use of infinite impedance supporting to overcome feeder insulation losses, the application of wave guides for energy transfer, the development and use of special valves, etc., were amongst the many exegencies discussed.

Exhibits included a magnetron and klystron and several other valves of special design for C/M use. At the conclusion a brief period for questions was taken advantage

of by several after which a vote of thanks, proposed by Mr. L. Jensen, was heartily tendered by acclamation and Mr. Hughson was assured that any thought he might have of boredom was not to be entertained, he having previously suggested the possibility.

Since last edition 7JH has had a fortnight laid up with a badly sprained ankle, this has delayed the "getting going," but we should hear him soon on 20 and 40 Mx. Sorry to hear of it OM and hope all is well again now.

Some congestion here at times in the narrow 20 and 40 Mx. channels especially when a certain local Ham decides to have a one, two, three test repetition and, overmodulated, splatters the band. I believe the Eastern States are after his blood, hi! He is using a commercial P.A. for modulators, I hear.

Another of the local phone lads on 20 Mx. is reputed to be giving some BCL interference in his locality—beware of the Vigilance Committee chaps. Received advice from Doug. Fisher (7AB), of Burnie, that things are moving on the Coast, several signals should be heard from there—7JT and 7AB now and 7CK and 7XL soon.

7XL is in Launceston at present and is building a rig fully relay protected, a la R.A.A.F. Doug tells us that Eric Trebilcock, well known pre-war S.W. listener and in DX and B.E.R.U. contests, is at Wynyard, operating the 'Drome station after a hectic time in New Guinea and Salamaua. Doug's rig is 6V6 Xtal, three stages, 807 doublers with Eimac T35 final and 6L6's P.P. modulator. He worked a TG9 on phone at first CQ. Happy hunting Doug and let's hear from you again soon.

7AL finally fired up a rig, has developed a V.F.O. using Xtal/E.C.O./mixer combination into an 807, says job is very stable and controls FB, has receiver perking well at last.

Several Southerners on regularly and migrating to 20 and 40 between QRM lapses of these channels.

Generally speaking, the new rigs here are tending towards compactness as against the old floor type rack and panel of pre-war days and certainly they have much to commend them.

Australian Hams are now permitted to use the 80 Mx. band. The allocation 3.5 to 3.8 Mc. became effective as from 1000 hours E.S.T. on the 1st September. This allocation will no doubt relieve the congested higher frequency bands, and the extension of the 7 Mc. allocation is hoped for in the near future.

The Radio Society of Great Britain has decided that, due to changed circumstances, it will be necessary to revise the rules governing the issue of W.B.E., H.B.E., and B.E.R.T.A. Certificates. In view of this decision no claims for such certificates can be accepted at present.

The R.S.G.B. announce that it is proposed to form a Radio Society of India. It is planned to operate the Society through Branch Managers, one for each of the main centres of activity.

New Barretter Available

Philips Electrical Industries of Australia announce that a new barretter type C8 is now available for replacement purposes. The C8 may be used as a direct replacement for C1 in existing AC/DC receivers fitted with "200.in A" valves. The C8 is electrically identical to the C1. In the new version however pins 1 and 2 are internally linked. This has no bearing on the operation as in both types the resistance element is connected to pins 3 and 6.

C8 is designed for operation in receivers in which the total heater voltage (series connected) is not less than 52 volts. The maximum voltage applied to the heater circuit must not exceed 250 volts when switching on. Regulating range is 80-200 volts for a heater current of 200 in A.

The C8 barretter can only be substituted for the C1 and other substitutions must not be attempted.

From a complete three stage rig on a single chassis little larger than a 30 watt P.A. to a table model two tier rack of nominal dimensions seems to be the aim.

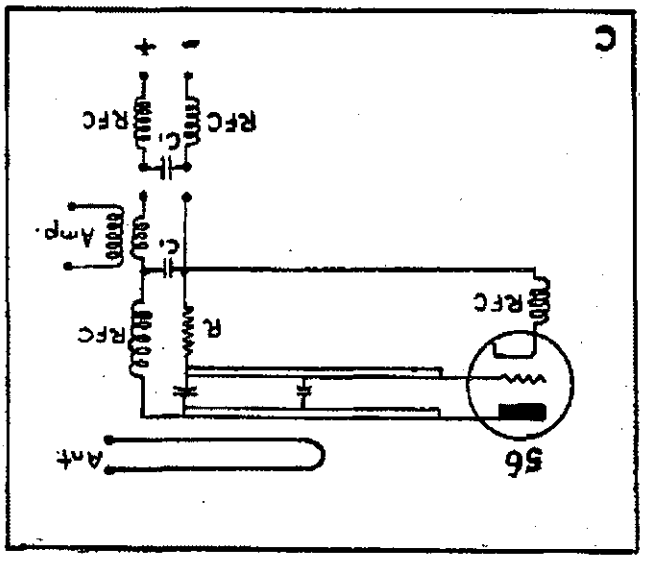
Receivers in the main are home-made supers of the communications variety, some with R.F. stage and one or two I.F. stages of 455/465 Kc., and almost everything that opens and shuts.

One or two are specialising in the three or four tube simple super and a commercial or two are also evident.

One or two ultra vernier dial elaborations are noteworthy. 73's de 7PA.

SIMPLE CIRCUIT FOR 166-170 MC.

It is self-explanatory. As shown it will generate a frequency close to 176 Mcs. The frequency may be lowered by increasing the length of the line slightly, or by introducing a small variable capacity across the line a short way up from the condenser end. A smaller frequency change can be obtained by making C a variable capacity about 100 mmfd.



Antenna Line: 5 7/8-inch of 1/4-inch copper, 1/2-inch between centres.
C = 0.00005 mfd.
C1 = 0.001 mfd.
R.F.C. is 16 B & S enamel, 12 turns 5/8-inch diameter, 5/8-inch long.
R = 10,000 ohms.
Return all Earths to one point.

With a plate voltage about 250 volts, the plate current will be about 30 Ma., but it is not possible to give much indication here as the valve used in the original circuit was an old one of doubtful quality. However there was no trouble in obtaining oscillations, and a pea lamp, coupled to the "hair pin," can be lit quite well when

placed parallel to the copper line. The oscilator was quite stable and started instantaneously under load. It was not possible to obtain a measure of the useful output power, but 1 watt of useable power should be obtained, which is more than sufficient for suitable communication over good distances.

(b) As a Receiver. The oscillator can be used as a receiver by replacing the grid resistor by a resistor of 200,000 ohms. When this is done the receiver super regenerates very smoothly, it being better to have a fixed voltage on the plate and vary the loading of the aerial circuit to control the regeneration. The 56 in the receiver refused to super regenerate with less than 400 volts of plate potential, sometimes noticed with poor valves, but this can be overcome by the use of R.F. chokes, of the same dimensions as those above and connecting them as shown below. Super regeneration was then obtained with about 300 volts.

Tune the receiver with a small variable capacity across the line.

The receiver can be coupled to an amplifier in the usual way. Obtaining smooth regeneration will depend on effective earthing and considerably more attention needs to be given to this point than it was possible to give the original. Nevertheless, it was felt that when it was shown that it is quite possible to reach the 166-170 Mcs. band with a standard valve, others withholding action on account of lack of suitable equipment would take new heart and carry on the good work that is commenced here, resulting in a fuller occupancy of the band than is the case at the present time. In conclusion, a duplicate of this circuit was constructed independently and found to work satisfactorily, both as a receiver and as an oscillator.

Propagation Predictions For September

The following information is extracted from the Radio Propagation Bulletin for September, 1946, No. A.R.P.C.-A21, published by the Australian Radio Propagation Committee.

Zone E.—Latitude 10° South—(North Queensland, Northern Territory, North Western Australia):—

28 Mc.—From 0700 hours skip should be in the vicinity of 2,500 miles until around 1600 hours when this frequency should cease to be of any value for DX.

14 Mc.—From midnight till 0200 hours skip increases from 1,000 miles to 2,500 miles after which time and until 0600 hours the band suffers a fade out. At 0600 hours skip is once again 2,500 miles, which distance gradually decreases until at noon it is in the vicinty of 500 to 600 miles.

7 Mc.—Shows a peak of 1,500 miles skip at 0400 hours, apart from which it doesn't offer much possibility for long distance working.

Zone E.—Latitude 20° South—(Southern Queensland, New South Wales, South Australia, Southern Western Australia):—

28 Mc.—Except for a short period of 2,500 miles skip between 0900 hours and 1300 hours, 28 Mc. doesn't look too bright for DX.

14 Mc.—Comes to life at about 0600 hours with skip of 2,500 miles, which steadily decreases until at 1100 hours it is approximately 700 miles. After this however, it gradually increases until at midnght it is approximately 2,000 miles. The only period when 14 Mc. is unsuitable for DX is between 0200 hours and 0500 hours.

7 Mc.—Seems useful from midnight till around 0600 hours and again from 1500 hours till midnight. Skip distance varies, but never at any time exceeds 1,000 miles.

Zone E.—Latitude 30° South—(Victoria, Southern New South Wales, Southern South Australia and Southern Western Australia):—

28 Mc.—Not very bright at all. May possibly be useful around noon for a very short period of 2,500 miles skip.

14 Mc.—Opens up at 0600 hours with skip distance at 2,500 miles after which it decreases until at noon it is around 700 miles, then skip increases until it reaches a maximum of 2,500 miles at 2200 hours. Only doubtful period is between 0200 hours and 0600 hours.

7 Mc.—Useful until 0700 hours for skip distances up to a maximum of 1,000 miles. Comes good again at 1700 hours.

Zone E.—Latitude 40° South—(Tasmania):—

28 Mc.—Similar conditions apply here as in the previous case. Although the charts do not look promising, there may be a short period of 2,500 miles skip around about noon.

14 Mc.—Opens up at 0700 hours with skip at 2,500 miles, which decreases to 800 miles at noon. Then from noon onwards skip steadily increases to a maximum of 2,500 miles at 2100 hours.

7 Mc.—Should be quite useful up till 1100 hours and again from 1700 hours till midnight.

Our copy of the Radio Propagation Bulletin No. A.R.P.C.-A21 for September, 1946, by courtesy of the Australian Radio Propagation Committee. Copies may be obtained from all newsagents and booksellers priced 2/- per copy. Wholesale distributors are Gordon and Gotch (A'Sia) Ltd.

CLEARING THE ETHER.

(iii) Separate anode and grid tanks can be correctly matched to tubes employed.

(iv) Permits transmitter to be constructed as separate units, facilitating maintenance, switching and economy.

In operaion the excitation is adjusted by either changing physical relationship of link to tank coil, or by changing the number of turns in the link. The former method is correct method to employ in a transmitter designed to operate at more than one frequency.

FOR SALE, EXCHANGE, WANTED

9d. per line, minimum 2/-.

FOR SALE.—Bliley 465 Kc. Filter Xtal new, mtd., £3. METERS: Triplett 2-inch 0-500 volts A.C./D.C. £2; Radio Corp. 2-inch 0-10 Ma., 15/-; 2 Weston 2-inch 0-150 Ma., 35/- each; 1 Hickok 3-inch 0-50 Ma., 25/-; 1 Readrite 0-100 Ma., 12/6; 1 Readrite 0-200 Ma., 12/6; 1 new University 4-inch square 100 microamps with multi volts, ohms scale, suit V.T.V.M., 77/6; 2 new Palec 3-inch 0-100 Ma., 50/- each; and the following Weston 301 3-inch bakelite cased milliammeters: 4 0-100 Ma., 2 0-50 Ma., 1 0-25 Ma., 50/- each; University ERT ohmmeter with prods, as new £5; Calstan AC202 Valvetester £10; Clough-Brengle battery model OD mod. oscillator 50 Kc. to 30 Mc. in six ranges, with charts and instructions, £15; small oblong D/W dial new, 7/6; 2 801 ceramic base tubes as new £1 each; 4 type 10 7/6 each; over a dozen speakers 5-inch to G12 with new isocore transformers to suit you, inquiries invited. All gear guaranteed good order and condition. Please add freight and exchange. B. R. MANN, VK3BM, Quambatook, Victoria.

WANTED TO SELL.—Two EIMAC 50T valves in new condition £4 each. Complete portable transmitter-receiver (less batteries) in leather carrying case, receiver 3 valve TRF, transmitter two-stage CC vibrator powered, covers 80, 40, 20. This equipment won two National Field Day Contests and operating portable has worked 28 countries, W.A.C. and W.B.E. Full technical details on request, Price £17/10/-. VK3UK, 75 Argyle Road, Kew, E.4, Victoria, Hawthorn 4596.

WANTED.—Super, suitable for 28 Mc. and 14 Mc. operation. Send particulars to VK3BG, 11 Mitchell Street, Bendigo.

COMMUNICATION RECEIVER AMR200, Super-Pro copy, 15 tubes. Complete with tubes, tested and aligned £110 less speaker. Only two left. VK3KM (FJ 1339).

FOR SALE.—Pre-war radio gear—C.R. oscilloscope with Philips DG7-1 and time base, amplifiers, power packs, audio oscillator, meters, valves, parts, etc. Mattingley, 113 Rowell Ave., Camberwell (WM 3719).

METERS.—0-50 microamp., 4-inch, British Pullin, uncalibrated £3/10/-. Similar 0-1 milliamp., £2. 0-1 milliamp. 3-inch, £1/10/. M. C. Radcliffe, 60 Elimatta St., Braddon, Canberra.

AMATEUR RADIO

OCTOBER 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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

AMATEUR RADIO

VOL. 14 OCTOBER, 1946 No. 10

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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Advertising Representative:
W. J. LEWIS
20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

NEW CONSTITUTION

The Wireless Institute of Australia, which is the oldest active body of Amateurs in the world, has achieved a position of high standing in Australia and all overseas countries through its meritorious work on behalf of the Amateurs of this country. It has done all this in spite of its limited constitution.

One of the ways the Institute intends to guard and improve this fine reputation is by revising this rather inadequate constitution. The Constitution will be an instrument which defines the objectives and the mode of organisation of your Institute more thoroughly than in the past.

Our existing constitution was drawn up in 1939 as an interim one, and it was proposed to make improvements in the following year. However, the 1939-45 war intervened, and postponed that work until now.

At the Federal Convention held in April 1946, the first since 1939, it was unanimously agreed by all the Divisions that a new Constitution should be drawn up and adopted eventually by the several Divisions.

The Federal Executive has been preparing a Draft Constitution during the past few months on the following general bases:—

(a) The Federal Council shall be the governing body.
(b) The Federal Executive shall be the executive body.
(c) The Divisions shall be the bodies charged with the local administration and giving effect to the Federal policy of the Institute.
(d) The members shall be of various sections and shall provide the funds to carry on the work of the Institute.

(Continued on Page 4)

IN THIS ISSUE

SIMPLIFIED DESIGN OF TANK CIRCUITS FOR R.F. AMPLIFIERS. Part II.

BY W. T. S. MITCHELL, VK3UM*

1—GENERAL

As mentioned in Part 1 of this article, this part will deal with the coil design for the tank circuit, that is, actual diameters, lengths, turns, and wire sizes for the coils.

This side of the problem proved more tedious and somewhat more difficult than the determination of the L/C ratios. This was mainly due to the fact that so much information is obtainable on this subject from various experimenters, and it has meant co-relating this information and putting it into tabular form.

The main differences in these experimenters' results seem to be in regard to the length to diameter ratios. It might here be explained that the inductance obtained from these formulae is the "current sheet" inductance, so therefore a correction has to be applied when the turns are spaced, and round in section.

The formulae we will use, however, is one which has been determined experimentally, and so is accurate enough for our purposes. In fact, it checks very closely with theoritical figures, and has a very small percentage error over a wide range of length to diameter ratios.

2—CALCULATION OF NUMBER OF TURNS

The table to follow has been compiled from the experimental findings of Pollack (QST, Feb., 1939). Pollack's formula for inductance is:—

$$L = \frac{D\,N^2}{40.16\,S + 17.72} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

where L = inductance of coil in microhenries.
D = mean diameter of coil in inches.
N = number of turns.
b = length of coil in inches, and

$$S = \frac{b}{D}$$

This may be rewritten as:—

$$N = \sqrt[3]{\frac{40.16\,S + 17.72}{D}} \times \sqrt[3]{L} \quad \ldots\ldots\ldots \quad (2)$$

In Table 1, A equals this value:—

$$\sqrt[3]{\frac{40.16\,S + 17.72}{D}}$$

The problem that confronted the writer was the substitution of values of b and D in this expression, and after quite a few headaches and sore eyes, the table was completed. It is not the full table that is presented here, but an extract which covers most of the transmitting coil sizes. However, for all its trouble, it has been considered worthwhile because of its very usefulness to the newcomer to radio.

So our turns can now be written:—

$$N = A\,\sqrt[3]{L} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

3—SELECTION OF D AND b

It can be seen from the Table, that both the diameter and length of coil must be obtained to find A. There is no accurate way of determining either, so it means selecting a value of D and one for b, which follow generally accepted ideas.

Experiments have shown that the coil Q increases with D, b being constant, and also Q increases with b, D being constant. The Q increases rapidly for small values of b/D and more slowly for larger values of b/D (when b is greater than D).

Co-relating these various facts, it follows that the larger the diameter we can use, consistent with practical limitations, the better our coil will operate. Most experimental work has also shown that for minimum RF coil losses, the length of the coil should be between $\frac{3}{4}$ and $\frac{5}{6}$ the diameter of the coil. It is also good practice to use an airwound coil in preference to a former wound one. The turns should only be supported at the least number of places to achieve sufficient mechanical stability.

So when choosing the values of D and b, it is important to bear these few points in mind, and make the selection accordingly.

4—DETERMINATION OF WIRE SIZE

The factor B appearing under A in Table 1 is used to obtain the correct wire size. Pollack, by laboratory work, has ascertained the optimum diameter of wire to be used. The value gives minimum RF copper losses, and hence an improvement in Q. This formula simply states that optimum wire size is obtained when it equals .707 times the winding pitch or in equalled form:—

$$d = \frac{1000\,b}{\sqrt[3]{2\,N}} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

where d = diameter wire in mils. (1/1000th of an inch)
b = length of coil in inches.
N = number of turns.

Substituting equation (3) in equation (4) we obtain:—

$$d = \frac{1000\,b}{\sqrt[3]{2} \times A \sqrt[3]{L}}$$

or in different form:—

$$d = \frac{1000\,b}{\sqrt[3]{2\,A}} \times \frac{1}{\sqrt[3]{L}} \quad \ldots\ldots\ldots\ldots \quad (5)$$

So in Table 1, factor B is made equal to:—

$$\frac{1000\,b}{\sqrt[3]{2\,A}}$$

So now our wire diameter can be expressed:—

$$d = \frac{B}{\sqrt[3]{L}} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

By comparing equation (3) and (6), we can see that we have N and d in convenient forms of the square root of the inductance. So that by taking the square root of the inductance obtained from the Table in Part 1 of this article, and using our constants A and B, we have a simple means of calculating N and d.

To illustrate the simplicity of the use of the Table, we will take one or two examples.

(i) Assume our inductance from Part 1 was found to be 9.5 microhenries.

Let D = 2½ inches and b = 1½ inches.
From the Table, A = 4.1 and B = 259.

Therefore $N = 4.1 \times \sqrt[3]{9.5} = 4.1 \times 3.08 = 12.6$ turns

and $d = \frac{259}{\sqrt[3]{9.5}} = \frac{259}{3.08} = 84$ mils.

From Table 2, d = 14 S.W.G. Enamel.

By referring to Table 2 we may obtain the wire gauge corresponding to the calculated mils.

(ii) Assume L = 12.3 microhenries.

Therefore $\sqrt[3]{L} = 3.5$

Let D = 1½ inches, b = 1 inch.
From Table 1, A = 5.4 and B = 131.
Therefore N = 5.4 × 3.5 = 18.9 turns.

* 1946 Lower Malvern Road, East Malvern, Vic.

TABLE 1

TRANSMITTING COIL FACTORS

Winding Length in Inches "B"	Constant	DIAMETER "D" INCHES										
		1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4
1	A	5.4	4.8	4.3	4.0	3.7	3.4	3.2	3.0	2.9	2.7	2.6
	B	131	147	165	177	192	208	221	236	244	262	272
1¼	A	5.8	5.2	4.6	4.2	3.9	3.6	3.4	3.2	3.0	2.9	2.8
	B	153	170	192	211	227	246	260	276	294	305	315
1½	A	6.2	5.5	4.9	4.4	4.1	3.8	3.5	3.3	3.2	3.0	2.9
	B	171	193	216	241	259	279	303	321	331	354	366
1¾	A	6.6	5.8	5.1	4.7	4.3	4.0	3.7	3.5	3.3	3.1	3.0
	B	187	214	243	263	287	309	334	354	376	399	413
2	A	6.9	6.0	5.4	4.9	4.5	4.1	3.9	3.6	3.4	3.2	3.1
	B	205	236	262	288	315	345	362	393	416	442	456
2¼	A	7.2	6.3	5.6	5.1	4.6	4.3	4.0	3.7	3.5	3.3	3.2
	B	221	253	285	312	346	370	398	430	455	482	497
2½	A	7.5	6.6	5.8	5.3	4.8	4.4	4.1	3.9	3.6	3.4	3.3
	B	236	269	305	333	368	402	431	453	491	520	536
2¾	A	7.8	6.8	6.0	5.4	5.0	4.6	4.3	4.0	3.8	3.5	3.4
	B	250	286	324	360	389	423	453	486	512	556	573
3	A	8.1	7.0	6.2	5.6	5.1	4.7	4.4	4.1	3.9	3.6	3.5
	B	263	304	342	379	416	452	483	518	544	590	606
3¼	A	8.3	7.3	6.4	5.8	5.3	4.9	4.5	4.2	4.0	3.7	3.5
	B	277	315	359	397	434	470	511	548	575	622	656
3½	A	8.6	7.5	6.6	6.0	5.4	5.0	4.6	4.3	4.1	3.8	3.6
	B	288	331	376	413	458	495	539	576	604	652	688
3¾	A	8.9	7.7	6.8	6.1	5.6	5.1	4.8	4.4	4.2	3.9	3.7
	B	298	345	391	434	474	520	552	603	632	681	716
4	A	9.1	7.9	7.0	6.3	5.7	5.3	4.9	4.5	4.3	4.0	3.8
	B	311	358	405	449	497	534	578	629	658	707	744
4¼	A	9.4	8.1	7.2	6.5	5.9	5.4	5.0	4.7	4.4	4.1	3.9
	B	320	371	418	463	509	557	601	640	684	733	770
4½	A	9.6	8.3	7.4	6.6	6.0	5.5	5.1	4.8	4.5	4.2	4.0
	B	332	382	430	483	531	579	624	663	707	759	796
4¾	A	9.8	8.5	7.5	6.7	6.1	5.6	5.2	4.8	4.5	4.3	4.0
	B	343	396	448	501	551	600	646	700	747	782	840
5	A	10.0	8.7	7.7	6.9	6.3	5.7	5.3	4.9	4.6	4.4	4.1
	B	354	407	460	513	562	621	668	722	769	804	863
5¼	A	10.3	8.9	7.8	7.0	6.4	5.9	5.4	5.0	4.7	4.4	4.2
	B	360	417	477	531	581	630	688	743	789	843	884
5½	A	10.5	9.1	8.0	7.2	6.5	6.0	5.5	5.1	4.8	4.5	4.3
	B	371	427	486	540	598	649	707	762	810	865	905
5¾	A	10.7	9.3	8.2	7.3	6.6	6.1	5.6	5.2	4.9	4.6	4.3
	B	380	437	497	557	617	667	726	782	830	884	946
6	A	10.9	9.4	8.3	7.4	6.8	6.2	5.7	5.3	5.0	4.7	4.4
	B	390	451	511	574	624	685	745	801	849	904	965

Formulae:- $L = \frac{D\,N^2}{40.16\,S + 17.72}$ $\quad do = \frac{1000\,b}{\sqrt[3]{2\,N}}$

$N = A\sqrt[3]{L}$ Turns $\quad do = \frac{B}{\sqrt[3]{L}}$ Mils.

$$d = \frac{131}{3.5} = 37.5 \text{ mils.}$$

From Table 2, d = 20 S.W.G. Enamel.

5—CONCLUSION

At some future date, it is expected that values as given, may be checked by laboratory experiment, and the results published.

In concluding, it is only hoped that this article will prove as useful to the reader, as it has proved to the writer in the past. More accurate design data is available on RF Amplifiers L/C ratios in various textbooks, but even so, this article still will have its usefulness in preliminary design work.

TABLE 2

Gauge	S.W.G.		
	Bare	Enamel & Tin.	D.C.C.
10	144 — 116	148 — 120	158 — 130
12	116 — 92	120 — 96	130 — 106
14	92 — 72	96 — 75.5	106 — 84
16	72 — 56	75.5 — 59	84 — 68
18	56 — 40	59 — 42.6	68 — 51
20	40 — 34	42.6 — 36.4	51 — 45
21	34 — 30	36.3 — 32.2	45 — 41
22	30 — 26	32.1 — 27.9	41 — 36.5
23	26 — 23	27.8 — 24.7	36.5 — 33
24	23 — 21	24.6 — 22.6	33 — 31
25	21 — 19	22.5 — 20.5	31 — 29
26	18 — 17.2	20.4 — 18.6	29 — 27.2
Gauge	B. & S.		
	Bare	Enamel & Tin.	D.C.C.
10	114.4 — 90.7	116.5 — 92.7	126.4 — 100.2
12	90.6 — 72	92.6 — 74	100.1 — 81.5
14	71.9 — 57.1	73.9 — 59.1	81.4 — 66.6
16	57 — 45.3	59 — 47.1	66.5 — 54.8
18	45.2 — 35.9	47 — 37.7	54.7 — 45.4
20	35.8 — 30.2	37.6 — 32	45.3 — 39.8
21	30.1 — 26.9	31.9 — 28.6	39.7 — 35.9
22	26.8 — 24	28.5 — 25.6	35.8 — 32.5
23	23.9 — 21.3	25.5 — 22.8	32.4 — 29.9
24	21.2 — 19	22.7 — 20.4	29.8 — 27.5
25	18.9 — 16.9	20.3 — 18.2	27.4 — 25.4
26	16.8 — 15.1	18.1 — 16.2	25.3 — 23 9

EDITORIAL.

Federal Executive has given much thought to these objectives in the preparation of a Draft Constitution which is about to be circulated among the Divisions for comment. It is hoped that the next Federal Convention will ratify the completed Constitution.

The objective of this Constitution will be to ensure that the Wireless Institute of Australia acts as one homogeneous body and speaks with one great voice on the affairs of the Amateur, both publicly and privately.

It must be the earnest desire of all members to support and see that such a Constitution makes your Institute an even greater organisation than it ever has been in the past.

R.J.M.

CLEARING THE ETHER.—Series II, Part VI

*By G. GLOVER, VK3AG

CONSTRUCTION AND OPERATION OF MODERN TRANSMITTER (Continued)

(b) Harmonic Amplification

A previous section covered the requirements of Harmonic Amplification or Frequency Multiplication in the Exciter Unit, with minimisation of controls as the major requirement; however, in the case of the R.F. Power Amplifier efficient resonant circuits are required in both grid and anode circuits. Thus, at least two controls per stage are inevitable.

In previous section it was suggested that the frequency-multiplier provided the ultimate frequency; however, under some circumstances it is desirable to further multiple the frequency in the power amplifier. For example, the exciter unit in question reaches 28 Mc/s, but the requirement is for 56 Mc/s; hence the most efficient method of reaching the latter frequency is to double in the power amplifier. Then again when tuning capacitors used are capable of tuning to the second harmonic without changing coils, it is quicker to leave exciter output, and grid circuit of P.A. set and tune the anode of P.A. to the harmonic.

Efficient harmonic generation or amplification in power amplifiers is best understood by reference to tabulated comparisons of various classes of amplifiers as set out hereunder:—

Class	Anode Efficiency	Operating Angle	Operating Conditions	Distortion	Power Ratio	Output
A	Relatively low, 30-40%.	360°	Biassed to swing equally about centre of linear portion Ip/Eg Curve. Grid quiescent.	Low. Minimum harmonic content.	High output from given size of tube.	Wave-form true reproduction of input, but at greater amplitude dependant upon effective amplification of stage.
B	Medium, 50-60% at Maximum signal level.	180°	Biassed to cut-off entire linear portion Ip/Eg Curve employed Grid is driven positive, hence power is dissipated in grid circuit.	Moderate. Moderate harmonic content.	Moderate.	A.C. component of anode current is proportional to square of grid excitation voltage. Wave shape approximates positive swing of grid voltage.
C	High 70-85%.	150° or less.	Usually biassed to twice cut-off or more. Grid is driven to saturation on positive peaks of input, causing distortion of output wave-form.	High. Large harmonic content.	Low. Power output high for given size of tube.	A.C. component of anode current is proportional to the anode voltage, power output is therefore proportional to the square of anode voltage.

There are other classes of amplifiers which have not been tabulated, notably, Class AB1 and AB2. These amplifiers operate under conditions between Class A and Class B, hence the designation "AB," Class AB1 is referred to as being quiescent, that is, tube does not draw grid current. In the Class AB2 amplifier on the other hand the grid of tube is driven positive, thereby drawing grid-power. The main object of this class of operation is to secure the advantages of Class A operation at low levels and the added output of Class B operation at high levels.

We have already shown how the use of correct L/C ratio in anode "tank" circuit will minimise effects of distortion in amplifier tube output, due to the presence of large flywheel effect. This means that if large value of L is used in comparison to C, the effects of distortion are magnified and an excellent harmonic amplifier results.

Where neutralised triodes used in P.A. operating at fundamental frequency, the change to even harmonic operation causes the neutralising circuit to provide positive instead of negative feedback, thus emphasising the even harmonics and resulting in considerable increase in the efficiency of frequency multiplier.

(c) Harmonic Elimination

In the preceding sub-section the object was to produce wanted harmonics—in this case the problem is to suppress unwanted harmonics. Not only do unwanted harmonics occupy unnecessary channel space in harmonically related "Ham bands," but also in the case of bands which are not harmonically related, cause considerable interferences to other services—earning the well-merited disapproval of the R.I. It is the duty of every Ham to suppress all unwanted harmonics, and a careful study of the conditions which cause harmonic production should provide clue to their suppression. The following sub-paragraphs outline some of the causes and suggest means of avoiding and eliminating unwanted harmonics:—

(1) Once again the correct L/C ratio of tank circuits plays a very important part. The Q of tank should be at least 12.
(2) Avoid over-excitation of Class "C" amplifiers.
(3) Prevent distortion of RF grid voltage wave-form.
(4) Employ link coupling and high Q circuits between final driver and final stage to attenuate unwanted components as much as possible.

(5) Employ driver with large enough capacity to ensure good regulation of RF drive under all conditions of modulation when using "phone."

(6) Eliminate stray capacity couplings between final anode and aerial coupling circuits, by employing "Faraday Shield." The same story applies to offending interstage couplings.

(7) Employ selective aerial coupling unit.

(8) Use series resonant circuits to provide greater degree of attenuation of frequencies other than resonant frequency (usually only necessary in high power rigs).

(d) Parasitic Suppression.

Parasitic oscillation is another bug bear which raises its ugly head to embarrass the user of transmitting equipment. Briefly it means that conditions exist in the transmitter or stage which cause self oscillation to occur at some frequency other than that selected. This spurious mode of oscillation causes considerable waste of good energy, unstable and erratic operation at operating frequency, and may be of unsustained character. In the latter case its presence may only be recognised by abnormal key clicks over wide range, or by the presence of spurious side bands in the case of "phone" transmitter.

Parasitics fall into various categories:—

(1) L.F. Parasitics.

(2) Parasitics near operating frequency.

(3) V.H.F. Parasitics.

(1) Low Frequency Parasitics.—Parasitics of this category are usually confined to frequencies below 500 Kc/s and are of the TPTG type. The RF chokes and allied bypass capacitors in plate and grid circuits forming the resonant elements. This effect is particularly noticeable in push-pull units when elements concerned operate both tubes in parallel. Arranging circuit to eliminate RF choke in either the grid or plate circuit is the answer to this problem.

(2) Parasitics near Operating Frequency.—This usually indicates that circuit employs coupling medium involving taps, that is, either the grid is tapped off portion of the coil, or grid and/or anode transmission lines are attached directly to tank coil. In the former case, the turns between grid and ground and plate and ground, plus stray capacities, provide the ingredients conducive to TPTG operation at a frequency somewhat higher than the normal operating frequency. In the latter case, the multi-resonant conditions set up result in oscillation at a frequency close to the normal operating frequency, at a point where it is un-neutralised. Furthermore if neutralising circuit leads have appreciable inductive reactance, the amplifier may be sufficiently un-neutralised as to oscillate at a frequency near the normal operating frequency.

Leaving the centre-point of split stator anode tank capacitor ungrounded is another cause of parasitic oscillation, due to current flowing through the neutralising lead and tank capacitor in similar manner to "Modified Colpitts" oscillator circuit.

(3) V.H.F. Parasitics.—Oscillations of TPTG or Ultraudion type caused by neutralising circuit connections associated with balanced tanks are sometimes encountered.

TESTING FOR PARASITICS

In order to test for parasitics of sustained and non-vicious nature a receiver, capable of being tuned over a wide range, should be employed to identify each emission of the transmitter, making due allowance for image frequency response of superheterodyne receiver.

If difficulty is experienced in neutralising the amplifier parasitic conditions may be suspected, provided of course that the neutralising circuit values are consistent with normal requirements.

After neutralising the amplifier it may be tested for self-starting oscillations by removing the excitation and applying sufficient bias to limit the anode dissipation in accordance with tube rating. Anode voltage is then applied, if the amplifier is free from parasitics the plate current will remain constant as the tank capacities are varied; also there will not be any grid current and a neon tube, applied to any part of the circuit, will not glow. "Trigger" oscillations present should be detectable in receiver in the form of abnormal clicks when anode supply is switched, or by momentary glowing of neon tube applied to certain parts of circuit. Care must be exerised to avoid confusing this latter effect with normal switching "flash."

In determining the nature and cause of parasitics one should set about the job in methodical manner. Commencing with the lowest frequency element if possible, this decision will be governed by nature of vicious parasitics.

In order to determine when low frequency parasitic is of parallel type, in the case of push-pull circuits, connect both grids or both anodes together. If the parasitic IS of parallel type the effect on oscillation will be barely perceptible, because these points are at the same potential. The amplitude of oscillations of this type are further increased by absence of neutralisation at parasitic frequency; furthermore, as the neutralising capacitors and grid/anode capacities are effectively in parallel, a large amount of energy is fed back to maintain oscillation at high level.

L.F. parasitics may be eliminated, as previously stated, by removing RF choke in either grid or anode circuit.

Parasitics near the operating frequency may be eliminated by discarding tapped tank coils and using low impedance links to couple grid and anode transmission lines.

VHF parasitics usually respond to one of the following methods:—

(1) Insertion of resistors of the order of one to one hundred ohms close to the grid or anode of tube for the purpose of damping circuits. Resistors employed should be either non-inductively wire-wound or preferably of the carbon type.

(2) Introduction of tuned circuit (resonant to parasitic frequency) in series with the grid circuit.

(3) Detuning anode or grid circuits, that is, the grid circuit is tuned to a much higher frequency than the anode circuit, achieved by keeping grid circuit leads short or by adding small choke coils, consisting of a few self-supporting turns of heavy wire, inserted in anode circuit near tube to increase the effective inductance in the anode circuit. Resistors may be added in parallel with the chokes, or alternatively the chokes may be wound of resistance wire, if necessary in order to prevent "trigger" oscillations; however, sufficient detuning of parasitic circuits usually accomplishes the same result. The choke coils serve another good purpose, that is, they improve the efficiency of amplifier and reduce harmonic components of anode current. For this reason it is desirable not to damp same with resistors unless "trigger" oscillations occur.

Several forms of parasitics may be present in the same unit, and do not be surprised if now parasitics appear as others are eliminated. The writer has found by experience that in vicious cases it is sometimes easier to insert everything but the kitchen sink, and then gradually remove each element separately until minimum requirement for stability has been reached. One transmitter had such vicious neutralising circuit characteristics, that it was necessary to employ resistance wire to effect connections. In another case it was necessary to employ bridge neutralising circuit which will be illustrated in diagram covering neutralising circuits.

Generally speaking VHF parasitic oscillations differ from high order harmonics in that the amplitude of the

(Continued on Page 28)

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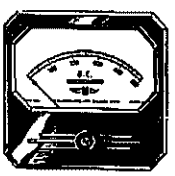

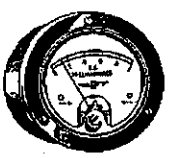

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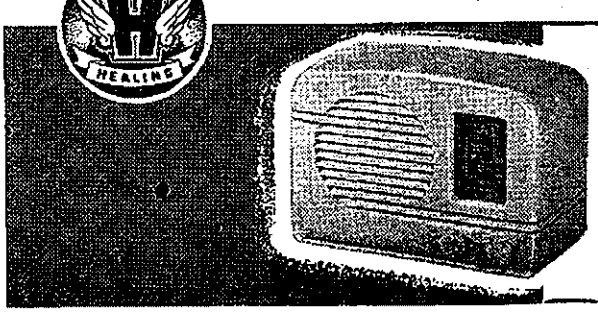

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NEW TUBES

RADIOTRON 2E26

VHF BEAM POWER AMPLIFIER

Radiotron type 2E26 is a beam power amplifier intended primarily for use in FM transmitters, either in low power driver stages, or in the output stage when only low power output is required. It is also useful in a-f power and modulator service.

Having high power sensitivity and high efficiency, the 2E26 can be operated at relatively low plate voltage to give large power-output with small driving power. Furthermore, it can be operated with full input to 125 megacycles.

Small in size for its power-output capability, the 2E26 features rugged button-stem construction with short internal leads, and an octal base with short metal sleeve which shields the input to the valve so completely that no other external shielding is required. Separation of input and output circuits is accomplished by bringing the plate lead out of the bulb to a cap opposite the base.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	Volts
Current	0.8	Ampere
Transconductance for plate current of 20 milliamperes	3500	Micromhos
Grid-Screen Mu-Factor	6.5	
Direct Interlectrode Capacitances:*		
Grid to Plate	0.20 max.	mmfd.
Input	13	mmfd.
Output	7	mmfd.

* With no external shielding and base sleeve connected to ground.

Mechanical:

Mounting Position	Any
Overall Length	3-1/2" plus or minus 5/32"
Seated Length	2-15/16" plus or minus 5/32"
Maximum Diameter	1-5/16"
Bulb	T-9
Cap	Small
Base	Small Wafer Octal 8-Pin with Sleeve No. R-6159

AF POWER AMPLIFIER AND MODULATOR —CLASS A1

Maximum Ratings, Absolute Values:

	CCS†	
DC Plate Voltage	300 max.	Volts
DC Grid—No. 2 (Screen) Voltage	200 max.	Volts
Plate Dissipation	10 max.	Watts
Grid—No. 2 Input	2.5 max.	Watts
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode	100 max.	Volts
Heater positive with respect to cathode	100 max.	Volts

Typical Operation:

DC Plate Voltage	250	Volts
DC Grid—No. 2 Voltage	160	Volts
DC Grid—No. 1 (Control Grid) Voltage	—12	Volts
Peak AF Grid—No. 1 Voltage	12	Volts
Zero-Signal DC Plate Current	35	Ma.
Max.-Signal DC Plate Current	42	Ma.
Zero-Signal DC Grid—No. 2 Current	7	Ma.
Max.-Signal DC Grid—No. 2 Current	10	Ma.
Load Resistance	5500	Ohms
Total Harmonic Distortion	10%	
Power Output	5.3	Watts

Maximum Circuit Values:

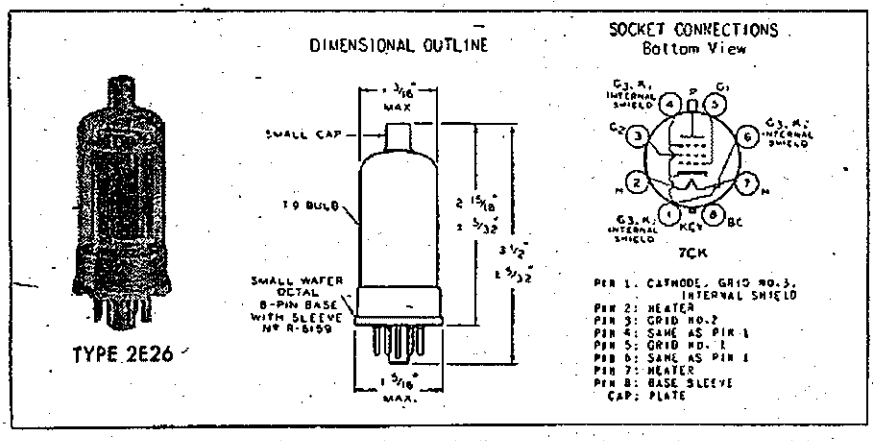
Grid—No. 1, Circuit Resistance	30000 max.	Ohms

PUSH-PULL AF POWER AMPLIFIER AND MODULATOR—CLASS AB2*

Values are for two valves

Maximum Ratings, Absolute Values:

	CCS†	ICAS†	
DC Plate Voltage	400 max.	500 max.	Volts
DC Grid-No.2 (Screen) Voltage	200 max.	200 max.	Volts
Max.-Signal DC Plate Current**	150 max.	150 max.	Ma.
Max.-Signal Plate Input**	60 max.	75 max.	Watts



Max.-Signal Grid-No. 2 Input**	5.0 max.	5.0 max.	Watts
Plate Dissipation**	20 max.	25 max.	Watts
Peak Heater-Cathode Voltage:			
Heater negative with respect to cathode	100 max.	100 max.	Volts
Heater positive with respect to cathode	100 max.	100 max.	Volts
Typical Operation:			
DC Plate Voltage	400	500	Volts
DC Grid-No. 2 Voltage¶‡	125	125	Volts
DC Grid-No. 1 Voltage (Fixed Bias)	—15	—15	Volts
Peak AF Grid-No. 1-to-Grid-No. 1 Voltage	60	60	Volts
Zero-Signal DC Plate Current	20	22	Ma.
Max.-Signal DC Plate Current	150	150	Ma.
Max.-Signal DC Grid-No. 2 Current	32	32	Ma.
Effective Load Resistance (Plate to Plate)	6200	8000	Ohms
Max.-Signal Driving Power (Approx.)¶¶	0.36	0.36	Watts
Max.-Signal Power Output (Approx.)	42	54	Watts

PLATE MODULATED RF POWER AMPLIFIER —CLASS C TELEPHONY

Carrier conditions per valve for use with a maximum modulation factor of 1.0.

Maximum Ratings, Absolute Values:

	CCS†	ICAS†	
DC Plate Voltage	400 max.	500 max.	Volts
DC Grid-No. 2 (Screen) Voltage	200 max.	200 max.	Volts
DC Grid-No. 1 (Control Grid) Voltage	—175 max.	—175 max.	Volts
DC Plate Current	60 max.	60 max.	Ma.
DC Grid-No. 1 Current	3.5 max.	3.5 max.	Ma.
Plate Input	20 max.	27 max.	Watts
Grid-No. 2 Input	1.7 max.	2.3 max.	Watts
Plate Dissipation	6.7 max.	9 max.	Watts
Peak Heater-Cathode Voltage:			
Heater negative with respect to cathode	100 max.	100 max.	Volts
Heater positive with respect to cathode	100 max.	100 max.	Volts
Typical Operation:			
DC Plate Voltage	400	500	Volts
DC Grid-No. 2 Voltage††	160	180	Volts
	(32000	35500	Ohms
DC Grid-No. 1 Voltage§	—50	—50	Volts
	(20000	20000	Ohms
Peak RF Grid-No. 1 Voltage	60	60	Volts
DC Plate Current	50	54	Ma.
DC Grid-No. 2 Current	7.5	9	Ma.
DC Grid-No. 1 Current (Approx.)	2.5	2.5	Ma.
Driving Output (Approx.)	0.15	0.15	Watt
Power Output (Approx.)	13.5	18	Watts
Maximum Circuit Values:			
Grid-No. 1-Circuit Res.§§	30000 max.	30000 max.	Ohms

RF POWER AMPLIFIER AND OSCILLATOR —CLASS C TELEGRAPHY

Key-down conditions per valve without modulation‡‡

Maximum Ratings, Absolute Values:

	CCS†	ICAS†	
DC Plate Voltage	500 max.	600 max.	Volts
DC Grid-No. 2 (Screen) Voltage	200 max.	200 max.	Volts

DC Grid-No. 1 (Control Grid) Voltage	—175 max.	—175 max.	Volts
DC Plate Current	75 max.	75 max.	Ma.
DC Grid-No. 1 Current	3.5 max.	3.5 max.	Ma.
Plate Input	30 max.	40 max.	Watts
Grid-No. 2 Input	2.5 max.	2.5 max.	Watts
Plate Dissipation	10 max.	13.5 max.	Watts
Peak Heater-Cathode Voltage:			
Heater negative with respect to cathode	100 max.	100 max.	Volts
Heater positive with respect to cathode	100 max.	100 max.	Volts

Typical Operation:

DC Plate Voltage	400	500	600	Volts
DC Grid-No. 2 Voltage*	190	185	185	Volts
	19000	28500	41500	Ohms
DC Grid-No. 1 Voltage**	—30	—40	—45	Volts
	10000	13500	15000	Ohms
Peak RF Grid-No.1 Voltage	41	50	57	Volts
DC Plate Current	75	60	66	Ma.
DC Grid-No. 2 Current	11	11	10	Ma.
DC Grid-No. 1 Current (Approx.)	3	3	3	Ma.
Driving Power (Approx.)	0.12	0.15	0.17	Watt
Power Output (Approx.)	20	20	27	Watts

Maximum Circuit Values:

Grid-No. 1-Circuit Res.§§	30000 max.	30000 max.	Ohms

* Subscript 2 indicates that grid current flows during some part of input cycle.

** Averaged over any audio-frequency cycle of sine-wave form.

¶ Preferably obtained from a separate source, or from the plate-voltage supply with a voltage divider.

‡ In applications requiring the use of screen voltages above 135 volts, provision should be made for the adjustment of grid-No. 1 bias for each valve separately.

The necessity for this adjustment at the lower screen voltages depends on the distortion requirements and on whether the plate-dissipation rating is exceeded at zero-signal plate current.

¶¶ Driver stage should be capable of supplying the No. 1 grids of the class AB2 stage with the specified driving power at low distortion. The effective resistance per No. 1 grid circuit of the class AB2 stage should be kept below 500 ohms and the effective impedance at the higher desired response frequency should not exceed 700 ohms.

†† Obtained preferably from a separate source modulated with the plate supply, or from the modulated plate-supply through series resistor of the value shown.

§ Obtained from grid resistor of value shown or by partial self-bias methods.

§§ Any additional bias required must be supplied by a cathode resistor or a fixed supply.

‡‡ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

* Obtained preferably from a separate source, or from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown. The grid-No. 2 voltage must not exceed 600 volts under key-up conditions.

** Obtained from fixed supply, or by grid-No. 1 resistor of value shown.

† CCS = Continuous Commercial Service; ICAS = Intermittent Commercial and Amateur Service.

Radiotron Lighthouse Valves

TYPES 2C40, 2C43 AND 559

These three valve types have been called "lighthouse" valves because of their distinctive appearance which results from their design features. These features are of vital importance in their UHF performance, and include:

1—Very close interelectrode spacing combined with low interelectrode capacitances.
2—RF and mutual DC cathode connections.
3—A unique arrangement in connections to the grid and plate.
4—A structural shape facilitating their use in concentric line circuits.

Types 2C40 and 2C43

Bottom View of Socket Connections

Pin 1—Internal connection, do not use.
Pin 2—Heater.
Pin 3—Cathode.
Pin 5—Cathode.
Pin 7—Heater.
Pin 8—Cathode.
Post and Disc Terminal Plate
Disc Terminal—Grid.
Shell—Cathode RF Terminal.

Radiotron types 2C40 and 2C43 are triodes for use in RF Amplifier and Oscillator service at frequencies up to approximately 3,000 Mc/s. Both types have low frequency drift with variations in heater and plate voltages. In addition, they are held to close electrical and mechanical tolerances to meet the exacting requirements of UHF circuit design.

Radiotron type 559 is a diode for operation in half wave rectifier services.

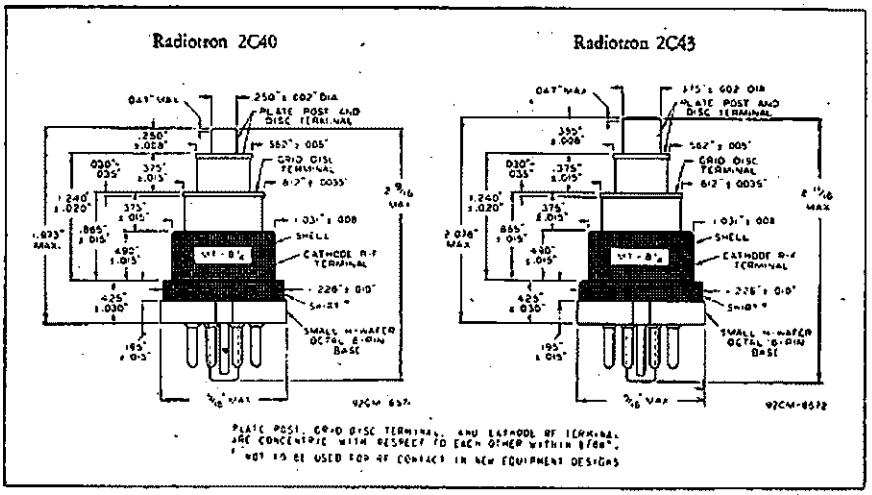
Types 2C40 and 2C43

General:

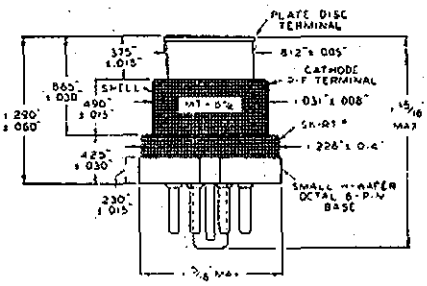
	2C40	2C43	
Heater, for Unipotential Cathode:			
Voltage (AC or DC) plus or minus 5%‡	6.3	6.3	Volts
Current	0.75	0.9	Ampere
Direct Interelectrode Capacitances (Approx.):			
Grid to Plate*	1.3	1.7	mmfd.
Grid to Cathode*	2.1	2.8	mmfd.
Plate to Cathode*§	0.02	0.02	mmfd.
Cathode to Shell	100	100	mmfd.
DC Heater-Cathode Voltage	100 max.	100 max.	Volts
Seal Temperature	200 max.	200 max.	°C
Dimensions and Terminals	See Outline Drawings		
Base	Small H-Wafer Octal 6-Pin		
Mounting Position	Any		

Characteristics, Class A Amplifier:

DC Plate Voltage	250	250	Volts
DC Grid Voltage: from a cathode resistor of¶	200	100	Ohms



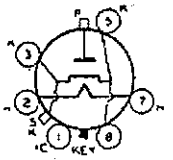
Radiotron 559



MAXIMUM ECCENTRICITY OF C_g (AXIS) OF THE FOLLOWING ITEMS WITH RESPECT TO C_L OF SHELL AS REFERENCE IS:
PLATE DISC TERMINAL 0.020"
SKIRT, 0.035"

* NOT TO BE USED FOR CATHODE RF CONTACT IN NEW EQUIPMENT DESIGN.

Bottom View of Socket Connections



PIN 1 INTERNAL CONNECTION — DO NOT USE
PIN 2: HEATER
PIN 3: CATHODE
PIN 5: CATHODE
PIN 7: HEATER
PIN 8: CATHODE
SHELL: CATHODE RF TERMINAL
DISC: PLATE

Amplification Factor	36	48	
Plate Resistance	7500	6000	Ohms
Transconductance	4800	8000	Micromhos
Plate Current	16.5	20	Ma.

RF AMPLIFIER AND OSCILLATOR— CLASS C TELEGRAPHY

Maximum Ratings, Absolute Values:

DC Plate Voltage	500 max.	500 max.	Volts
DC Plate Current	25 max.	40 max.	Ma.
Plate Dissipation	6.5 max.	12 max.	Watts

* With cathode connected directly to shell.
¶ Fixed bias is not recommended.
‡ Type 2C40 may be operated at 6.3 volts plus or minus 10% in some applications.
§ With shield having diameter of 2-3/8" in plane of grid disc terminal.

The cathode of each type is brought out to three base pins in order to make possible the reduction of circuit inductance. In addition, a capacitor of approximately 70 mmfd. is connected between the cathode and the metal shell. Connection to the shell provides a low-impedance path for UHF currents to the cathode.

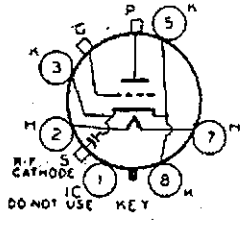
Type 559

General

Heater, for Unipotential Cathode:
Voltage (AC or DC) plus or minus 5% ..... 6.3 Volts
Current ..... 0.75 Ampere
Direct Interelectrode Capacitance (Approx.):
Plate to Cathode ..... 2.70 mmfd.

Types 2C40, 2C43.

Bottom View of Socket Connections



PIN 1 INTERNAL CONNECTION, DO NOT USE
PIN 2: HEATER
PIN 3: CATHODE
PIN 5: CATHODE
PIN 7: HEATER
PIN 8: CATHODE
POST & DISC TERMINAL PLATE
DISC TERMINAL: GRID
SHELL: CATHODE RF TERMINAL

Valve DC Voltage Drop (Approx.) for a DC plate current of 24 Ma.	5 Volts
Dimension and Terminals	See Outline Drawing
Base	Small H-Wafer Octal 6-Pin
Mounting Position	Any

Maximum Ratings, Absolute Values:

Peak Plate Voltage	100 max.	Volts
Peak Plate Current	200 max.	Ma.
Average Plate Current	30 max.	Ma.
DC Heater-Cathode Potential	100 max.	Volts
Seal Temperature	200 max.	°C

The above is an extract from "Radiotronics," No. 118.

NEW RMA TYPE DESIGNATION SYSTEM.

For some years past the RMA type designation system (e.g., 6D6) has been used for receiving types of valves and cathode ray tubes, but transmitting types have generally had a numerial type designation. As from 11th October, 1945; a modified form of this same type designation has been used for electron tubes and devices other than radio receiving valves and cathode ray tubes. The full RMA standards proposal No. 168 is quoted below, and it will be seen that it incorporates three basic symbols, the first being a number symbol indicating the cathode power, the second a letter symbol indicating the structure and the final number symbol which is purely a serial symbol commencing with the number 21.

As an example, type 2C21 would indicate a cathode power not more than 10 watts, a triode, and serial number 21 under this system.

It is possible to differentiate between receiving valve types under the old RMA system and other than receiving types under this modified system, by the fact that the latter all have the final number 21 or more. There is, therefore, no danger of confusion between the two systems.

The full RMA standards proposal, as adopted, is given below.

FOR TRANSMITTING AND SPECIAL PURPOSE TUBES

The type designation shall comprise three distinctive symbols. These will be, in their regular order, a number symbol, a letter symbol, and a number symbol; the significances of which are given below:—

1.—**The first number symbol** will indicate the cathode power required for normal operation in accordance with the following schedule:—

Designation.	Range of Filament or Heater Power	
1.		Zero Watts
2.	In excess of zero watts and up to and including	10 „
3.	In excess of 10 watts and up to and including	20 „
4.	In excess of 20 watts and up to and including	50 „
5.	In excess of 50 watts and up to and including	100 „
6.	In excess of 100 watts and up to and including	200 „
7.	In incess of 200 watts and up to and including	500 „
8.	In excess of 500 watts and up to and including	1000 „
9.	In excess of 1000 watts.	

2.—**The letter symbol** will indicate the structure in accordance with the following schedule:—

A. Monodes—Such as ballast tubes and vacuum-sealed resistors.
B. Diodes—Including full-wave as well as half-wave rectifiers, protective tubes, spark gaps, voltage regulators, etc.
C. Triodes—Including thyratrons, cold-cathode three-electrode control tubes, etc.
D. Tetrodes—Including thyratrons, cold-cathode four-electrode control tubes, etc.
E. Pentodes.
F. Hexodes.
G. Heptodes.
H. Octodes.
L. Vacuum-sealed types of capacitors.
N. Crystal detectors and crystal rectifiers.
P. Photo-emissive, vacuum-sealed devices; photo-tubes, photo-multipliers, pick-up tubes, etc.
R. Mercury pool types, inclusive.
S. Vaccum-sealed contactor-type switches.

3.—**The second number symbol** will be a serial designation and in no case shall be less than 21.

(Continued on Page 28)

SUPPRESSION OF PARASITIC OSCILLATION WITH AN 807

It has been found that type 807, which is somewhat inclined to give trouble with parasitic oscillation under certain conditions, may be made to give satisfactory operation by the incorporation of a small resistor and by-pass condenser in the screen circuit, in the form of a suppressor resistance.

A resistance of 100 ohms has been found satisfactory when connected directly to the screen terminal of the valve, with a by-pass condenser having a capacitance of 0.01 mfd. taken from the end of the suppressor resistance remote from the screen, directly to earth. The resistor should be non-inductive, and I.R.C. type F with a maximum dissipation of 2 watts has been found satisfactory. The by-pass condenser should be of the mica type.—"Radiotronics" No. 117.

COLOUR TELEVISION ON ULTRA HIGH FREQUENCIES

The present C.B.S. System uses 525 lines interlaced 2 : 1, the interlaced fields being scanned at 120 per second. Improved definition is obtained with a 10 Mc/s bandwidth in the band 480-920 Mc/s and single side-band operation is eventually contemplated. The transmitter used a disk-seal triode (6C22) giving 1 KW peak or 600 W average; a slotted waveguide radiator gives a concentration in the horizontal direction with a power gain of 20. The use of the vision flyback period for sound permits transmission up to 10500 c/s. Of two receivers demonstrated, one gives direct vision of a 10 inch C.R. Tube and the other an optical system giving a 17 x 22 inch picture. A tunable crystal mixer and 105 Mc/s I.F. Amplifier with a bandwidth of 12 Mc/s gives an equivalent input noise level of 8 uV. The color wheel uses standardised green, blue and red filters, giving an average transmission of 14%. The required bright phosphor image is obtained with an accelerating voltage of 8,000.

A NEW ELECROLYTIC SELENIUM PHOTO-CELL

This consists of a metal electrode (cathode) completely coated with metallic selenium, immersed in an aqueous solution of an electrolyte, preferably selenium dioxide together with an auxiliary electrode of a noble metal. This differs from the earlier electrolytic selenium cells chiefly in that directly electrodeposited metallic selenium gives rise to a higher sensitivity and that the selenious acid permits a higher lifetime as well as hermetical sealing of the cell.

DID YOU NOTICE IT!

Ought to be able to work at least four States from VK5 now—just couple up with one of those "Interstate" transformers advertised on page 18 of August issue, hi!—VK5UX.

THE EXPERIMENTERS' ADVISORY COMMITTEES.

Having in mind the need for improving operating conditions on the experimental bands, and being desirous of accomplishing this as far as practicable without official action, the Postmaster-General's Department, in 1936, instituted a system of Vigilance Committees throughout the Commonwealth.

These Committees functioned so successfully, and their members, individually and collectively, rendered such excellent service, that considerable improvement in the standard of transmissions and operating procedure was effected.

With the resumption of experimental activities on the cessation of war, the Department, in the light of previous experience, decided to again form the Committees, this time under the title of "Advisory" Committees—a title more appropriate to their function.

Many amateurs have, through the medium of the Experimental Handbook or by contact with members of the Committees, become aware of the existence of the organisation. It is thought, however, that the service being rendered by the Committees is not generally understood, and to many licencees, the Advisory Committee may mean just a name or, perhaps, an organisation set up to act as "aerial policemen." It is proposed, therefore, to give hereunder an outline of the manner in which the organisation operates.

Each Committee consists of a Radio Inspector, who acts as Chairman, and six members who are representative of experimental licencees. Briefly, the functions of the Committee are as follows:—

1—To ascertain by observation and/or other means, short of an inspection of the station, particulars of transmissions conducted contrary to the Wireless Telegraphy Regulations and departmental instructions.

2—To issue a notice or notices to the licencee concerned as the result of the observation of a breach or an irregularity.

3—To supply the Department with full particulars where the friendly advice of the Committee has been ignored, where licencees concerned refuse to co-operate with the Committee or where a breach is sufficiently serious to be beyond the scope of the Committee's functions.

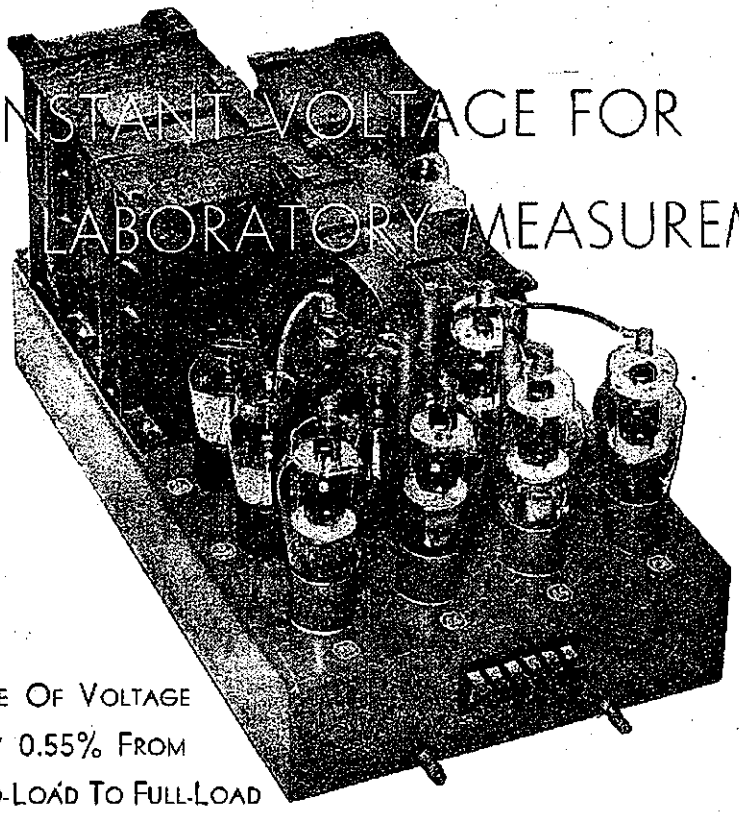
The Chairman, although a Radio Inspector, will not, in his capacity as a member of the Committee, take any action to discipline licencees guilty of breaches of Regulations or instructions. He will, however, refer to the Superintendent, Wireless Branch, any case which, because of non co-operation by the licencee, the Committee is unable to adjust. Any official action taken will then be at the discretion of the Superintendent and under the powers given to him by virtue of the Wireless Telegraphy Regulations.

All notices issued by the Committee are over the signature of the Chairman and, in selecting representatives, the Department is guided by the need for having men with a broadminded outlook. There is very little likelihood, therefore, of partiality being shown by members.

In addition to assisting experimental licencees by giving, where needed, friendly advice by letter, telephone, personal visit or wireless contacts, and thus trying to instil in them a pride in their equipment and transmissions and a desire to place amateur radio in Australia on a high plane, Committees have been active in other ways. They meet regularly each month and discuss possible means of improving conditions for the experimenter. They have been instrumental in having cleared up many points affecting operating conditions, and in some cases have been indirectly responsible for the easing of restrictions and the grant of greater privileges. They wish it to be realised that they are at all times amateurs, and extend an invitation to those in need of assistance to approach the Committee at any time.

It is felt that, with a proper understanding of the manner in which the Committees operate and the fact that they were instituted for the benefit of amateurs as a whole, 100% co-operation will be achieved, and amateur radio in this country will soon reach a standard of which all will be proud.

CONSTANT VOLTAGE FOR LABORATORY MEASUREMENTS



CHANGE OF VOLTAGE
ONLY 0.55% FROM
NO-LOAD TO FULL-LOAD

MANY testing processes require constant voltage to be applied to valves or other equipment during the time that the test is in progress. It is useless to have instruments correct within 1% or less if the voltage is going to vary while the current or other feature is being read.

This is particularly important in the testing of radio valves in which some of the characteristics are critically dependent upon the applied voltages. An example of this is the Characteristic Tester recently constructed in the Laboratory of Amalgamated Wireless Valve Co. Pty. Ltd. at Ashfield. This equipment is used for the checking of a percentage of all valves manufactured each day, to see that the accuracy of the factory testing is maintained, and to carry out other tests not normally applied to the whole production owing to their complexity.

The equipment uses an electronic voltage regulator on the plate, screen and grid supply voltages. The input is from the 240 volt A.C. mains, the output is variable in voltage from 0 to 300 volts with a maximum current of 200 mA. With the maximum output voltage, the percentage voltage drop is only 0.55% for a change of load from 0 to 200 mA.

The equipment uses Radiotron type 807 valves, four of which carry the current of 200 mA. between them. The 807 is probably the most satisfactory type of valve for this purpose owing to its high current capability (72 mA. per valve maximum) and its high amplification factor. This is only one of many applications in which Radiotron type 807 may be used with every satisfaction.

Radiotron
MADE IN AUSTRALIA

Advertisement of Amalgamated Wireless Valve Company Pty. Ltd.

FEDERAL HEADQUARTERS.

FREQUENCIES

Following on the release of portion of the 3.5 Mc/s band we are continuing our negotiations with the P.M.G. Department for the expansion of our existing lower frequency bands, and the release of some higher frequency bands. We are hoping that it won't be long before the full bands are available to Hams again.

CONTEST

The VK Contest for November has been very well received everywhere, and we think this will be an excellent opportunity for amateurs to have some pre-war excitement. There will be some great interest in the DX Clubs, which will be partaking in the receiving side. It is most unfortunate that we were unable to include the ZL Hams with us this year, but the very short time we had at our disposal to arrange the Contest precluded the New Zealanders. However, next year we hope the full dress VK-ZL Contest will re-take its old place as one of the big annual Ham World Contests.

W.A.C. CERTIFICATES

The I.A.R.U. has resumed activities in W.A.C. Certificates again. The W.I.A. is therefore receiving from amateurs their requests for and proof of W.A.C.

STOP PRESS

Federal Executive negotiations with the Wireless Branch are still proceeding, but the following new facilities are now available:—

Bands.—2,500-2,700 Mc/s, 5,250-5,650 Mc/s, and 10,000-10,500 Mc/s.

Emissions.—A0 for all bands 166 Mc/s and up. Handbook Rule 75 to be re-written to include conditions of use of A0.

Mobile and Portable.—Now available on 50 Mc/s and up without prior application or advice. Full licenced power and types of emission can be used. Announcement must be made with each transmission to the effect that operation is portable or mobile, and location must be given.

Handbook Rule 62.—This Rule concerning high power components is to be re-written to provide more liberal interpretation than at present.

Handbook Rule 25.—To be revised to allow audio tones for modulation tests, and relaying of Amateur Stations on 50 Mc/s and up.

Institute Call Signs—Reserved for FHQ: VK3WIA. Reserved for WIA use at World Fairs, etc., VK2AUS to VK7AUS. Application made for 300 Watts permit for WIA official stations.

The following matters are still under review at date of going to press:—

Class of Licence.—WIA has stated strong case for reversion to one class, with revised power limit.

Bands.—The WIA has applied for: 27.185-27.455 Mc/s, 29-30 Mc/s, 235-240 Mc/s, 420-430 Mc/s, and Defence Communication Committee is considering our case. Expected that existing HF Bands will be extended as soon as British release approved.

Types of Emission.—WIA has applied for A4, A5, FM, and Pulse. P.M.G. not authorised to grant these as subject is under review by Parliamentary Standing Committee on Broadcasting. Matter held up by elections, but if no decision reached within six weeks WIA will approach P.S.C.B.

NOTE.—Wireless Branch Superintendents have not yet been notified of above decisions, but it is expected that when official action has been taken, Superintendents will notify respective Division Secretaries. Until then **do not ask Superintendents for information.**

Q.S.L. BUREAUS.

Another two for the Philatelists: SM3UT, H. W. Stromberg, Fack 209, Gavle, Sweden. F8KT, L. Michel, 3 Rue Bigot, Nimes (Gard), France.

Tubby Vale, VK2ANN, ex VK3MK, VK2AER and VK2ACW, writes to say he is now located at Bega, N.S.W., and well settled in the ways of married life as a Ham.

A temporary QSL card from PK4DA located at Palembang, Sumatra, expresses disappointment with the prevailing order of things at that location. Cheer up Arie, everything will soon be alright (we hope).

Brewer Spoonts, of Fort Worth, Texas, states that the following 28 Mc/s signals drop heavily in his part of the country: VK2GU, VK2MH, VK2AHP and VK2AJG.

Lt.-Col. Whatman (a real old time Ham) is QSLing all contacts made when he used the callsign VS1BC from Singapore recently. He is now VU2BC located at Signals Directorate GHQ, Delhi, India.

TG9FG, F. W. Green, c/o Pan American Airways, Guatemala City, Central America, writing under date June 23, states he has worked 40 VK stations and has QSLed them all via WIA. Desires his cards to be sent to above address and will also pass TG9JK, TC9RC and TG9JW. All are Americans and employed by Pan American Airways.

The following addresses of overseas Bureau have come to hand:—

Czechoslovakia—C. A. V., Vaclavsko Nam 3, Prague 11.
Denmark—E.D.R., PO Box 79, Copenhagen K.
Belgium—Reseau Belge, Boite Postale 634, Bruxelles.
Norway—N.R.R.L., PO Box 898, Oslo.
Finland—S.R.A.L., Linnankuja 10A8, Helsinki.
Sweden—S.A.A., Postgirokonto 52277, Stockholm 8.
Luxembourg—R.L., rue Neyperg 33, Luxembourg.
Eire—R. Mooney, "Aughnacloy," Killiney, Dublin.
Brazil—L.A.B.R.E., Caixa Postal 2523, Rio de Janeiro.
Colombia—L.C.R.A., Apartado 1266, Bogota.
Cuba—R.C.C., Lealtad 660, Habana.
Costa Rica—F. Gonzalez, Box 365, San Jose.
Peru—R.C.P., Box 538, Lima.
Chile—R.C.C., Casilla 761, Santiago.
Jamaica—Thomas Meyers, 122 Tower St., Kingston.
Mexico—L.M.R.E., Avenida Juarez 104, PO Box 907, Mexico, D.F.
Newfoundland—N.A.R.A., PO Box 660, Stjohns.
Paraguay—R.C.P., Palma 310, Asuncion.
Uruguay—R.C.U., Casilla 37, Montevideo.
Venezuela—R.C.V., Apartado 981, Caracas.
New Zealand—N.Z.A.R.T., Box 489, Wellington, C.1.
Malaya—James McIntosh, Postal Dept., Kuala Lumpur.
South Africa—S.A.R.R.L., Box 7028, Johannesburg.
Porto Rico—E. W. Mayer, PO Box 1061, San Juan.
Phillipines—G. L. Rickard, 48 Ortega, San Juan, Rizal.
U.S.A., W5—L. W. May, Jnr., W5AJG, 9428 Hobart St., Dallas 18, Texas.
Canada, VE1—VE1FQ resuming appointment shortly.
VE4—Via A.R.R.L.
VE6—W. R. Savage, VE6EO, 329 15th Street North, Lethbridge, Alta.
VE7—same as VE5.
VE8—Yukon A.R.C., PO Box 268, Whitehorse, Y.T.

Cards are on hand at the VK3 Bureau, 23 Landale St., Box Hill, E.11, Victoria, for VK3's:—AB, ABN, AC, ACG, ADR, ADX, AE, AFQ, AGB, AHB, AJE, AJR, AOG, AP, APM, ARH, AT, AV, BC, BE, BG, CO, CU, CX, DA, DD, DK, DR, EC, ED, EH, EJ, EM, EO, EZ, FA, FB, FE, FP, FT, FY, GB, GC, GU, GX, HE, HP, HV, HX, IK, IU, IZ, JD, KD, KR, KS, KT, MN, MP, MQ, MS, MW, NB, NF, NU, NW, OZ, PI, PZ, QB, QD, QM, QG, QK, QN, QP, QQ, RW, SG, SQ, SZ, TB, TF, UE, UI, UO, UP, UQ, VC, VD, VE, VJ, VM, VO, VU, VV, XA, XB, XH, XN, XC, YA, YC, YG, YH, YQ, YU, ZG, ZP, ZR.

DX OF THE MONTH.

28-29 MEGACYCLES

The enthusiasm of some Hams, who month by month, endeavour to write these notes from their own logs is a valuable contribution to the Magazine. I have taken the liberty of publishing a letter which accompanied this month's notes—Editor.

Editor, "A.R.,"

It seems that another plea for reports from the country and other districts is indicated. The lack of assistance makes one wonder if the notes are of any real interest to the boys. However, it is the best we can do and is, of course, indicative only of 3CP's and my results.

We are very appreciative of VK5NR's assistance.

73's, Ingram Patterson, VK3YP.

General.—Although conditions have shown a decided improvement, there have been a few days when the band did not come up to expectations. It has been possible to contact USA from 6 a.m. to 3.30 p.m., with all continents appearing during daylight hours most weekends. Occasionally the band has been open until 9 p.m. and later for some of the "near" DX, such as Burma and Singapore.

Europe.—The highlight of the month has been the appearance, in hordes, of European stations around 7.30 a.m. EST. These stations are audible via South America and have been too numerous to warrant any special individual mention in these notes except to say that over 40 fone contacts were made with England, and reports up to 10 db over S9 were exchanged.

Many contacts have been made in the evenings, some of the new DX stations on the band being F8PA CW, F3FN fone, F8CX CW, PA0WL CW, OZ2DA CW, SV1EC CW, ON4LZ CW, UA3KBC CW, and D4UKW who is an unlicenced D working inside Germany—'nuff said!

VK5NR, who is the first VK to send in a contribution to these notes, has worked a magnificient list of Europeans including juicy ones like GI5UR CW, PA0OO CW, GM6MD CW, OZ4HE CW, HB9CV CW, OZ7PH fone, SM5ZF CW, OZ9P CW, SM7WL CW, and VE1EP the long way round. He complains of G QRM, particularly from fone stations in the CW band (VK2 stations please note) and is forced to call "CQ NO G's" in an endeavour to work the rare stuff.

Europeans come through from 5 p.m. to 3 a.m. Contacts have been very consistent in this direction, mainly due to the times during which communication is possible—late afternoon up to 8 p.m. EST. The best fone signals have been from SU1HF, SU1MW, VQ4MNS, ZS1AX, ZS6FU, ZS6CZ, ZS6FD, OQ5BH, and the CW gang have been well represented by CR7AD, ZS5LK, ZS5BZ, ZS6BJ ZS5BS and ZS6ID.

Asia.—AC4YN of pre-war fame has been contacted on 28300 CW. Rangoon Burma is quite a Ham city these days with XZ's 2DA, 2AB, 2RK and a few others working VK every evening. VS9AP, 28300 fone, has been contacted by nearly every VK with a beam and is very consistent. A rare one on 28050 CW is ZC6FP near Palestine, who comes through around 6 p.m. OD2AC, Lebanon has been contacted several times. VU stations and GI's in ex-Japanese territories are also numerous.

South America.—Pride of place goes to HK3AB who puts an R9 plus fone signal into most of Australia and who provided VK5NR with his WAC after many moons of effort. Next best is CE1AH, 28280 fone, who is also R9 around 7.30 a.m. when conditions are suitable. VP8LK, 28020 CW, is a phoney although he is somewhere in South America, this information comes from VP8AD on South Georgia Island and has been confirmed by LU3DH. Other reliable stations from this Continent are LU9EV, LU9AX, PY1DS, CE3AG on CW and HK3DD, YV5ABX, HC1FG on fone.

Central America, West Indies, etc.—HR1MB, Honduras, 28350 fone, is a newcomer with a terrific signal. VP9F, 28230 fone, numerous TI stations, FM8AC CW, W4IWX/MM on board ship in the Gulf of Mexico and XE1FE, 28300 fone, are some of the others from these parts.

North American and Oceania contacts are too easy and numerous to be worthy of comment.

It is desired to thank VK5NR for his splendid report, his DX contacts are enough to make a hardened DXer like VK3JD envious, and that's saying something.

50 AND UP.

50-54 MEGACYCLES

The interest in this band is rapidly expanding, judging by the few reports which are arriving. However Ken McTaggart, VK3NW, provides much of the news. Very little Interstate news is coming to hand except by hearsay. The Editor would appreciate very much, reports from each State.

The following is a brief account of the doings for the month on 50-54 Mc/s at VK3NW/ANW. Firstly there was the trip to Ballarat with the portable outfit. The writer now has a portable licence, VK3ANW, which was used for the first time on this outing, so if anyone on 50 Mc/s hears this call he will know that the little portable is in operation somewhere! Well we got to Stan's—VK3SE—QTH, about 3 p.m. on Saturday, 31st August, and found that he had erected a three element rotary beam co-axial fed and also a co-ax fed rotatable dipole for us. The Ballarat weather was as expected, showery and very cold. The new receiver at 3NW—8 tubes using 954 RF 954 Mixer and 955 Osc., etc., was put on the job at schedule time but never a trace of signal was heard, All the Melbourne boys were "beaming" at us for their lives. So we called CQ and imagine our surprise to hear VK3IV, Keith of Ballarat calling us. Keith was perched on Mt. Buninyong, 2,200 feet up and 6 miles out of Ballarat which is 1,400 feet. After a short chat to him we called and listened again with no result. Then we heard 3IV working Dave, 3MJ, and later 3ABA and 3GG. We could only sit and listen to the one side of the conversation! A check up on 7 Mc/s with 3YS showed that no one in Melbourne had heard a trace of our signal either. That evening for the 7.30 p.m. schedule Stan and I took the gear up Black Hill just on the edge of Ballarat and about 300 to 400 feet higher than the city, i.e. about 1700 to 1000 feet. We thought the extra height might help, but never a sound did we hear from there either.

It appears that although Ballarat is 1400 feet high it lies in a saucer shaped depression with higher hills between there and Melbourne. 50 Mc/s signals apparently don't bend down into it. It is significant that the R.A.A.F. tried to put 4½ meter signals down to Melbourne but had no success and finally erected a station some miles out of Ballarat on a hill.

For the Sunday morning schedule we took the gear up on Mt. Buninyong to see if we could repeat 3IV's good work and although we were 25 minutes late in starting all the boys were there and did the signals rock in!! We contacted Dave 3MJ first, got R7 and gave him R8, then followed 3BW, Arch, in Portarlington (R8, we gave R8/9), Bon 3GG (R6, gave him R7/8), and Keith 3HK at Mitcham (R8, gave him R7). Also heard was 3ABA, Jim at Box Hill on ICW R7 but Jim was missing later when we called him. I believe Reg, 3LS was calling but we did not hear him, possibly because the receiver was covering the lowest end of the band.

Distances covered were Buninyong to Melbourne 60 miles, to Mitcham about 73 miles, and Portarlington 55 miles. Power to portable was 3 watts, co-ax fed dipole 12 feet off ground. During the week-end of 7th and 8th September, Keith (3IV) came through Melbourne with his portable outfit but due to some bad luck and lack of good liasion few contacts were made and none from out of Melbourne. He visited the writer and 3QO, 3HK and 3YS before returning. VK3IV, touring the country

(Continued on Page 28)

DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX, Box 1734 G.P.O. Sydney.

Meeting Place: Science House, Gloucester and Essex Streets.

Meeting Night: Fourth Friday of each month.

Over 120 members attended the August meeting of the N.S.W. Division. Main interest centered around the ordering of Disposals gear, which was being purchased in Melbourne by F.H.Q. for us. It seems too good to be true, to think that the Ham will receive, at reasonable prices, some of the gear that they had worked so hard over in the Services.

The lecture was delivered by Mr. M. MacDonald, of Ferguson's Radio, the subject being "The Design of Power Supplies and Modulation Equipment." The lecturer covered the subject fully and was well received. He showed that there was more in transformers than mere turns of wire and pieces of iron.

A notice of motion was tabled to rescind the previous direction, that a questionnaire be sent to all members to ascertain their feelings on fone and CW sub-divisions of bands. The September meeting, when the motion will be put should see some rather keen debating on the subject.

A suggestion was forwarded to F.H.Q. that an Australian DX Century Club be formed and that only post-war contacts count.

During the past month, there has been considerable development in our association with the N.S.W. Bush-fires Advisory Committee. With summer fast approaching and the drought, in many areas still unbroken, the response to a circular sent by the Committee to all country Shire Councils was most encouraging. It is now up to the amateurs to do their part in rendering further service of national importance. Whilst we know that FHQ is oganising a nation-wide communications network to meet any emergency, that might arise, we feel it essential at this juncture, to proceed with the present system inaugurated some two years ago.

Sub-committees of the Bushfires Advisory Committee and the N.S.W. Division were recently appointed to investigate equipment and associated technical problems, At the last combined meeting of the sub-committees, definite action was taken to purchase a considerable number of army type 108 and 109 sets available from Disposals. These sets will replace our Ham constructed truck and pack sets and standardise equipment. The development of the network is, to a large degree, due to the efforts of Messrs. Taylor and Thackeray, 2TC and 2TA of Young.

We have been asked to arrange demonstrations for the Shire Council authorities at Mudgee, Wagga, Orange and Grenfell with sets that are at present being modified. Members in these areas are earnestly asked to afford their Shire Councils the utmost co-operation. In doing so, they will not only render valuable service to the community but will again place before the public the work of the Amateur and the Institute.

Two new members of the N.S.W. Council were elected during the month. Basil Dale (2XX) fills the position of Treasurer in lieu of Gordon Cole (2DI). Clive Hutchinson (2YP) was elected a Councillor while John Moyle (2JU) fills the vacancy as Vice-President. Both 2XX and 2YP have been strong W.I.A. supporters over many years and it is gratifying to see them taking a more active part in Institute affairs.

The N.S.W. Division congratulates FHQ on its work with Disposals—especially that of Harry Kinnear (3KN) and Bob Anderson (3WY).

Opening of the 3.5 Mc/s band from September the 1st was welcomed and quite a large number of N.S.W. amateurs, including old timers, are making use of the new territory.

The country zone system is being inaugurated again and so far two zone officers have been appointed, Harry Hawkins (2YL), for the Coalfields, and John Traill (2XQ), for Newcastle and Maitland area.

The VK2WI broadcasts are being well received by country members. Present schedule is 11 a.m. every Sunday on 7 Mc/s and it is hoped to extend this service at a later date.

The routine of writing these notes has been arranged so that it will be done in rotation by various Councillors. However, we refuse to sign these so Peter (2JX), our worthy Secretary, can be blamed for them anyway!

COALFIELDS ZONE—(Zone Officer VK2YL)

2TY, Bob, at Lochinvar, celebrates arrival of second son, and is active on 7 and 28 Mc/s and uses three element rotary on the latter band. 2DG is working good DX on 14 Mc/s. A new shack is under construction by Max (2KZ), is active on 28 Mc/s and should be on fone with a new modulator on 7 Mc/s shortly. 2XT and 2YO not active as yet. 2LB, newcomer to Cessnock, is at present rebuilding. 2MK, with a plumber's delight rotary, stops on 28 Mc/s. With a lot of new gear, 2PZ will be on all bands shortly; Chris is now on 14 Mc/s fone. 2ADT, Zone's most active Ham with 35 watts into a rotary, works twenty to thirty DX stations a day on 28 Mc/s. 2YL mostly on 28 Mc/s with a new modulator, a rotary beam, an 8JK, a long wire zepp, and a 14 Mc/s doublet. Visitors to the Coalfields would be welcomed by 2YL at Comfort Street, Cessnock.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne. WM 1579.

Meeting Place: Lecture Hall, Chamber of Manufacturers' Building, 312 Flinders Street, City.
Meeting Night: First Tuesday of each month.

The September General Meeting was well attended, about 140 members and visitors being present.

Through the illness of President Kinnear, it was realised that at the Annual Meeting the election of Vice-Presidents was overlooked. As a result of nominations received Bill Gronow (VK3WG), Herb Stevens (VK3JO) and Mr. Matthews were elected for the ensuing year, and Bill Gronow occupied the chair for the evening.

Amongst those present were VK3's: PW, WQ, XJ, OT, AJH, CO, AME, UR, ZS, LZ, EA, KP, DM, CT, MN, XK, TZ, MB, ABA, MO, AP, YS, RN, ADX, SZ, QZ, AMP, FF, PC, AV, AT, IF, MX, JR, QI, LL, XA, NY, EK, EN, ARN, ZB, IK, FJ, ALW, QW, AE, YK, KC, ED, AFQ, FR, IM, AI, UK, DN, AKL, QU, LA, TF, OV, AJY, HS, LI, ET, JO, OF, QP, ADF, HB, KB, IT, PQ, TQ, RX, VK2BN, and Miss T. J. Currah, Mrs. J. W. Emmel, Messrs. Chalmers, Crowther, Hartley, Hatch, Belcher, G. Searle, Hooper, Ultmer (?), King, Elliott, Neilson, McLeod, Strickland, Timmins, Lance Smith, Pile, Taylor, Barry, Him, Gauntlett, Lee, Holland, Tew, Meallin, Alan Smith, Cains, Billings and Walsh.

The Treasurer gave a detailed statement of the Division's fignancial position in conjunction with the belated printed balance sheets which were distributed amongst the assembly.

VK3AFQ spoke at some length as to the amount of time that was, at present, being devoted to the distribution of QSL cards, which, on numerous occasions, has precluded a lecture being given or sufficient time for the boys to have an after-meeting get-together. After discussion the

Chairman called for suggestions as to ways and means of reducing the time in disposing of the cards. It is understood that a new system will be implemented at the October meeting.

The Secretary advised that all financial members would be forwarded Order Forms for Disposals Equipment which the Institute had been successful in tendering and ere this appears it is hoped that some of the material is put to good use in improving the performance of the receiver or getting more watts out of the final than heretobefore has been the case.

It has been noted that the Division has a Bendix Frequency Meter and as it may be some time before 3WI is on the air a suggestion was raised by VK3RN that a service similar to that in operation in VK5 be commenced as soon as possible in view of the narrow band widths now available. It was felt that such a service is urgently needed as those boys who have band edge crystals with stated frequencies on the holders have found that they do not coincide with the P.M.G. Monitoring Station. This matter is now in the hands of the Technical Advisory Committee.

The Administrative Leader of the newly formed Technical Advisory Committee, Herb. Stevens, briefly outlined the aims and organisation details of this Committee recently approved by Council. Details of this Committee's work appears elsewhere in this issue.

At the conclusion of general business, a brief address on "Recent Radar Developments in Australia" was given by Mr. O. L. Wissu (VK3ALW) and as the hour was getting late he promised to cover the matter fully at a later date when it is hoped that a blackboard will be available to help the lecturer explain some of the more

A.O.C.P. CLASSES, VICTORIAN DIVISION.

Applications are invited from members of the Victorian Division for the positions of (1) Class Manager; (2) Theory Instructor; and (3) Morse Code Instructor in connection with the next series of A.O.C.P. Classes to be conducted by this division. Particulars regarding rates of remuneration etc., may be had from the Secretary, Wireless Institute of Australia, Victorian Division, Box 2611W, G.P.O., Melbourne. Applications close on October 31st.

compex matters by means other than the gesticulations of one imitating an F.

3AMP and 3KX holding the fort in Colac, and both getting well among the DX on both 28 and 14 Mc/s. Wherever there is DX, there will be found Ron, 3KX. 3AGB in Warracknabeal is an ex-VK5, and is on 7 Mc/s with nice quality phone and e.c.o. 3YW is heard on 7 Mc/s with nice T9 note; has recently erected a new mast. 3TA, an old timer in Horsham, is active again. Alan (3HL) is rebuilding and will be on again soon; you can't keep an old timer down!

3TW, 3YN and 3QM seem to be the most active of the Hamilton gang; mostly all on 7 Mc/s, but 3TW is on 14 Mc/s occasionally working some nice phone DX. 3YN now has his phone permit. 3MC also has his phone permit and using grid modulation to get out nicely; has rhombic antenna on Europe and is putting another up, his score of countries is mounting steadily. 3GH, also of Coleraine, using a haywire V beam on 14 Mc/s and a

three element beam on 28 Mc/s is steadily plugging away at the DX; still some way to go for the DX C.C.

3NC, of Casterton, not heard lately, but has been putting up remarkable work on 14 Mc/s using only 4½ watts to a 6V6, reports from G are up as high as S9, with V beams and a rhombic. 3QC, our Council representative, of Terang, works 7 Mc/s phone mostly. Don't know what has happened to Jack (3PA) lately, but he has not been heard for weeks. 3XI, another old timer, is on again on 7 Mc/s with phone. 3NK, Jim, seems to be the sole representative from Camperdown, and is steady on 7 Mc/s with CW. 3GN, in Ararat, is very active on several bands, has nice receiver.

WESTERN ZONE CONVENTION AND ANNUAL MEETING

This function, to be held at Hamilton on the 26th and 27th of October, promises to be the biggest and best ever held in Victoria. Tentative arrangements are for a Dinner on the Saturday night, followed by the Convention which will be held in the 3HA Theatrette, which has been loaned by the management for the occasion.

As there is a large volume of business to be discussed, it is not expected that it will be concluded on Saturday night, so there will probably be a further session on Sunday morning.

On Sunday afternoon it has been arranged to give a demonstration to the authorities of the Rural Fire Brigades. This will involve the use of mobile and portable equipment such as the FS6 and 108 army type transmitters and receivers.

One of the residents of the Hamilton district has offered the services of himself and his Moth Minor aircraft and this will be equipped with one of the transmitters and used in the demonstration.

Some of the officials of the District Rural Fire Brigades have given donations towards a trophy which will be given for a competition which, it is hoped, will be run on the week-end following the convention. It is expected that a suitable prize will be available and negotiations are in progress for a 108 transceiver or amateur gear to a similar value. This competition will be open to all financial members of the Western Zone, and the committee will make the conditions known at the Convention.

Amongst other things to be discussed at the Convention is the matter of each Zone having a representative on Council. Also there has been a suggested re-arrangement of the Zone boundaries, not only the Western Zone, but all Zones and it is expected that there will be a lot of discussion on this matter.

An invitation has been extended to members of Council to be present at this important meeting and it is hoped that one or more will be along.

To complete arrangements for the dinner and also for accommodation it is necessary to advise the Western Zone Secretary that you are coming, also stating whether you want accommodation arranged for you.

The Western Zone Secretary is M. R. Riley (VK3TN), Box 139, Hamilton.

QUEENSLAND

Secretary: C. Marley, VK4CJ,

Box 638 J. G.P.O., Brisbane.

Meeting Place: State Service Building, Elizabeth St., City.

Meeting Night: First Friday of each month.

We were pleased to be able to screen several films at the August General Meeting. A couple of the talkies shown were definitely meant for "Ham" digestion, being on "Antennas" and "Ohm's Law;" a fresh programme is lined up for the September meeting. The meeting was notable for the spirited exchanges re the matter of what is being done for the country man. The plain fact of

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course is that we can't do much. A library service is being organised, the QSL service is available, and any constructive suggestions from country men re additional services would be appreciated. It has been suggested that lectures be published in "Amateur Radio" for the benefit of fellows who can't attend in person, whenever this is possible it will be done.

The Institute has on hand a number of Great Circle Maps of interest to all, they are available for the modest sum of 2/-. Here's your chance for a useful decoration for the shack walls. We also want to make it known to all and sundry that as cards accumulate for country Hams a list of callsigns will be published in "A.R." and the owners of the cards can—in the case of non-members—obtain same by forwarding a stamp or two. The service is of course free to members.

Speaking of cards, there are a few coming thru for 4HR, who we think, heads the list of DX worked in VK4 since the war. The total comprises a modest 63, with 4EL not far away with 60. 4KS with 54, 4JU 46, and 4RC 40 are runners-up. How do those figures compare with country men and, for that matter, Interstate DXers? The way they pound in at 4EL's is remarkable. In response to a recent CQ Eric landed four G's, not bad for a single CQ. A juicy one worked by 4RC on the 12th September was BIZ, operating on 14 Mc/s. Bob worked him at 8 p.m. and the fellow said he was on a ship going to India.

4AB up in Ipswich has been playing around with No. 11 army type sets and on a recent QSO with a VK2 in Casino got an R7 report, on fone we might add. An addition to the fold is 4GD (late VK2LD), pounding brass in Townsville we believe. On the other side of the State 4WX is now VK2AGA. High spot of the month was 4FN on 14 Mc/s fone. Heard Frank with my own ears working a W1 too! We were pleased to hear from Harold Hobler, of Rockhampton, that the Rockhampton Radio Experimenters Association is active once again and we hope that the proposal to form a Rockhampton zone of the Institute finds favour with them.

We hear that 4EJ (Townsville) is making a hole in the local ether, using an input of 50 watts to an 809. A three element beam puts the stuff out and invariably to the tune of R9 at the other end. 4GF has been fairly quiet, although Edgar has been responsible for a nice 10 watt signal on 7 Mc/s from an 807. 4GD mentioned earlier in these notes, does the job on 14 Mc/s with a doublet; this gentleman makes a speciality of W's. 4GE, complete with clothes lines, doing his stuff with 35 watts to an 807; we had better add that the clothes line is for yanking the two element rotary around, simple isn't it? Glad to hear from you OM and Tnx.

4VH, Jack, is very busy collecting his gear and has an even busier time ahead building a 14 Mc/s rig. In general, the northern fraternity are finding 14 Mc/s very patchy. Frequently when VK2's and 3's can be heard working DX, it's just not even to be heard in North Queensland. We believe that in extreme cases they even froth at the mouth at the injustice of it all! Anyhow, it's been nice hearing from you chaps.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.
Meeting Place: 17 Waymouth Street, Adelaide.
Meeting Night: Second Tuesday of each month.

At the monthly meeting of the W.I.A. held last Tuesday night, visitors included VK5GB, VK5AJ, VK3QH, GW2FUD (Mr. A. Wyn Owen, a commercial operator on the "City of Sydney" at present in port), Dr. Lower, Mr. Ray Tower, Mr. B. A. Bartlett, Mr. J. Coombe, Mr. George Smith and Mr. Cunningham. The lecturer was Mr. A. Smythe (VK5MF) whose subject "Relays and their applications" was well received. A vote of thanks proposed by Mr. M. Phillips (VK5ZU) was received with acclamation.

Mr. Smythe, in his lecture, covered a great deal of ground and unfortunately for the writer spent quite a time at the blackboard giving diagrams which, for obvious reasons cannot be reproduced here. "Al" commenced by describing various types of contacts and the manner in which they could be arranged to secure efficient operation. He then described the construction and installation of various types of relays, pointing out that the mounting of relays on their side assured an easy path through the contacts to any dust, etc., that might have accumulated. He further explained that a relay, being an electro-magnet, a certain amount of residual magnetism must remain in the iron core, and to prevent the relay sticking after the current is cut off it is the practice to place a piece of non magnetic material, known as the "residual," on to the armature and thus prevent the armature from actually touching the core, giving an air gap wide enough to block any residual effect. The use of a spark quench circuit across any relay contacts carrying high current was stressed by Mr. Smythe and a simple circuit consisting of a 2 mfd. condenser in series with a 200 ohm resistance across the contacts was advised. It was also stressed that all relays are not suitable for use in radio and the various types of relays and contacts were described at length with particular reference to their adjustments and usefulness with regard to radio circuits. In the standad 3,300 ohm relays the armature does not lend itself to high speeds such as keying relays, etc. The inertia of the armature is overcome in such relays by using an isthmus armature designed to offer as least surface to the magnetic field, thus permitting the armature to operate speedily as the magnetic field collapses or builds up.

By suitable design the relays can be made to operate in various ways such as quick to operate slow release, slow operate quick to release, slow make or break, quick break or make, make before break, break before make and many more types too numerous to mention. The above effects are quite simple to arrange either with contacts, copper slugs, or valve, resistance, and capacity circuits. VK5MF at this juncture displayed quite a child-like faith in his fellow Hams by passing round the assembly several types of relays for inspection. It speaks volumes for "Al's" faith that all relays had been clocked in at the close of the lecture.

Mr. Smythe then sketched on the blackboard a suitable circuit for incorporation in the average Ham shack for remote control, etc. Many questions were asked of the lecturer, the nature and quantity of which demonstrated effectively the success of the lecture.

Power rationing in VK5 has now become almost the accepted thing and activity on any of the amateur frequencies is very limited. Most of the DX can only be heard working the Eastern States and the notes this month reflect the scarceness of material. No relief is in sight and VK5 Hams regret their inability to add to the QRM at present on all bands.

It is not often that one secures the opportunity of talking in person with ones DX, but GW2FUD (Wyn Owen) attended the general meeting this month. He is a commercial operator on the "City of Sydney" and was voted a good chap by all who met him.

The frequency checking service provided by the W.I.A. South Australian Division is now functioning on 14, 7, and 3.5 Mc/s and in the hands of VK5DW is an unqualified success. So far the queue system has not invaded this field but you never know.

The new A.O.C.P. class is now filled and should commence very shortly. Keen interest is being shown by the students of the post-war era which is all to the good of Ham Radio.

The official membership of the South Australian Division is now 229 members and applications are still coming in.

It is rumoured that a certain VK5 Ham had a bout of BCL trouble recently and went to great pains to do the right thing by the BCL, only to read some time later in the daily paper that the said BCL had been prosecuted for not having a current BCL licence. Wouldn't it!

The VK5 gang are very happy to welcome back Ted Cawthron (VK5JE) and Jim Sullivan (VK5JK). Both were P.O.W. in the notorious Burma Road, and I guess there were times when Amateur Radio seemed very far away, anyway we are all glad to have them back and expect to hear that Ted is once again chasing that elusive "one more grid mill!"

It has been suggested that personal paragraphs make good reading and I will be only too happy to oblige providing that one or two personal happenings are blown down my ear. Come on now "fellas" what about it, this is your column and I welcome all news.

As an indication of the DX that can be heard but dared not be called in VK5, the following was heard between twelve thirty and nine forty five p.m. on Sunday, 8/9/46 on 14 Mc/s: HK4AF, KZ5AA, VA3BC, UD6KAB, UA2BS, UA3DA, D4AND, UA3AM, OK1AW, G5LP, G8RL, F8WK, E16G, PK6HA, HB9BX, ON4NC, LA2GA, G2QO, KH6BM, LU6DJK, VS1BX, KA6FA, CE3AG, YV5AN, VS7ES, CX1CX, KA5EA.

Overheard VK5JS telling several Hams that VK5KG was the number one DX station in VK5. Only Jack's natural modesty prevented him from admitting that he himself is the outstanding DX station, probably in VK. I will admit of course he is on the air quite frequently!

Mr. Hugh Lloyd (VK5BC), operating at Spring Cart Gully overlooking the River Murray midway between Renmark and Berri, reports DX conditions on 14 Mc/s as being excellent at the moment. Included in his contacts for August were the following: PY2AL, LU8EN, YO5WZ, PA0JQ, SM3ZF, OZ5AG, VP4TR, D4AND, HB9P, D5F, VS1BX, F8YZ, UA3AM, ON4AU, ON4WR, G8RL, OK3MV, KL7BH, K4ES, HC1FG. Strangely enough no VK5 signals are ever heard at this location although the DX stations can always be heard calling the VK5 Hams.

Many Hams are finding the present power restrictions a decided handicap from the DX outlook and quite a few stations have been off the air for weeks. A variation of the hours available for amateurs was discussed at the General Meeting and it was unanimously decided to carry on as at present, possibly approaching the "powers that be" for a variation of hours should the restrictions still be in force during the coming DX contest.

The W.I.A. has decided to hold a field day on a Sunday in the near future possibly at National Park and also to have the December meeting take the form of a Xmas Social. Council will announce further particulars at a later date.

WESTERN AUSTRALIA

Hon. Secretary: H. B. Lang,
42 Ord Street, Claremont, W.A.

Meeting Place: Builders' Exchange, St. Georges Ter., Perth.

Meeting Night. Third Monday in each Month.

VK6DD, John, sure makes news and this time it's WAC on fone. Congrats OM, an excellent performance for a single 807 in the final. Now has V beam on Europe and you should hear them come back! VK6KW now has three element dual 10 and 20 rotary beam 50 feet high.

It sure does its stuff even if there are complications. VK6LW, Wally, has just worked his first G on fone on 28 Mc/s. His first G fone on any band for that matter. His three element 28 Mc/s beam is now in the clear, being up about 35 feet high. VK6RU still favors 28 Mc/s. Sometimes heard on 14 Mc/s but on rare occasions. Jim lands nice DX consistently on 28 Mc/s. VK6HM is building four element array for 28 Mc/s and I believe the 50 Mc/s band. VK6PJ seems to have given 14 Mc/s away. Can be heard consistently on 28 Mc/s and working some nice DX. VK6WS now has two element array on 30 feet lattice tower ready and waiting for co-ax. Then he really intends going after that DX on 28 Mc/s band. VK6MB is working on 28 and 14 Mc/s and getting out very well. Has fixed key troubles now.

VK6DN heard frequently on 14 Mc/s CW and seems to get amongst the DX. Nice fist but has some keying troubles. Filter will do the trick OM! VK6WZ no news letter from Harry this month but I'll wager if there's any activity on 28 Mc/s he'll be there trying hard. VK6HL Harry has two element rotary and doing some nice work on 28 Mc/s when that band permits. Maybe he will be on the 50 Mc/s band soon. Watch out now! VK6DJ, Bill, still pounding away at CW, when is that fone rig starting up Bill? VK6CM, another nice CW signal on 14 Mc/s. Nice keying, good fist and good operating. VK6RG, Ross, is very consistent on 28 Mc/s band, now has three element rotary and appears to have it working nicely. VK6MW yep he's back on. Bill is running a full 7 watts into a rhombic—I guess you miss the T40's and that four element rotary you had prewar Bill! VK6WH, these notes would not be complete without reference to our "beam putter upper." Still keeping himself on 7 Mc/s band. How's about getting a rig on "six" Ted?

VK6HT has Albany on the map and seems to be getting out well. Would appreciate some news from the Southern Port Harry! VK6AJ still with us and was actually heard on "ten" this week. Would like to hear more of you Jack OM. VK6SA, Jim, has resumed his sked with W2GTZ. Complains of receiver troubles or I should say, lack of good parts to complete same. VK6LM, Lionel, has three element fixed beam and is doing good work with 22 watts to his 802 final. VK6MU not heard lately, may be I'm slipping but I'll wager Mal is there getting his share with his T40 final. VK6TX still silent, still house hunting and as yet no luck. How about some activity Jack, it's about time!

There must be others active than the above mentioned "consistents," a short note to GPO Box N1002 Perth would be appreciated. Let's know what you are doing. Your rig and what have you. Remember the other chap likes to know what's going on. You can help, so go to it PLEASE!

Conditions generally in VK6 in the past month have been very patchy. 28 Mc/s really goes to town at odd periods and European signals have been excellent round 10000 to 1200 GMT. Early morning risers have been somewhat disappointed, W signals are there, but work them, that's different.

14 Mc/s band has been having its ups and downs, but at times really opens up for excellent W and European contacts—if—you have a good receiver plus the ability to copy through real QRM.

The 50-54 Mc/s band appears quiet at the moment. However, several regulars are rebuilding or revamping their gear and it is expected to see this band really open up (maybe DX) with more activity from the locals. Maybe you guys need some inducement to popularise this band. If so, here it is, your scribe will hand over (present if it sounds better) one only 807 to the first new station to work him on that band. There's one stipulation. The transmitter must be crystal controlled. Now, who wants that tube?

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.

Meeting place, Photographic Society's Rooms, 162 Liverpool Street, Hobart.
Meeting Night: First Wednesday of each month.

The monthly meeting for September took place as scheduled on 4th inst. Council met at 7.30 p.m. and those present were L. Jensen (7LJ) in chair, J. Brown (7BJ), A. Finch (7CJ), C. Walsh (7CW), F. Gee (7RF), T. Connor (7CT), A. E. Allen (7PA). Correspondence and accounts were dealt with and business for special general meeting to follow was prepared.

8 p.m., Special General Meeting.—This meeting was summoned to deal with alterations, deletions, and additions to our Articles of Association, there being a number of changes necessary to bring us into line with the present conditions and practice. The articles being dealt with were the original ones drawn up at the inauguration of this Division, at that time situated in Launceston, and only minor alterations had previously been made.

Members present in addition to the Council were R. O'May (7OM), Lipscombe, Clarke, Glover, M. Loveless (7ML), E. Raynor, Richardson, A. Russell, W. Miller, D. Watson (7DW), D. Hildyard (7DH), T. Allen (7AL). Apologies were received from R. Conrad (7TR), C. Oldham (7XA), and O. S. Dahl.

Each article concerned was read in its original or existing form and the proposed alterations, etc., was read following in each case and where necessary the chairman explained the purpose of the alteration, asked for and then called for any discussion from the meeting. All alterations were accepted by the meeting, much to the satisfaction of those who had devoted so much time to preparing them. The old articles are out of print and it is proposed to reproduce the essential sections for the present so that members can be issued with a copy as is required and the revision was deemed necessary before proceeding with the copying.

Unfortunately present finances wont stand the reprinting of the entire articles at this juncture, hence the above decision which, we trust, will tide us over till better times. Maybe some rich old uncle will remember us in his last will and testament. After concluding the business of the Special Meeting it was closed and Ordinary General Meeting opened at 8.40 p.m.

Business for the meeting was unusually light, members were advised that VIH had received a visit from Len Crooks (7BQ) during the month but it had been very hurried and little time was available for visiting owing to pressure of business, we hope to see you down again soon Len with some time to spare and we'll have a jaunt around the shacks. The main item of the evening was well in progress by 9 p.m. and took the form of a lecture on Frequency Meters and Standard Frequencies given by C. Walch (7CW) and supported by lantern slides prepared by L. Jensen (7LJ). It was further supported by 7CW's Halicrafter (hotted up) and his recently constructed 100 and 1000 Kc/s S.F.O. with which practical demonstrations were given.

The subject, a most important one these times of narrow channels, etc., was well handled once 7CW got going and he far exceeded the 15 minutes he nominated, for as he proceeded, his "nerves" left him and he did the subject full justice and told of some very interesting observations he made while constructing and adjusting his own set up even to variations with commercially prepared and mounted crystals.

At the conclusion a vote of thanks, proposed by the chairman, was carried by a hearty round of applause. 7BJ was heard to say that it had taken some doing—persuading Cros to do his stuff—but it was worth it. As for the methods used—ask Cros.

The September General Meeting was held on Monday 16th and a very excellent attendance was again recorded. General business was quickly dealt with and the lecturer for the night was Major Mulder, whose subject "British and German Radio" was delivered in an instructive and interesting manner. A vote of thanks to the lecturer was proposed by Mr. J. Gabbertas and carried with acclamation.

As the time was still early members had a general get together and many and varied were the various subjects discussed. It was very evident that members appreciated the opportunity of discussing their problems in this manner.

Several interesting lectures have been arranged for future meetings, so keep swelling that attendance. We will soon require more commodius premises on present indications.

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50 AND UP.

around Ballan, at 30 m.p.h., heard VK3BW on 50 Mc/s. Signals were R9 and a dipole car antenna was used, the airline distance is approximately 40 miles.

Active on the band during the month have been 3BW, 3GG, 3KU, 3NU, 3MJ, 3YJ, 3QO, 3MJ, 3LS, 3ABA, 3HK, 3ZO, 3AJE, 3AFQ, 3IV, 3NW (and 3ANW!!), 3GB has put in an appearance.

VK3QC has been talking of making an appearance on this band and proposes to use an 832 in the final. Other country Hams who anticipate activity are 3AMP, 3KX, 3GN, 3TA, 3AGB, and 3YV.

There appears to be some activity on 50 Mc/s in VK4 as we learn that 4FB is now putting out a solid signal on that band, while 4HR, in a new location, has been heard to better advantage than hither-to. 4RY is talking of a beam—there goes the antenna coil in my receiver!

In South Australia quite a few contacts are reported on the 166 Mc/s band but a lot more Hams will have to move up to these frequencies before anything approaching consistent working can be expected. The UHF boys meet on 50 Mc/s each night at 7.30 p.m. and arrange all frequencies and schedules for experiments. Anyone interested will be welcomed with open arms as new stations are few and far betwen.

CLEARING THE ETHER.

latter is comparitively small, while the former is normally large. This fact provides positive identification of parasitic.

Beware of conductive loops in physical construction of coil mountings, etc., these loops form very virulent sources of parasitic oscillation and harmonic generation when electromagnetically coupled to RF circuits. Furthermore, such loops sometimes upset the circuit balance to such an extent that complete neutralisation cannot be achieved.

NEW TUBE DESIGNATIONS.

Use of Suffix Letter for Type Designations
(Standards Proposal No. 144)

It shall be standard to use the same type designation for both the prototype and the improved version where complete interchangeability exists between the two types, and to assign different type designations in accordance with the appropriate standard to tube types that are not completely interchangeable except that it shall be standard to permit the assignment of a suffix letter in alphabetical order, beginning with A. to the type designation of a prototype to identify the improved version where both:—

A. Unilateral interchangeability exists between the improved version and the prototype, i.e., where the improved version may serve to replace the prototype in all known, important applications but not vice-versa, and,
B. The improved version is intended to displace completely the prototype.

Typical Type Designations
1C23, 1N35, 2C53, 3C44, 6D25, 1P39.

AMATEUR RADIO

NOVEMBER 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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

AMATEUR RADIO

VOL. 14 NOVEMBER, 1946 No. 11

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.
Editor:
T. D. HOGAN, VK3HX
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Business Manager:
J .G. MARSLAND, VK3NY
Advertising Representative:
W. J. LEWIS
20 Queen St., Melbourne, C.1.
Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.
Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.
Subscription rate is 6/- per annum in advance (post paid).

CO-ORDINATED DEVELOPMENT

Elsewhere in this issue you will find the doings of Federal Headquarters since the Convention six months ago. Time has advanced rapidly since that date and there has been much work to be done—quite a lot of it routine and a goodly part progressive work. We aimed firstly at obtaining the re-instatement of the rights of the Hams. Secondly we aimed at putting "a head" onto the W.I.A. to give it a Federal Constitution by which the future functions of the Amateur movement in Australia depend and so that we can truly represent the Amateur and speak as one voice, to preserve the rights and privileges of the movement, and thirdly to improve existing circumstances. Whether we have achieved very much can best be left to you to judge.

The W.I.A. has earned for itself recognition as the mouthpiece and accepted administrative controlling body of Amateurs in Australia. The Disposals Commission recognised the W.I.A. by offering service equipment to amateur members at liberal prices. Nearly all the Radio Trade provides discounts to Institute members. We doubt very much whether the Radio Inspectors' Branch would have granted extended privileges in the form of additional frequency assignments and operating conditions to anybody but one that is truly representative of the licencees.

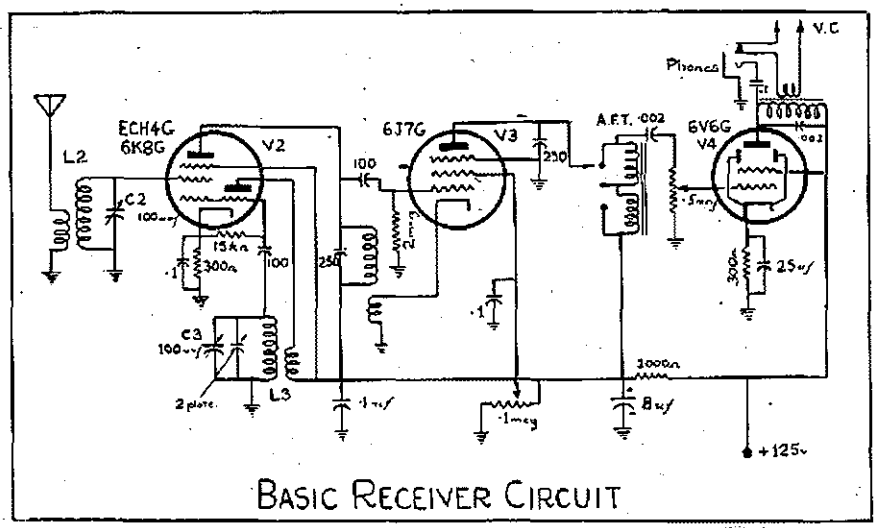
There is much work to be done but we are now equipped to do it. The work of F.H.Q. is now to be centered around the development and advancement of standards of amateur radio, technically and administratively. Co-ordination of activities and development will be the key to the future. It is for the W.I.A. to lead these developments in this country and the co-ordination must originate from Federal Headquarters as it is the source of contact with international societies, scientific bureaux and authorities in allied arts.

R.H.C.

IN THIS ISSUE

A SIMPLE HAM RECEIVER

By J. Brown, VKJBJ*



BASIC RECEIVER CIRCUIT

Although the receiver to be described is simplicity itself, no apology need be made for its performance. As it was considered that an I.F. of 1600 Kc. was most suitable for a 28 Mc. receiver, the Two Valve Super shown in the A.R.R.L. Handbook was built up. However, this simple set, although adequate for headphone reception on the lower frequency bands, did not have enough punch on 28 Mc.

The first step in search of more gain was to replace the 6C8G combined second detector and audio with a 6J7-6V6 combination. This improved the sensitivity out of sight and made an ideal set for a new Ham, or an old one who does not want too much complication. A set of this type will be described first, and then the addition of an R.F. stage will be dealt with.

The circuit is shown in Figure 1 and a suggested layout in Figure 2. The spare space to the right is used to mount a code monitor for transmitter keying, the same chassis being used for the set with the R.F. stage. When the R.F. stage is not used, the space occupied by L1, C1 and V1 is left vacant. There is nothing unusual about the second detector-audio circuits, these merely being an ordinary two valve regenerative arrangement fixed tuned to 1600 Kc. or thereabouts, but attention to a few points makes a lot of difference to results. Firstly, owing to the tuned anode arrangement used, the ordinary tapped coil cathode feedback circuit cannot be used, and a separate cathode tickler coil must be used. This is really a preferable arrangement, as it enables a ready adjustment of turns in order to get extremely smooth control of regeneration, which makes all the difference to the results obtained. The feedback control is a potentiometer in the screen supply, and the number of cathode turns should be altered until the valve slides into oscillation at 30-40 volts on the screen. The grid is fixed tuned with a rather large mica condenser in order to give the maximum stability and selectivity. Suitable coil details are given in the table at the end of the article.

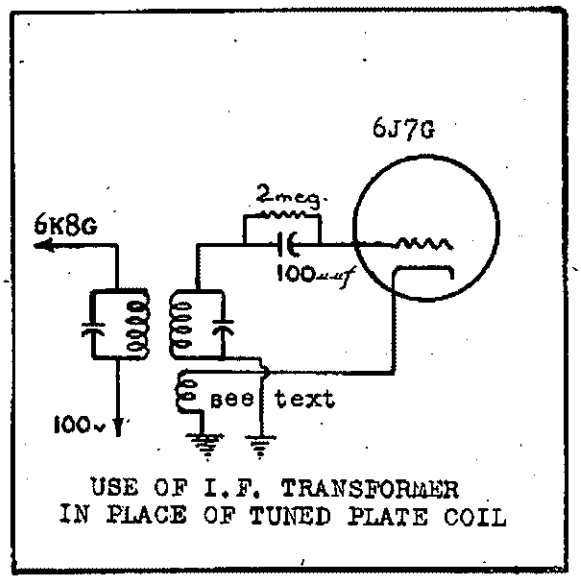
The other item of note is the coupling between the 6J7 and the 6V6. This consists of an audio transformer with the windings connected in series and, owing to the switching arrangement shown, it can be used either as a high impedance choke or a low impedance transformer. When it is used as a choke, good phone quality is obtained, whilst as a transformer working out of a pentode it gives a peaked response suitable for C.W. For the Philips transformer used, the P and G should be connected together.

Owing to the extremely high gain of this portion of the circuit, care has to be taken to eliminate hum and feedback. The plate leads of the 6J7 and the grid leads of the 6V6 are run in shielded wire, the grid lead to the 6J7 is run in low capacity shielded cable (braid over spaghetti with a small wire inside) and the grid leak and condenser are shielded with a metal box. The 2,000 ohm resistor and the 8 mfd. condenser provide decoupling, in the absence of which feedback may occur owing to the tuned anode circuit effectively coupling the grid of the 6J7 to the power supply for the higher audio frequencies.

The converter valve is the heart of the set and, although it may have been due to the valves tried not being representative of their type, the ECH4G and the 6K8G were the only ones that worked satisfactorily on 28 Mc. The new ECH35G will probably also be OK. Whilst the ECH4G did not seem to have any snags and worked first try, the 6K8G needed some taming. Two troubles seem to be in evidence with the 6K8G at 28 Mc., firstly the oscillator portion tends to superregenerate and, secondly the 6K8G has a negative input conductance at 28 Mc. which provides the same effect as regeneration and may become high enough to cause an efficient grid circuit to break into oscillation. The first trouble was overcome by using a 15,000 ohm gridleak for the oscillator instead of the 50,000 ohm usually used here and the second, if it occurs, may be overcome when a R.F. stage is being used by loading the 6K8G grid tuned circuit with a resistance of 10,000 ohms or more. If a R.F. stage is not in use simply increase the aerial coupling.

In practice the 6K8G, once tamed, seems to be the more satisfactory as, although it gives slightly less gain and signal/noise ratio, its ability is much higher. At 28 Mc. the ECH4G is very sensitive to changes of oscillator voltage and is also subject to a large amount of pulling when

* 12 Thiiza Street, Newtown, Hobart, Tasmania.



USE OF I.F. TRANSFORMER IN PLACE OF TUNED PLATE COIL

the grid circuit is tuned, this makes tuning difficult. The 6K8G seems to be relatively free from these faults. It was found that the best gain was obtained from the ECH4G when the oscillator was on the H.F. side of the signal, but for the 6K8G it should be on the L.F. side (for 28 Mc. at any rate). The oscillator grid current for both valves should be about ½ Ma. through 15,000 ohms. To obtain the best results from the regenerative feature of the 6K8G, the aerial coupling should be looser than when the ECH4G is used, and should be experimented with until the best results are achieved. In both cases the heater voltage is very critical and it must not be allowed to drop below 6 volts or else the gain drops right off.

Separate band-set condensers are used for the aerial and the oscillator circuits, the aerial condenser being driven by an Eddystone slow motion coupling. In order to get the shortest possible leads in the R.F. circuits, the aerial is mounted on the top of an aluminium bracket, the tuning condenser being mounted on the front of the bracket; the oscillator coil is mounted direct on the chassis and its tuning condenser is underneath. For band-spread, a small condenser is shunted across the oscillator coil only. When the receiver is needed for the lower frequency bands, it is proposed to use a condenser here large enough to spread the 3.5 Mc. band across the dial, and then for the higher frequencies this condenser would be tapped down on the coil so as to spread these bands over the dial also. As the receiver has not yet been used on the lower frequency bands, these details cannot be given, but they may easily be obtained by experiment. For the main tuning dial, a small cord-driven job was obtained and the driving shaft with the V groove in it was replaced by a piece of ¼-inch ebonite rod with no groove. The absence of the groove gives much smoother operation and the ebonite shaft stops contact noises which may be troublesome on 28 Mc. For the same reason the main bushing of the dial is replaced by an ebonite one, these two alterations turn the dial into a first class unit.

Although the receiver without the R.F. stage is excellent for headphone work, it has not got enough gain for loudspeaker work except on strong signals. In order to remedy this a stage of R.F. was added in preference to a stage of I.F., as the R.F. stage greatly improves the inherent signal noise ratio. The three valve job will reproduce loudly any signal that is above the converter hiss and an I.F. stage would not improve the situation as it would make both the signal and the noise louder. The R.F. stage, however, amplifies the signal without increasing the converter hiss and so improves the signal/noise ratio. A 6K7 was used here, but the other conventional types would also be satisfactory. If obtainable, the newer types 6SK7 or 6SG7 are much better, but the 1852/6AC7 is not recommended. For the fortunate few the Acorn or 9000 series are ideal, but on 28 Mc. the conventional tube does not do too bad a job.

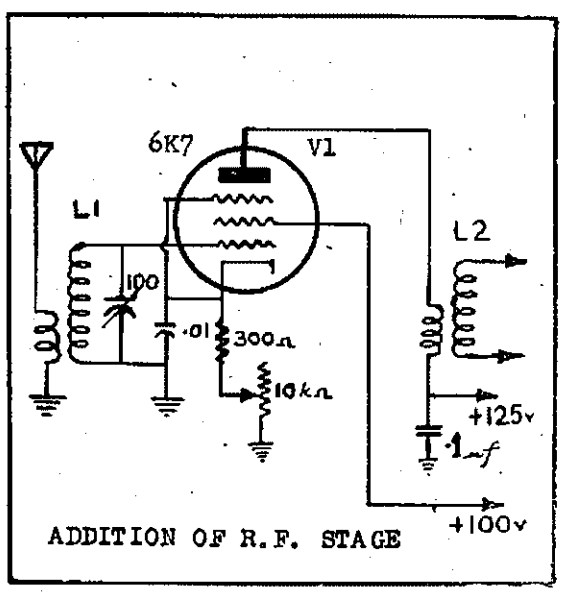
Owing to the removal of the aerial loading from the grid of the mixer oscillation may occur with the 6K8G, but can be easily fixed by shunting a resistance across the grid coil as mentioned before. For this reason low loss coils are not always an advantage for use with a 6K8G. The aerial and mixer tuning condensers are ganged and driven by the Eddystone reduction as before, both being mounted on the bracket and shield which carries the aerial and mixer coils. With the addition of the R.F. stage this little receiver really does perform on 28 Mc.

There are a couple of modifications which can be carried out if desired. Firstly the tuned anode circuit may be replaced by a conventional 1600 Kc. I.F. transformer (a number 1 is preferable). The tickler coil should be wound near the grid winding and 5 to 10 turns should be enough, the actual number of turns and the polarity of connections being adjusted for correct regeneration. When the transformer is being lined up, the regeneration control should be just below the point of oscillation. This alteration will improve the selectivity at the expense of gain and should appeal most to the city dweller. Secondly the A.F. transformer used to couple the 6J7 to the 6V6 may be replaced by a 250,000 ohms resistor without greatly affecting the results.

In wiring the set, make all leads direct and as short as possible. All earths for any particular valve should be returned to one point and these points joined together with heavy copper wire.

A power supply of 25 Ma. at 125 volts is required for the three valve version and 35 Ma. at the same voltage for the 4 valve set.

All the coils except the 28 Mc. aerial and mixer coils are wound on ordinary valve bases, these 28 Mc. coils



ADDITION OF R.F. STAGE

(Continued on Page 25).

SELECTIVITY

The increase in the popularity of the higher frequencies has demanded a somewhat new and more intricate approach to receiver design. Much has been written about H.F. technique and its inherent problems but little has been said about that portion of the receiver which supplies the selectivity—referring of course to the I.F. channel of a superheterodyne. It will not be the object of this article to deal with any specific I.F. channel but rather to dwell on the general concepts of selectivity and enable the individual to design according to his own requirements and conditions.

First let us look at the requirements of selectivity and to set down some of the standard characteristics as used in selectivity measurements. Selectivity is invariably obtained by the use of resonant circuits. These may consist of inductance capacitance combinations, piezo-electric crystals or other vibrational devices but at this stage we will concentrate on the coil condenser combination being the most universally used for this purpose. When a coil and condenser are used in the well-known parallel resonance circuit they show an impedance characteristic as illustrated in Fig. 1. The impedance is maximum at the resonant frequency of the coil and condenser and falls off on either side. Thus in a receiver this parallel resonant circuit can be used to make the amplification of a valve vary with frequency proportional to the variation in the circuit impedance. The characteristic of the circuit is measured in terms of the ratio of the voltage gain at resonance to the gain at some frequency off resonance, this usually being taken at a number of spots. In actual practice the gain is usually referred to by the signal input required to give some standard output and the ratio is given by the voltage input off resonance divided by the voltage input at resonance. Also this ratio is given in DB as this is more suited to the logarithmic characteristic of the ear and the number of Kc/s. off resonance given in terms of total bandwidth which is twice the Kc/s. off resonance assuming a symmetrical curve.

Our selectivity curve has to fill a number of requirements, the first of which is its ability to handle the modulation of the incoming signal. From this point of view it must have a finite width which is dictated by the highest modulation frequency it has to pass. This is because of the sidebands generated in the process of modulation and which actually contain the intelligence. For this purpose a certain maximum attenuation is allowable in sideband cutting and for normal purposes this is set at 6 DB. Secondly, the selectivity curve must supply sufficient attenuation of adjacent signals to enable the desired signal to be heard without interference. For practical purposes this attenuation is set at a minimum of 60 DB. These two figures are the most important ones concerning any selectivity curve and the ratio of the bandwidth at 60 DB to the bandwidth at 6 DB is referred to as the shape factor. Thus the design of the circuit is towards a shape factor as small as possible tending ultimately towards the hypothetical perfect with a shape factor of 1.

THE DEVELOPMENT OF AN I.F. CHANNEL

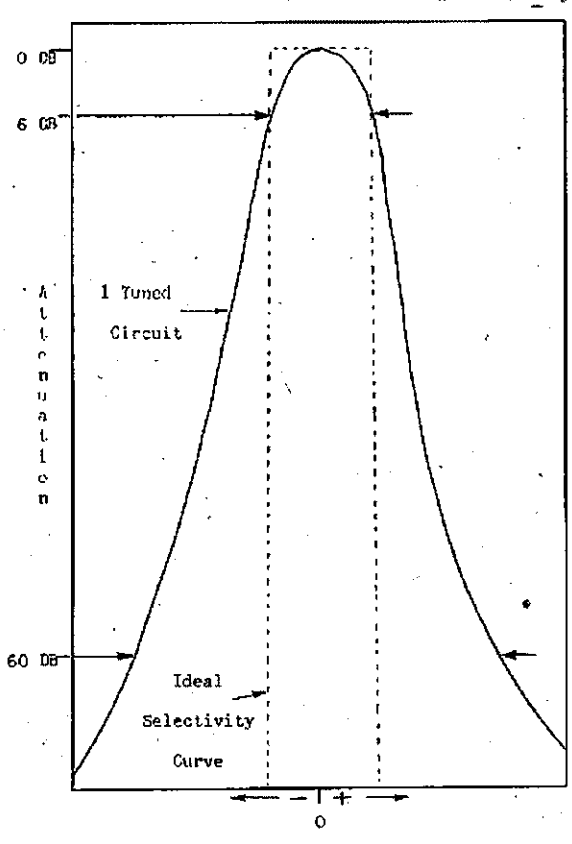
In studying more fully the characteristics of tuned circuits it will be necessary for the moment to use a much lower attenuation figure than 60 DB as this cannot be satisfactorily obtained with a small number of circuits. We will therefore use 15 DB to enable us to compare various combinations. The width of the curve is a function of the Q of the coil, the higher the Q the narrower the curve, and the Q is the effective working Q and not the initial value of the coil on its own as this value is reduced by the losses in the condenser and insulation and the loading of the accompanying valves and circuits and might only be a fraction of its initial value. Therefore any future reference to Q will be this effective value and not the initial value.

The following Table 1 will give a comparison of 1 tuned circuit, 2 tuned circuits with zero coupling (i.e. coupled through a signal transferring device such as a valve), 2 tuned circuits reactively coupled at one half critical and 2 tuned circuits critically coupled, each circuit having a Q of 130 and tuned to the standard frequency of 455 Kc/s.:—

TABLE 1

Circuit	B.W. at 6 DB	B.W. at 15 DB
1 Circuit	6.0 Kc/s.	20 Kc/s.
2 „ zero coup.	3.4 „	7.5 „
2 „ .5 x Crit.	4.2 „	8.6 „
2 „ 1.0 x Crit.	6.5 „	11.5 „
Circuit	**Attenuation at 6 Kc/s. B.W.**	**Attenuation at 20 Kc/s. B.W.**
1 Circuit	6 DB	15 DB
2 „ zero coup.	12 „	30 „
2 „ .5 x Crit.	10 „	29 „
2 „ 1.0 x Crit.	4.6 „	24 „

The value of Q at 130 has been used as this is a reasonable approximation of the maximum value that can be obtained under working conditions in present day coils at this frequency. It will be noticed from these figures that with two single circuits as would be used in the R.F. section of a receiver the attenuation at any



given bandwidth is equal to the attenuation of the one circuit multiplied by the number of circuits. Thus in obtaining adequate adjacent channel selectivity by the use of a number of single circuits the selectivity curve becomes very sharp on the nose. By coupling two circuits together reactively we get a new set of conditions in which the shape of the curve is altered in relation to the two separated circuits. It will be noticed that the general curve is somewhat broader but it has the desirable effect of having the bandwidth at any point increased by the same amount approximately. This results in an improvement in shape-factor as the percentage increase in bandwidth at 6 DB is 91%—3.4 Kc/s. to 6.5 Kc/s.—while at 15 DB is only 53%—7.5 Kc/s. to 11.5 Kc/s—and becomes progressively less as the attenuation becomes greater. These figures are for critical coupling which is the condition just before the familiar appearance of the double peaks of over-coupling. For practical purposes it is not desirable to use coupling beyond critical due to the difficulty of alignment without special equipment. Refer to Fig. 2.

Table 2 shows the effect of using a number of coupled pairs, each coil with a Q of 130 at a frequency of 455 Kc/s. and each coupled to critical.

TABLE 2

Circuit	B.W. at 6 DB	B.W. at 60 DB	Shape-Factor
1 Coupled Pair	6.5 Kc/s.	160 Kc/s.	25
2 „ „	5.0 „	28 „	5.6
3 „ „	4.4 „	16 „	3.6
4 „ „	4.0 „	11.6 „	2.9
4 Coup. Pr. Coup. .5 x Crit.	2.1 „	8.8 „	4.2

Circuit	Atten. at 6 Kc/s.	Atten. at 20 Kc/s.
1 Coupled Pair	5 DB	25 DB
2 „ „	9 „	50 „
3 „ „	13 „	75 „
4 „ „	17 „	100 „
4 Coup. Pr. Coup. .5 x Crit.	24 „	116 „

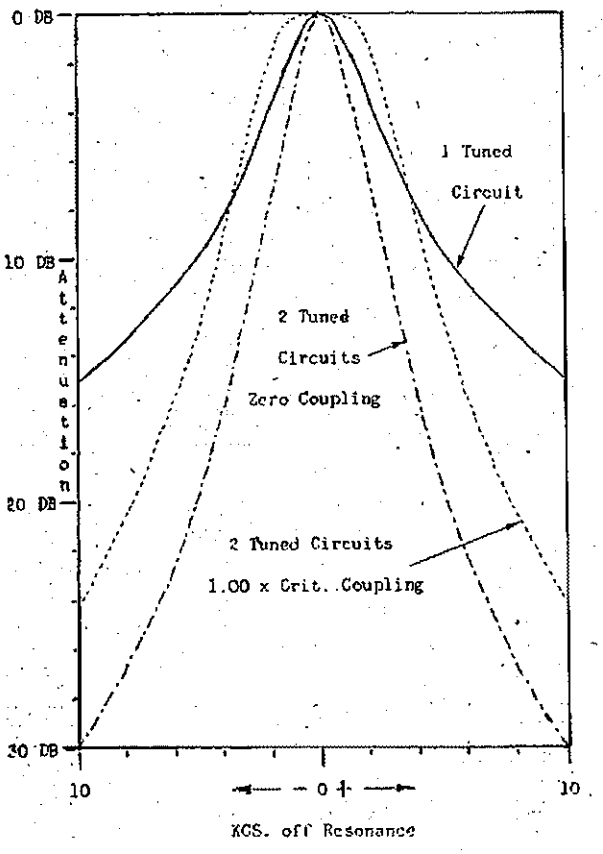
By using a number of coupled pairs as is the case in the usual I.F. channel it will be noticed that at first the shape-factor is improved considerably but after 3 pairs it becomes increasingly more difficult to obtain any improvement. Thus 4 I.F.Ts. should be the maximum considered under normal circumstances. The bandwidth at 6 DB is reduced by 40% with 4 pairs as against 1 pair whilst at 60 DB it is reduced by 93% thus giving a considerable improvement in adjacent channel selectivity with not much change in the bandwidth at 6 DB. For comparison also, is the effect of reducing the coupling to half critical in order to obtain greater selectivity. This method is often used but it is not personally advocated if it can be avoided. It will be seen that although the bandwidth at 60 DB has been reduced by 24% the bandwidth at 6 DB has been reduced by 47% which gives a curve so sharp on the "nose" as to cause an increase in the difficulties of tuning and oscillator stability as well as considerable audio attenuation without giving much improvement in adjacent selectivity. You will notice also that the shape-factor has increased to 4.2 which is not as good as 3 pairs critically coupled.

Next we will study the effects of altered Q and frequency using 3 pairs critically coupled in each case with a Q of 130 at 455 Kc/s., a Q of 65 at 455 Kc/s., and a Q of 130 at 1820 Kc/s.

TABLE 3

Circuit	B.W. at 6 DB	B.W. at 60 DB	Shape-Factor
Q of 130, 455 Kc/s.	4.4 Kc/s.	16 Kc/s.	3.6
Q of 65, 455 Kc/s.	8.8 „	32 „	3.6
Q 130, 1820 Kc/s.	17.6 „	64 „	3.6

Circuit	Atten. at 6 Kc/s.	Atten. at 20 Kc/s.
Q of 130, 455 Kc/s.	13 DB	75 DB
Q of 65, 455 Kc/s.	1.6 „	39 „
Q 130, 1820 Kc/s.	0.4 „	10 „

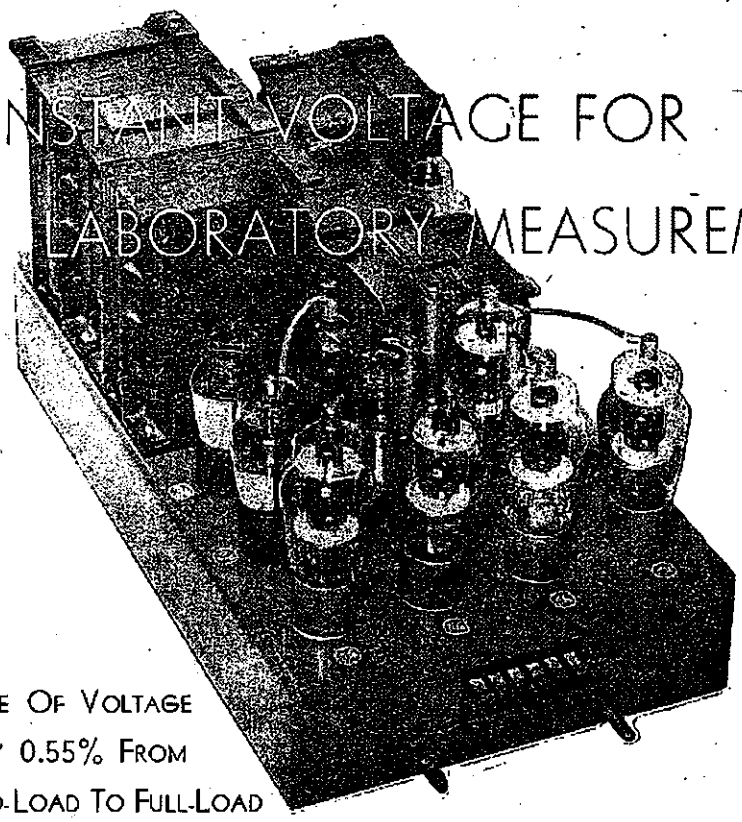


First note that the shape-factor is independent of the Q or frequency, being governed only by the number of tuned circuits and the degree of coupling. Second, the bandwidth is inversely proportional to the Q, the lower the Q the wider the bandwidth—reducing the Q by half gives twice the bandwidth—and third, the bandwidth is proportional to the frequency maintaining the same Q—increasing the frequency by four gives four times the bandwidth. Thus the use of an I.F. channel with a frequency of 1820 Kc/s. as against 455 Kc/s. would require a Q of 520 to give the same selectivity. In practice it is not possible to obtain figures anything like this, in fact it is difficult to obtain working Qs at 1820 Kc/s. any higher than that obtainable at 455 Kc/s. Therefore it must be born in mind that the use of higher I.F. frequencies will result in lower selectivity than that obtainable at 455 Kc/s. and it is not possible to completely solve this with more tuned circuits as the channel will be naturally broad and it is not possible to reduce the skirt to less than the nose bandwidth. It will be noticed that for the same Q at both frequencies the attenuation of a signal 10 Kc/s. off resonance at 455 Kc/s. will be 75 DB, but at 1820 Kc/s. would only be 10 DB and could not be regarded as sufficient as it is necessary to separate even better than 10 Kc/s. for amateur work.

All the figures quoted in this article are calculated and while they can be closely duplicated in practice with careful design, they do not take into consideration the effects of feedback which can have considerabe effect on the characteristics. Regeneration is one of the methods

(Continued on Page 26).

CONSTANT VOLTAGE FOR LABORATORY MEASUREMENTS



CHANGE OF VOLTAGE ONLY 0.55% FROM NO-LOAD TO FULL-LOAD

MANY testing processes require constant voltage to be applied to valves or other equipment during the time that the test is in progress. It is useless to have instruments correct within 1% or less if the voltage is going to vary while the current or other feature is being read.

This is particularly important in the testing of radio valves in which some of the characteristics are critically dependent upon the applied voltages. An example of this is the Characteristic Tester recently constructed in the Laboratory of Amalgamated Wireless Valve Co. Pty. Ltd. at Ashfield. This equipment is used for the checking of a percentage of all valves manufactured each day, to see that the accuracy of the factory testing is maintained, and to carry out other tests not normally applied to the whole production owing to their complexity.

The equipment uses an electronic voltage regulator on the plate, screen and grid supply voltages. The input is from the 240 volt A.C. mains, the output is variable in voltage from 0 to 300 volts with a maximum current of 200 mA. With the maximum output voltage, the percentage voltage drop is only 0.55% for a change of load from 0 to 200 mA.

The equipment uses Radiotron type 807 valves, four of which carry the current of 200 mA. between them. The 807 is probably the most satisfactory type of valve for this purpose owing to its high current capability (72 mA. per valve maximum) and its high amplification factor. This is only one of many applications in which Radiotron type 807 may be used with every satisfaction.

Radiotron

MADE IN AUSTRALIA

DISPOSAL TUBES

TECHNICAL DATA AND BASE CONNECTIONS

To those members who were fortunate in obtaining some of the tubes which were purchased from the Commonwealth Disposals Commission by the Wireless Institute, the following information will be of considerable interest.

CV6—E1148 V.H.F. TRIODE

(Full Ratings up to 224 Mc/s.)

Characteristics:—

Heater Voltage	6.3	Volts
Heater Current	0.175	Amperes
Plate Voltage	300	Max. Volts
Plate Current	20	Max. Ma.
Plate Dissipation	3.5	Max. Watts
DC Grid Voltage	—35	Volts
DC Grid Current	4	Ma.
Transconductance	3000	Micromhos
Amplification Factor	20	
Plate Resistance	10000	Ohms

Interelectrode Capacitances:—

Grid to Heater	1.4	Mmfd.
Grid to Plate	1.6	Mmfd.
Plate to Heater	1.2	Mmfd.

Class C Amplifier and Oscillator

Typical Operation:—

Plate Voltage	300	Volts
Grid Voltage	—35	Volts
Plate Current	20	Ma.
Grid Current	2.0	Ma.
Driving Power	0.4	Watts
Carrier Power	3.5	Watts

Class C Amplifier Plate Modulated Telephony

Typical Operation:—

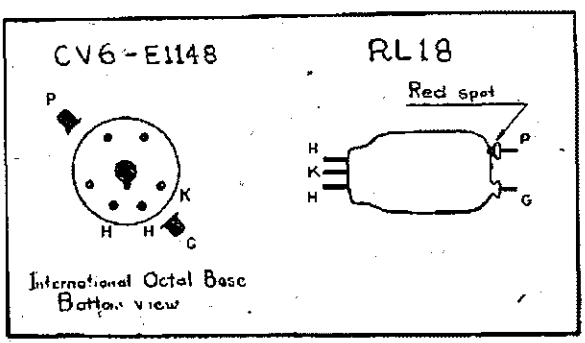
Plate Voltage	300	Volts
Grid Voltage	—35	Volts
Plate Current	20	Ma.
Grid Current	3.0	Ma.
Driving Power	0.8	Watts
Carrier Power	3.5	Watts

RL18 U.H.F. TRIODE

(Full Ratings to 600 Mc/s.)

Characteristics:—

Heater Voltage	6.3	Volts
Heater Current	0.25	Amperes
Plate Voltage	250	Max. Volts
Plate Current	15	Ma.
Plate Dissipation	2.5	Watts
DC Grid Voltage	—3.3	Volts
DC Grid Current	7.5	Ma.
Maximum Resistance in Grid	0.5	Megohm
Transconductance	2900	Micromhos
Plate Resistance	11500	Ohms



Interelectrode Capacitances:—

Cathode to Grid	1.3	Mmfd.
Grid to Plate	1.3	Mmfd.
Plate to Cathode	0.13	Mmfd.

RL16 SINGLE ENDED U.H.F. TRIODE

(Full Ratings to 400 Mc/s.)

Characteristics:—

Heater Voltage	6.3	Volts
Heater Current	0.43	Amperes
Plate Voltage	250	Max. Volts
Plate Current	10	Ma.
Plate Dissipation	7.5	Watts
DC Grid Voltage	—2.6	Volts
Transconductance	6500	Micromhos
Amplification Factor	60	
Plate Resistance	9500	Ohms
Equiv. Noise Resistance	310	Ohms

Interelectrode Capacitances:—

Cathode to Grid	5.2	Mmfd.
Grid to Plate	3.1	Mmfd.
Plate to Cathode	1.3	Mmfd.

RL7—SINGLE ENDED R.F. PENTODE

(Useable up to 250 Mc/s.)

Characteristics:—

Heater Voltage	6.3	Volts
Heater Current	0.3	Amperes
Plate Voltage	300	Max. Volts
Plate Dissipation	3	Max. Watts
Screen Voltage	300	Max. Volts
Screen Dissipation	1.7	Max. Watts
Grid Voltage	1.3	Volts
Grid Resistor	3	Max. Meg.
Total Cathode Current	15	Max. Ma.

Interelectrode Capacitances:—

Grid to Screen	2.2	Mmfd.
Grid to Plate	0.02	Mmfd.
Input	6.2	Mmfd.
Output	4.9	Mmfd.

Typical Operating Conditions:—

Plate Voltage	250	Volts
Screen Voltage	250	Volts
Grid Voltage	1.7	Volts
Plate Current	10	Ma.
Screen Current	1.45	Ma.
Transconductance	7700	Micromhos
Grid Resistor	0.5	Meg.
Cathode Resistor	150	Ohms
Equivalent Noise Resistance	700	Ohms
Input Resistance (50 C/s.)	10000	Ohms

Socket is 9 Pin Loktal. Base Connections as under:—

1—Heater	5—Cathode
2—Plate	6—Control Grid
3—Screen	7—Cathode
4—Suppressor and Cathode	8—Cathode
	9—Heater

A shield should be fitted across the underside of the Socket running through the line of pins 4 and 8.

CV66-RL37—GROUNDED GRID TRIODE

At frequencies of 200-250 Mc/s. this Valve gives about 5-6 DB improvement in signal/noise ratio over the RL7. A combination of an RL37 and an RL7 gives a gain of 16 DB and is a very satisfactory combination.

Characteristics:—

Heater Voltage	6.3	Volts
Heater Current	0.3	Amperes
Plate Voltage	200	Max. Volts
Plate Current	10	Ma.
Grid Bias	—2	Volts
Transconductance	8000	Micromhos
Amplification Factor	60	

Interelectrode Capacitances:—
(Grid Grounded, Heater connected to Cathode)

Plate to Ground	4.0	Mmfd.
Cathode to Ground	5.0	Mmfd.
Plate to Cathode, not more than	0.1	Mmfd.

Socket is 9 Pin Loktal. Base Connections as under:—

1—Heater	6—Grid
2—Grid	7—Grid
3—Grid	8—Cathode
4—Plate	9—Heater
5—Plate	

A shield should be fitted across the underside of the Socket running through the line of pins 3 and 7.

TYPE EF50

Owing to lack of space, information and characteristics regarding type EF50 has been held over till the December issue of "Amateur Radio." However the base connections for the EF50 are given below. Socket is a 9 Pin Loktal.

1—Heater	6—Cathode
2—Screen	7—Grid
3—Plate	8—Shield
4—Suppressor	9—Heater
5—Shield	

Some details of this Tube were given on page 4 of the January 1946 issue of this magazine.

VCR139A—CATHODE RAY TUBE

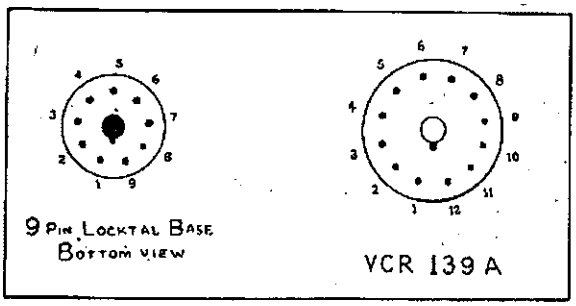
Characteristics:—

Heater Voltage	4.0	Volts
Heater Current	1.1	Amperes

Focus and Deflection—Electrostatic.
Maximum Voltage, Anode No. 3—1000 Volts.
Sensitivity m/m/V/V—X—170.
Y—170.
Maximum Dimensions, diameter 70 m/m.
length 205 m/m.
Screen—Green.

Socket Connections:—

1—Cathode	7—Deflection Plate Y2
2—Grid	8—Deflection Plate X2
3—Heater	9—Anode No. 3
4—Heater	10—Deflection Plate X1
5—Anode No. 2	11—Deflection Plate Y1
6—No Pin	12—No Pin.



Can You Help?

The Magazine Committee is contemplating alterations in the make-up of this Magazine. Have you any ideas in this regard? If so please drop a line to the Editor, c/o Box 2611W G.P.O. Melbourne, and let him know any improvements you would prefer.

DX FOR THE MONTH

28-30 MEGACYCLES

The 28-30 Megacycle Band has really come to life with easy contacts on fone and CW to almost any part of the world, and WAC can be made in a few hours.

To my (VK3CP) knowledge, the band has never been better and it is a real pleasure for the low power man, with that most essential, the three element rotary beam.

This month the Europeans have been coming through from 5.30 p.m. until after midnight, and of the dozens of G contacts G8QX, situated on the East side of the Malvern Hills with an ideal location for VK, has been the most consistant contact although he is using only the humble folded dipole for an antenna. There have been many instances of contacts the long way round, as proved by a beam test to the short path with zero signals. The South American HC1FG on 28400 fone and Central American VP6YB at Barbados 28140 fone have had the test signals via Europe.

From the States there is usually a solid block of signals around 28500 but apart from this jumble the most interesting contacts with W stations have been from portable and portable mobile marine stations. W6LMK contacted here at 2 p.m. with R8 fone was a surprise for his little rig had a 37 osc. 14 Mc/s. xtal, 6L6 final with a 6A6 for the modulator with 15 watts input. The antenna being a vertical ¼ wave rod mounted on the back bumper of his car.

W5IFM on a Tanker 75 miles East of the KA Islands with only 9 watts input to a final 807, 6L6 tri-tet 7 Mc/s. xtal, 6AG7 buffer-doubler, modulator 6J7 from a carbon microphone to a 6L6 modulator tube and a folded dipole antenna 70 feet above the water line, is an excellent contact around 6 p.m. any day.

W9FQE, on an Army Transport heading for California, and at present in the South China Sea, is using 20 watts input to an 807 final to a folded dipole antenna.

W3KIF in African waters on the "SS White Falcon" near Kenya Colony is also an interesting contact.

Europe.—Observations here indicate that if the BBC programme on 26.1 Mc/s. is coming through, the band is wide open for the Europeans. Apart from the numerous stations from the Old Country, the following Europeans have been contacted: OK1WF, 28030 CW; PA0JQ, CW 28100 ex-PA4DA; LA1F, 28560 fone; SM5QV, 28060 CW; SM3ZF, 28075 CW; F8GR, 28300 CW; G4AJ, 28430 fone has a five element rotary, i.e. three directors and has a signal worthy of such an antenna.

Asia.—The Ham community at Rangoon, Burma, is losing XZ2RK who is moving off for Indo-China and hopes to have FI8RK on his card from there. The XZs come through all the evening until after midnight with our beams poked up North. From Singapore VS1BG and VS1BV have good signals. India is represented by VU2LR and VU2AQ who are consistent contacts.

Africa.—From here the ZS stations are too numerous to mention although the best seem to be the following: ZS6EQ, 28400 fone; ZS6FU, 28380 fone; ZS1AX, fone, and ZS2AL, CW 28100; VQ2FR and VQ2PL, 28110 fone; also VQ3TOM; the last three are in Rhodesia. OQ5BH, 28300 fone, in the Belgium Congo, and CN8LR, 28080 CW, are very interesting contacts.

Central America and West Indies.—VP6YB, 28140 fone; TG9JW, TG9JK, XE1KE, XE1FE fone and HR1MB, the later with our beams turned due East has a terrific signal around midday.

South America.—These fellows keep us guessing because you can never tell what part of this Continent will show up. Some mornings between 8 and 9 a.m. the 28-28.5 Mc/s. portion is packed full of LU stations although they seem to only work W8s. The following are consistant: VP8LK, 28020 CW, gives his QTH as Port Stanley Faulkland Islands, but the other VP8s say he is phoney although our beam must be due South; CE1AH, 28240 fone; PY2QK, 28400 fone, has just discovered he must put his beam due South for VK and beam over the Pole; HC1FG, 28420 fone, long way round at 7 p.m. EST; PY3AH, 28400 fone; LU2AJ, LU4AW, LU1DH, and LU3BQ all on fone with good English. PZ1RM in Surinan just North of Brazil is a new contact.

Noel, VK5NR, comes to light with a very helpful letter and the DX worked by him during the month consists of ON4NC, 28100 CW; PA0QJ, 28400 fone; F8OB, I1ON, LX1SI, new country; OK1JB, OZ3FL, UA1AA 28190, SM5UN 28050, YR5X 28025 CW, LX1AI, fone 28100. Come on boys and follow VK5NR's example and post that dope to either VK3YP or VK3CP.

South Australia report hearing the following stations on 28 Mc/s.: XZ2YT, J2EUG, J9AAK, VU2PK, VS1BG, TG9RC, GW2WD, G2ZB, PK1AM, G5TP, G6VX, LX1IS, SU1HF, PA0OO, KH6AB, KH6AM, G2WW, G2CDI, VU2LR, VU2WJ.

In New South Wales, judging by the following list of countries heard, there is no dearth of DX. 28 and 14 Mc/s. bands are very much on the improve, now that the summer season approaches, Europeans are coming through consistently each night on 28 Mc/s. and are reliable QSOs on both fone and CW. Countries heard regularly on 28 Mc/s. are as follows: Morning—W, VE, TG, XE, VP9, HR, VR, LU, CE, ZL, KZ5 mainly; Evening—K6, J, VU, PK, VR, OA, VS9, XZ, ZS, CR7, ZE, VK6; Night—K6, J, PK, VS1, G, GM, EI, I, F8, D4, OK, OZ, PA, SM, LA, UA, YR, GW, ON being mostly heard.

28 Mc/s. peaks for Europe at 9 p.m. then fades out and reopens from 10.30 to midnight.

14 MEGACYCLES

The list of signals heard in VK5 on this band indicates that South Australia are not exactly out in the cold. Signals heard include J2EUG, KA1KA, XE1BA, GI6TK,

G8WL, DN4TA, ON4AU, VS1BX, G4KE, OZ5HG, XU1YY, UA3AM, KZ5AA, F8YZ, J9LG, HC1FC, TI2OA, HB9AW, J9ACS, J4AAB, HB9CD, LU7EO, LU6DJK, LU7EN, HC1FG, SM7YE, OZ5HG, PA0HG, GW3ZU, PK6TC, J3HRP, CM2BA, PY2AL, YO5WZ, VP4TR, D4AND, KL7BH, HC1FG, D4AMI, XE1CQ, OZ7CC.

South Australia reports signals on 14 Mc/s. from VK6 have been audible last month at R9 plus, VK6DD, VK6KW and VK6HS being the pick. VK2 signals on this band also are R9 plus during the afternoons. VK2CP, VK2ABD, VK2AGU, and VK2AID standing out. VK4KH, VK4EF, VK4AV, VK4KO, VK4MW are the pick of the VK4 Hams. VK3 and VK7 are not so consistent, being mostly heard on Sunday mornings. VK3ZJ, VK3VJ, VK3BH, VK3XJ, VK3VB and VK7AB are all R9 plus.

The influx of South Americans into the 14 Mc/s. band has made WAC appear quite simple. VK5JS contacted eleven of these stations in less than a week. He was WAC on three successive nights in times ranging from two to three hours duration, although one night he could not raise a contact in Oceania for WAC and after vainly waiting for an Australian contact, secured PK6PC in Dutch New Guinea to secure his "Worked All Continents" in two and a quarter hours.

New South Wales report that 14 Mc/s. is still a mass of QRM but with patience plenty of DX about. Main 14 Mc/s. DX coming through is W, VE, XE, LU, CX, VP4, PY, OA, KZ5, K7, K6 (JO Marshalls), J, PK, VS1, VS9, XU, KA, PK6, ZS, VQ2, ZE, TA, YR, G, GM, F8, ON, OZ, LA, YR, D, UA, OK.

FIFTY AND UP.

Ken McTaggart (VK3NW) again provides us with the doings on 50-54 Mc/s. in Victoria. Active on the band were VK3s ABA, YS, QO, MJ, HK, YJ, NU, ZD, LS, BW, ABU, GG, XA, and NW. 3NU is using two 807s in a push-push doubler and gets out very well with two half waves. 3ABU (portable 3BU of Geelong) was using 10 watts to an 807 doubler driven by an ECO oscillator on 12 Mc/s. a two tube super regen Receiver with 955 and 6V6 and a 8JK antenna with ¾ wave feeders. When worked he was 4 or 5 miles South West of Geelong at a "Lookout." We hope to hear more of Bill who has been threatening to break into 50 Mc/s. for some time. Unfortunately his home location is not too favorable, but if he keeps up the portable work it will be most interesting.

Sunday, 29th September, was quite a field day. 3ANW took the portable outfit, which was drawing only 1.7 watts on this occasion, to Olinda and after some tests in the morning, the afternoon was spent on the ridge between Olinda and Mt. Dandenong, 23 miles from Melbourne which is about 1500 feet high. Ten stations were contacted from 3ANW, viz.: 3NU, 3MJ, 3HK, 3YJ, 3QO, 3GG, 3LS, 3ABA, 3BW, 3ABU and everyone was surprised at the signal strength at each end. 3MJ and 3HK were getting the portable's signal at anything up to 10 DB over R9, while most other stations reported R9 to R9 plus. 3BW gave R7 and 3ABU R5. Similarly the incoming signals were extremely strong and 3ABU, from approximately 70 miles, was the weakest at R6/7. 3GG and 3MJ both contacted 3ABU. The portable outings have stimulated interest in the band and also in portable work itself. Several of the boys are contemplating portable work, the foremost being Dave (3MJ) who has just acquired an 815 which should put up a good show in this capacity.

The morning tests from Olinda conducted with the co-operation of 3MJ and 3HK were designed to determine "how much hill" it takes to stop a 50 Mc/s. signal

but were not entirely successful because there turned out to be not enough "hill" to give a very pronounced effect. Signals from 3MJ and 3GG were Q5 R6 at the Olinda Post Office, this being about 200 feet below the ridge and about ¾ mile down. 3GG reported the signal from the portable as R6 also. 3HK's signal was R8 but was apparently coming up the valley from Mitcham and not over the hill. However results showed that the signals do definitely "bend" to quite an extent and further tests are being planned in a locality where a more pronounced falling off can be obtained. Results of these tests are explained in another article in this issue.

The prediction charts continue to show the M.U.F. approximately 50 Mc/s. and VK2NO reports hearing unidentified stations in the region of 48 Mc/s. No such signals have been reported in Melbourne but it is felt that something will bo doing shortly. One of the difficulties is the great lack of stations to watch the band at the most suitable times. However 3HK and 2NO are going to keep a watch at lunch times and new test transmissions are planned for the week-ends.

3ABA was heard on phone on the 12th October so apparently Jim has passed the six months' key pushing period. 3BD in South Yarra, was worked by 3MJ and myself cross-band 7—50 Mc/s., Eric being on 50 Mc/s. with a doubling 807. His sig was R9 plus with an indoor antenna. Eric is in the last stages of receiver building and will be fully operative on 50 Mc/s. shortly. He is one of the pre-war 56 Mc/s. boys from Sydney.

3NW now has the 166 Mc/s. outfit functioning and looking for contacts. The Receiver is 955 super regen. into 6J5 and 6V6 output. The Transmitter is a 955 linear oscillator with 1 inch copper tubing driving an 832 P.A. and modulated by a 6A6 Class B. The input is 18-20 watts and the antenna is a co-axial dipole. Would somebody oblige with a contact or two? The phone number there is Hawthorn 930 (VK3NW).

QSL BUREAUX.

FEDERAL AND VICTORIAN

Ray Jones, VK3RJ, QSL Manager

The list of names, addresses and call signs of Australian Experimental Stations has now been published. It contains particulars of all licencees up to 31st July, 1946. It is well printed and at the price charged (2/-), it should be a necessary adjunct to all stations. The list is obtainable from the Wireless Branch of the P.M.G. Department.

F.H.Q. is now in a position to make recommendations for WAC. Cards should be submitted to the Federal QSL Manager, who will certify to F.H.Q. and return the cards. F.H.Q. will then make the necessary recommendation to the I.A.R.U. The R.S.G.B. has temporarily suspended the granting of WBE and BERTA certificates.

The box number of the S.A.R.R.L. has now been changed. The full QRA now is: S.A.R.R.L. QSL Bureau, Box 3037, Capetown.

Cards are coming to hand from AC4YN whose mailing QRA is R. Fox, Gyantse PO Tibet, via Calcutta.

A card and letter is to hand from W8CHT portable J7, Hokkaido, Japan. He has omitted to put a callsign on the card or on the letter. The letter begins Dear Sheila and Dick and relates to a phone QSO at 1910 TST 7th September, 1946. The owner can have the letter and card on application to this Bureau.

An incompletely filled in card is also to hand from G6CU/ZC2 of the Cocos Islands. It refers to a QSO on 15th February and the call sign given is VK3W. The card may be had on application.

A further one for the philatelists: Vaclav Bernat, OKRP 1273, Kutna Hora Bohemia, U Jelena 487, Czechoslovakia.

The Federal QSL Manager will be on vacation for the first three weeks in November. Distribution of cards at the November VK3 meeting will be arranged as usual but some lag in Interstate despatches is inevitable.

C.A.V., the official society for Czechoslovakia, is again in full swing the secretary being OK2RR Otakar Halas, Post Box 34, Bratislava 9, Czechoslovakia.

A note to hand from that ubiquitous fellow "Snow" Campbell (VK3MR) shows that he has finally shaken down in the married state at Quambatook, Victoria. He passed on a photo of Jack Decure, ex VK3WL, secured while in VK5. The "demon" looks to be in the pink and is surrounded by an extra fine array of progeny. "Snow" also wishes to acknowledge an "Asmusgram" from one Herman VK3ET. VK3MR will be on when the power situation is solved.

John A. Hunt (VS4JH/G2FSR) passes along a bunch of cards and bemoans that he did not receive cards—as yet—from the following VK's 3BW, VU, YP, VJ, JA, VQ, SE, TM, ZU, VD, BC, UJ, YT, ZR, GD, MR, UQ, JE, WX and ABA. All these related to 28 Mc/s. QSOs some months ago, and he requests me publish a reminder to the stations concerned. In conclusion he writes "I should like to extend my very sincere regards to all the VK boys whom I contacted and to thank them for many pleasant hours on the air from Borneo. Quite truthfully the outside Ham world could not do better than follow the example of the average VK with regard to operating, helpful advice and the all too elusive Ham spirit" (this does not refer to Ballarat Bitter). John now on the way home to England will always be an ambassador for VK and requests that all who have not QSLed him do so to his home QRA: Mr. J. A. Hunt, 2 Parkhill Road, Chingford, London, E.4, England.

Ivor Stafford (VK3XB) and his good wife Mavis (VK3KS) are located at Mt. Best, via Foster, Vic., and cards attest they are doing OK from that location despite Ivor's assertion that he spends most of his time re-erecting masts and reguying, etc., due to the prevalence of strong winds in that locality. A gale a day says Ivor.

Another one who is just out of the Services and took unto himself a wife during his sojourn with the R.A.A.F.

(Continued on Page 27).

FEDERAL HEADQUARTERS

RESUME OF ACTIVITIES

Here are some brief details of the activities of F.H.Q. over the last few months. Federal Executive has been very busy handling a large number of matters since the Convention in April. This has resulted in a great deal of credit to the W.I.A., for which we are grateful, and yet we still have a long way to go before we have completed the job we set out to do.

We have maintained a very cordial relationship with the P.M.G. Department and we have so far been successful in obtaining a number of changes and improvements in the regulations concerning Amateur Radio. We are still negotiating with the Department for further advantages for the Ham, specially in regard to frequencies, types of emission, class of licence, etc.

QSL BUREAU

You have, no doubt, observed from recent issues of "Amateur Radio" that the QSL Bureau has been well established and is functioning under a pretty heavy load.

DX CONTEST

F.H.Q. had very little time at its disposal to arrange the DX Contest for November, but the Contest appears to be assured of success judging by the favorable reception it has had. It is most unfortunate that we were unable to have a joint VK-ZL this year, but we hope to have the ZLs with us next year.

CONSTITUTION

F.H.Q. has prepared a draft of a new constitution as requested at the Easter Convention. This has involved considerable discussion of many aspects and represents many hours of application. We hope the Divisions will give it as much thought when they discuss it soon.

P.M.G. DEPARTMENT

We have had many communications with the Chief Inspector's Branch concerning many of the regulations and we have received a good hearing regarding some modifications, and privileges of these regulations. We have asked for:—

1. A reversion to one class of licence.
2. Restoration of the whole pre-war HF bands.
3. Allocation of higher frequencies (in the 200 to 22000 Mc/s. region).
4. Licencing of types of emission A0-A5 in addition to FM and Pulse on various bands.
5. The modification of regulations with respect to mobile and portable operation, high power components, age limit for licences, relaying of amateur transmissions or constant tones, and other similar details.

VARIATION OF CONDITIONS GOVERNING THE OPERATION OF EXPERIMENTAL WIRELESS STATIONS

The following is taken from an official communication from the Radio Inspectors' Department and is an enlargement of the Stop Press items in last month's magazine.

The following variations, which take effect as from 25th October, 1946, affecting the conditions governing the licensing and operation of Experimental Wireless Stations are forwarded for the information of members of your Institute and experimenters generally.

Experimental Advisory Committee

Representation on this Committee will be on a pro rata basis between representatives of the Wireless Institute of Australia and non-members of that Institute, with a minimum of one non-member. A member of the Wireless Institute may be appointed to fill the vacancy caused by there being no non-member offering. In the event, however, of a non-member subsequently becoming available, he should receive consideration for appointment at the conclusion of the normal twelve months' term of the existing Committee.

V.H.F. Frequency Allocations

The following additional frequency bands are now available for the use of Experimental Wireless Stations:—

2500—2700 Mc/s.
5250—5650 Mc/s.
10000—10500 Mc/s.

Types of Emission

Subject to the requirements regarding identification and time limitations, type A0 waves may be used on all experimental frequency bands from 166 Mc/s. upwards. Their use on lower frequency bands will not be permitted without the special authorisation of the Chief Inspector (Wireless).

NOTE.—Type A0 waves are those in which the successive oscillations are identical as soon as a steady state is reached (continuous waves). A type A1 wave is a keyed continuous wave.

Portable and Mobile Facilities

On all experimental frequency bands from 50 Mc/s. upwards, experimental licencees may operate portable and/or mobile stations without the necessity of obtaining a permit. This privilege will not affect licences already granted or which may be granted solely for portable operation on all experimental frequency bands, or the present arrangement whereby limited portable or mobile operation is permitted on any experimental frequency band at the discretion of the Superintendent in the State concerned.

Except in the case of stations licenced for portable operation (for which they are allotted distinctive call signs), the words "portable" or "mobile" respectively, and the locality of operation must be announced with each transmission conducted by a portable or mobile station. The necessity for obtaining the sanction of the Chief Inspector (Wireless) to conduct transmissions beyond the boundary of a State for which the station is licenced will not apply in respect of portable or mobile stations operating on frequency bands from 50 Mc/s. upwards.

Transmissions of Recordings

The restriction on the transmission of recorded music, imposed by Rule 25 of the "Handbook for the Guidance of Operators of Experimental Wireless Stations" is not intended to apply to the use of single constant tones, or similar sounds recorded by means of a sound recording device used solely for tests and having no entertainment value. Consequently, such transmissions may be permitted.

Relaying of Experimental Transmissions

On the experimental frequency bands from 50 Mc/s. upwards, the restriction on the relaying of experimental transmissions, referred to in Rule 25 of the "Handbook for the Guidance of Operators of Experimental Wireless Stations" is lifted. The relaying station must, however, identify itself in accordance with Rules 96 and 97 and conform in all other respects with Departmental requirements.

The granting of this privilege does not in any way authorise experimental licencees to re-transmit signals emanating from any station other than an experimental station.

F.H.Q. considers good progress is being made and will continue negotiations with the P.M.G. Department with a view to having the other modifications adopted.

BADGES AND MEMBERS CERTIFICATES

Production of badges and members' certificates has been delayed by circumstances beyond our control. Apparently present day difficulties and shortages are holding up deliveries.

DIVISIONAL NOTES

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX, Box 1734 G.P.O. Sydney.

Meeting Place: Science House, Gloucester and Essex Streets.

Meeting Night: Fourth Friday of each month.

The September general meeting held at Science House on the 27th was attended by more than 100 members and judging by the number of enrolments for the month, some 30 odd, even bigger attendances are anticipated.

Those present including visitors VK6RB and VK3ARG, heard a particularly interesting lecture supported by a film and slides on the Cathode Ray Oscillograph delivered by Mr. John Moyle (VK2JU). John's talk could not have been given at a more appropriate time in view of the anticipated availability of a number of cathode ray tubes at more than reasonable prices.

Once again, time for general business and discussion was at a premium and consequently, it was decided that the October meeting be devoted entirely to discussion of matters of major importance in so far as our operations as amateurs and members of the Institute are concerned. Some lively discourse of benefit to all is anticipated. In view of the foregoing and the non-receipt of certain items of the Disposals equipment, a special meeting is to be held as soon as practicable for distribution. No doubt many members are disappointed at the apparent lengthy delay in finalising this matter of vital interest to us all but rest assured that everything possible has been done to overcome our difficulties. Unfortunately, transport is just one of the factors over which we have no control.

In pursuance of our policy to strive for an improvement in the benefits accruing country members, VK2OJ, Noel Arnold, has been appointed Zone Officer for the Albury district. Noel will be remembered to many as one of our most capable Zone Officers in those now famous pre-war days. It is further hoped to arrange one of our equally famous W.I.A. Field Days at Wyong in the immediate future.

The Division's second A.O.C.P. Class concluded on 2nd October with 16 members attending the P.M.G's. examination. Although final results are not yet to hand, the Class Manager, Mr. Jack Howes (VK2ABS), is confident that both amateur and Institute ranks will be considerably swelled in consequence. To the uninitiated, may we draw attention to the high degree of organising ability, technical knowledge and patience required of a capable instructor, all of which qualities are possessed by Jack and his assistants.

The Bushfires Communications Network is gaining increased support from country members with sections being established in all corners of the State. The Army type 109 set adopted as the standard "truck-set" for this type of work, with necessary modifications incorporated has proved entirely satisfactory in tests carried out to date. Some of our Shire Councils are rather slow to appreciate the value of adequate communications in combating the bushfire menace, but thanks to the ability of the "Ham," this viewpoint is rapidly moving through 180 degrees.

The regular VK2WI 7 Mc/s. Sunday morning broadcasts have continued. The extent to which these broadcasts are received has been demonstrated by the many enquiries made concerning frequencies, times of transmission and reception conditions. It is hoped to have a special frequency allocated for the 2WI transmissions in the immediate future—in the meantime, however, all members irrespective of State are asked to co-operate by keeping VK2WI's channel clear each Sunday morning from 1100 to 1115 a.m. A new feature of the broadcast of interest to many is the inclusion of the weekly and special ionospheric predictions with a summary of actual conditions for the previous week.

During the past month, two N.S.W. Division Councillors (VK2XX and VK2VN) had the opportunity of visiting our neighbours in VK3 and discussing matters of mutual interest with State and Federal authorities. It seems a pity that visits of this nature cannot be made more frequently as once again, the principle that in five minutes discussion as much can be accomplished as in 5 days exchange of correspondence, was demonstrated.

By the time these notes appear in print, the first post-war Australian DX contest will be in progress. Good luck to all and may the best man win—let us strive for a high standard of operating ability, co-operation and spirit which has materially contributed to the high esteem in which the VKs were held throughout the world in the days gone by.

A valuable reward awaits the first member correctly identifying the author of the personal doings which follow! In November, Charlie Luckman (2JT), well-known to all old timers particularly in N.S.W., completes 25 years as the holder of a Ham licence. Charlie has not only "held" the licence but has been very active over the whole of the period. It was with great pleasure that we all heard his call on 28 Mc/s. early this year, but at the moment 14 Mc/s. CW is favourite with European DX coming back to his CQs. Hope you are on to celebrate the 50 years Chas. Another old timer call 2RF is heard these days so it appears that they are all "starting over again." Ex-2NR, 2AJX these days, is on 14 Mc/s. now

but very few recognise an old DX Contest King under the call of 2AJX. The way he rolls the DX over "should tell 'em." 2NS (Trevor Evans of Bathurst) started up once again too using the home clothes line as a start, but now the old transmitter just with the dust knocked off has a proper skywire and 2NS can once again be heard yarning to all the old gang as in days when VK2 stations were pretty rare.

There seems to be an epidemic to get rid of three letter calls in VK2, probably the first was 2AFB who dropped the "A" and became the shorter 2FB, then 2AHP changed to the call of a very old timer "Nick" 2HK; 2AEC became 2TR who went to VK7; and the latest seems to be 2AKX whose call is now 2HI. Poor old QSL Officer if it spreads—so please no two letter call chappie die off and leave them a vacancy, hi! Roy Hart (2HO) reckons its pretty impossible to get out of "Art Ollow" his QRA so he has erected a 56 feet tower surmounted by a three element beam for 28 Mc/s., on 14, 7 and 3.5 Mc/s. he uses a Jones type S.W.F.

2NI slowly turning grey like many another Ham owing to QRM from trams and cars. However, still has enough vim to experiment with Cathode Followers in modulators in a Cathode Modulated Final. 2ARM (ex-4RM) is active on 14 Mc/s. with 100 watts to a TR1/100, and judging from the pile of QSLs he turns in at each meeting results are very satisfactory indeed. 2AH's 211Es used as grid controlled rectifiers and keyed by relay. Keep grids very positive and return to negative HT instead of open circuit grid for cut off. Current can be 100 Ma. at as high as 1500 volts. Regulation not very good owing to thermionic voltage drop. His other suggestion is for beam rotation. The steering box of a small car can be used as a right angled drive, reduction gear and support for your beam. Price approximately 25/- at wreckers' yards.

2ATH has been receiving a visit from 3ARG who worked a couple of ZLs on 3.5 Mc/s. with an input of 8 watts. He reckons 2ATH's receiver and transmitter must be pretty efficient considering QRN from Auroras, Sunspots, etc. 2BG has recently moved from a nice location at Eastwood to a ground floor flat at Kirribilli. He is not overjoyed (from a Ham's point of view) with the change, and the rig now has to sit on the kitchen cupboard, but he hopes to be fairly active. In spite of what you may have heard to the contrary 2GM is now inactive, owing to QRM from a house recently drawn in a Housing Commission ballot. 2ALG is very busy working all the country chaps on 7 Mc/s., great rebuilding going on for 3.5 and 50 Mc/s. As regards 50 Mc/s., Don (2NO) who used automatic CW around 1 p.m. on Sundays, was recently heard by 2OC at Wyong. Don's was the only sig Owen could read though others tried to get through. It's all in the antenna sez Don.

Coalfields Zone

2DG operating mainly on 14 Mc/s. and doing well with 55 countries post war. 2TY, Bob, heard regularly on 28 Mc/s. and getting his share of DX; at present enjoying a trip to VK4. 2MK and 2LB inactive, doing a spot of building. 2YO not heard much, though does work on 7 Mc/s. 2PZ operates 7 and 14 Mc/s. occasionally. Chris has lots of gear, but busy with service work and not much time for Ham Radio at present. 2KZ, Max, is one of our regular Coalfields gang, and operating 28 Mc/s. only with fairly good results, contemplates building a super room which will be a big help at 2KZ. Has a lad as keen as the OM. So in years to come we may have another brass pounder. 2XT is not active, but building a shack in readiness to open up.

2ADT, Jack, still doing a good job on 28 Mc/s. Getting really good results with a three element rotary and DX now stands at 40 countries and all on 28 Mc/s., all but one or two worked on fone including W.A.C. Some of his DX (what I can think of!) VK, PK1, VK7, ZL, KG6, VR2, K6, KL7, VE, W, XE, HR, TG, LU, CE, HC, J, XU, VS1, VS9, XZ, Okinawa, Marshalls, Marianas, VS7, ZS, SU, G, D, F8, SM, KA, KW6, PA, VQ2. Jack is putting up antenna for 14 Mc/s. and hopes to be in contest, works 14, 7, and 3.5 Mc/s.

2YL, operating with good results on 28 and 14 Mc/s., also working 7 and 3.5 Mc/s. Hopes to operate in contest. DX here now up to 47 countries and W.A.C. post war. The three element rotary on 28 Mc/s. doing swell job. 8JK on 14 Mc/s. getting out well, rebuilt part of receiver and working fine now, DX as follows: VK, UK7, VK9, PK1, 3 and 6, ZL, Tinian, VR2, Saipan, KA, J, XU, VS6, CR9, CR7, ZS, VU, XZ, VS1, VS9, VS3, EQ3, VS5, KG6, J9, Marshalls, Okinawa, K6, KL7, VE, W, XE, KZ5, CM, TQ, LU, HC, G, F8, D, OZ, PA, LA, SM, UA, VS4, KE6 and ZC4.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne. WM 1579.

Meeting Night: First Tuesday of each month.

The October general meeting was attended by 190 members and visitors and through the continued illness of our president (3KN), Herb Stevens occupied the chair. The visitors included VKs 4OA, 5EL, 6WT, 5RO, and 2VN, Jesse Smith (ex-XU3GG), AC8JS, and Mrs. Laurel Emmel (XYL of 3AJE). The following VK3s were present: PW, XJ, WQ, VX, OK, OT, AJH, XM, KP, RX, NM, ZB, FR, AME, UH, TZ, QP, HS, RN, GS, AHM, UJ, GU, FW, ADS, LL, QH, LM, AE, WO, IP, AJK, ADX, MQ, VZ, VH, AP, DK, HK, IG, PG, EX, EN, II, JF, FU, PU, ACM, ARN, VJ, ED, XA, AKL, OG, AGS, QI, OL, ABD, UO, FX, EV, EM, YR, PC, QS, QW, VQ, KV, ZJ, OF, VQ, NU, SO, XR, DF, TU, LN, WW, TF, OJ, JF, WF, AH, CF, JI, HC, UM, MJ, AG, YK, JD, YJ, QZ, JE, DZ, VD, JZ, JT, GX, MN, QU, LA, RI, IW, YS, ABA, ADF, ACS, KC, ZV, ES, AJY, OV, ZC, AJE, KM, PQ, TQ, MO, QE, HX, AI, also ex-2TJ, Messrs. Tew Crowther, Merritt, McLeod, Johnson, Belcher, A. G.

Smith, Sykes, Maroney, Wolstenholme, Gauntlett, Strickland, Holland, McClouskey, Knight, Pile, Taylor, Chalmers, Hodgkinson, Moon, Sandon, Rimmer, Cosgriff, Forshaw, Morrison, Billings, Lancaster, Henderson, Western, Barnes, Elliott, Neilson, Sullivan, Gray, Moran, Hibbert, Groves, Warner, Briggs, Amor, Russell, Houston, Gee-Wah, Gilbert, Gillingham, Meallin, Hodson, Iliffe, Titherudge, Sloss, Porter, Storck, A. Morrison, West, Curnow, Searle, Clarke, Jones, Fawkes, Hayes, Camp, Poppleton, Harbour, Benning.

In consequence of the amount of time spent in the distribution of QSL cards mentioned in last month's notes, the QSL Manager (Ray Jones, 3RJ) opened up his dispensing department a little after 7.30 p.m. The early arrivals at the meeting came to a mutual agreement that there was no claim jumping of pews whilst they queued up for their cards. With this system it appears that a new era QSL distribution is being launched in VK3.

The Secretary announced that a general distribution of materials purchased from disposals would be made available during the week of the meeting and judging by the tired look on his face it looks as though he has very little material left on hand for distribution. Your scribe stood amongst others for approximately one hour, which in these days queues are nothing unusual but very back-breaking after a day's work. The 1946-47 membership cards are now to hand and the Treasurer will be forwarding same in a short space of time to FINANCIAL members.

In the absence of the Federal Executive Councillor a progress report was given by a member of F.H.Q. of the negotiations with the P.M.G's. Department which mainly consist of items appearing in the stop-press notes in the October issue of this journal.

At the conclusion of general business 3UK gave a rather comprehensive lecture on "Radio Communications in the Services during war-time" for which he was very enthusiastically applauded by the assembly.

"THE TECHNICAL ADVISORY COMMITTEE, IT'S AIMS AND OBJECTS"

Included in the Victorian Division Notes published in "Amateur Radio" of October, 1945, was a very informative article entitled, "The Laboratory Committee, Its Aims and Objects." In order to introduce the "Technical Advisory Committee" we crave the indulgence of members who have already read that article, while we quote extracts therefrom for the benefit of new members.

"The Victorian Division of the W.I.A. has always been proud of its claim to be the possessor of first-class laboratory equipment. The fact that it was seldom used, and no determined effort made to set it up in a laboratory kept up to date by the addition of new equipment as it became available, is a reflection on either the financial policy of the past or lack of interest in such a project, or both.

"Amateur Radio has progressed through the years, and the more or less haphazard cut and try methods of the past have now given way to practices involving the use of accurate measuring equipment of all kinds, much of which is too costly for the average Ham to purchase.

"One of the first objects of the Laboratory Committee, therefore, is to plan, design, construct and equip with modern and accurate apparatus, a laboratory which can be of assistance to members in their efforts to secure maximum efficiency from their gear, and to test the accuracy of the calibration of their own test equipment. The Committee, in its report to Council in July, 1944, recommended that the apparatus necessary to establish such a laboratory should include the following:—

1—Beat Frequency Oscillator, or other suitable type, having a range of from 20 to 15,000 cycles per second and capable of developing at least two volts across a suitable range of output impedances.

2—Precision Signal Generator, suitable for making accurate tests on communications and Ham band receivers.

3—Inductance, Capacity and Resistance Bridge.
4—Vacuum Tube Voltmeters.
5—Cathode Ray Oscilloscope.
6—Heterodyne Freqency Meter.
7—Transmitting and Receiving Tube Testers (Mutual Conductance).
Such measuring or other equipment as may be deemed necessary for future developments.

"With a laboratory so equipped, the Committee would be in a position, not only to apply many tests to members' own equipment, but also to carry out experiments and tests to determine the behaviour of new circuits, components and practices, and to write up their observations, and results of such experiments and tests in the form of technical articles for the Magazine.

"The provision of technical articles for 'Amateur Radio' is another important task for the Laboratory Committee, and one which will require continuous attention. By careful planning and selection of subjects, and co-ordinating the efforts of contributors, it should be possible to build up a reserve of articles of a standard that reflects the undoubted genius and ability of the Australian Radio Amateur. With the re-introduction of the printed magazine, this task has increased. If it can be arranged, we plan to include as regular features, in addition to the main technical articles, a Digest Section, a Beginners' Section, etc., as space permits."

These were the laudable aims and objects of the "Laboratory Committee" as it existed until Tuesday, 20th August, 1946, mainly due to the dogged persistence of Messrs. Stevens, Quinn and Ridgeway, supplemented by various members and ex-servicemen returning to the fold. In the evening of above day, members of the Laboratory Committee gathered at a special meeting to consider the future.

Firstly, it was recognised that the post war period would be saturated with new developments, due mainly to the release of war-time inventions for general use. Hence, the scope of the committee would have to be considerably increased in order to give adequate service to members.

Secondly, it was recognised that in order to properly function the committee would have to be properly constituted and have the wholehearted support of Council and members generally.

After a lengthy discussion the following proposals were submitted to the Council for consideration and approval:

(1) That Council formally constitute this Committee under the title "Technical Advisory Committee."
(2) That Council approve the appointment of the following Office-Bearers:—
Chairman of Committee: Mr. H. N. Stevens, VK3JO.
Vice-Chairman and Deputy Council Representative: Mr. C. Quinn, VK3WQ.
Hon. Secretary and Council Representative: Mr. G. Glover, VK3AG.
Assist. Secretary: Capt. W. Mitchell, VK3UM.
(3) Secretary's duties to include the preparation of monthly report of committee's activities which would be read before general meeting by each member of committee in rotation. This would give members generally an opportunity of becoming acquainted with members of committee and at the same time follow progress of programme.
(4) That Council appoint member of committee to represent the latter at Council meetings. It is considered that such close liasion between Council and committee will expedite the work of both by ensuring unification of control and avoidance of overlapping of functions.
(5) That the scope of committee's activities should be:
(a) To advise Council on Technical Matters.
(b) To provide Technical Advisory Service for Institute Members.
(c) To control groups doing specific research and development work.

(d) To be responsible for the provision, construction, control, and maintenance of all technical equipment.
(e) To undertake the establishment of standards, where applicable to the work of the Institute.

(6) That future programme should be developed along the following lines, as time, personnel and facilities permit:—
(a) Establishment of Band Edge Location Transmissions (B.E.L.T.).
(b) Establishment of a Frequency Measuring Service (F.M.S.) for Institute Members.
(c) Provision of communications equipment, for use by Traffic Manager and to supplement (a) and (b).
(d) Establish Laboratory and Calibration Service for Institute Members.
(e) Modernise Technical, Book and Magazine, Reference and Lending Library.
(f) Modernise Technical Instrument Library, both for internal use and lending purposes.
(g) Draw up syllabus for A.O.C.P. Classes.
(h) Plan and supervise programme covering Technical Articles for the Magazine.
(j) Training young members in practical work.
(k) Preparation, programming, and presentation of lectures, demonstrations, etc.
(l) Such other duties as instructed by Council
(m) Provision and maintenance of Class Demonstration Equipment.

(7) That the following Groups be formed immediately and others added, and work further divided, as soon as personnel and facilities will allow:—
Group No. 1, Sub-Committees:—Advisory Panel, A.O.C.P. Class Syllabus, Lectures, etc., Technical Editorial Magazine, Correspondence Column in Magazine, Standards.
Group No. 2, Laboratory and Calibration:—Band Edge Location Transmissions, Frequency Measuring Service, Laboratory Measurements, Calibration of Members' Equipment.
Group No. 3, Library Service:—Text Books and Publications, Instruments.
Group No. 4, Transmission and Reception:—Transmitting and Receiving Equipment, Maintenance of Communications and Class Demonstration Equipment, Power Supplies, Modulation Technique, Portable and Emergency Equipment.
Group No. 5, Propagation:—Ionospheric Studies, Aerial and Earthing Systems.
Fields to which sub-division and extensions are contemplated include:—Modulation Technique, Portable and Emergency Equipment (such as Bush Fire Fighting Equipment), Visual Technique (Television, Facsimile, etc.), Micro-Wave Technique.

(8) That the following appointments be approved:—
H. N. STEVENS—Chairman of No. 1 Group.
DUNCAN GRAY—Leader No. 2 Group.
G. GLOVER—Construction of Band Edge Location Transmitter.
K. RIDGEWAY—Technical Editorial Magazine.
J. GROVES—Librarian (Book).
R. JEPSON—Librarian (Instrument).
D. MEDLEY—Leader of No. 5 Group.
E. FERGUSON—Maintenance of Communication Equipment.
W. MITCHELL—Provision and maintenance of Class Demonstration Equipment.
H. WEBBER—Portable and Emergency Equipment.

The Council in its wisdom accepted these proposals, recognising both the importance of committee's work and its need for greater assistance from everyone concerned in the future of Amateur Radio.

The organisation plan published herewith should enable members to appreciate the set up of the committee and its groups.

Having got down to brass tacks regarding its constitution, aims and objects, the committee is now seeking the assistance of each and every member of the Victorian Division, in order to ensure that the project is highly successful.

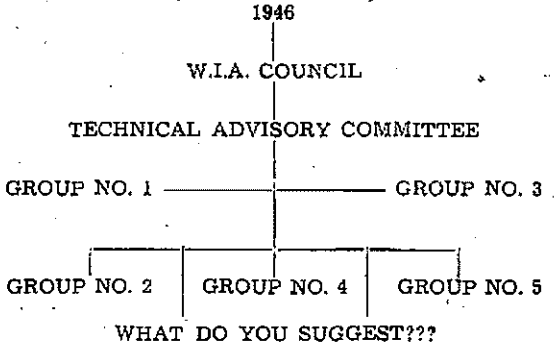
For the information of members generally it is desirable to stress that the committee is not only available to advise your Council on technical matters, but also to provide such advice as required by individual members.

In order to keep members who are unable to attend the general meeting fully informed regarding the activities of the Technical Advisory Committee, the report as read before the meeting will be published in "Amateur Radio" under the Victorian Notes. In addition to the report each month some section of the committee's activities will receive special attention.

The object of this report, as previously stated, is to keep you informed of the committee's activities, and a cordial invitation is extended to you to come and see, or better still stay and help the committee at work. There is plenty of scope for willing and interested members. Get in touch with the leader of the group in whose work you are interested—get cracking NOW!!

For further information ring Secretary George Glover at WX 3440.

ORGANISATION PLAN FOR THE TECHNICAL ADVISORY COMMITTEE OF THE W.I.A.
(Victorian Division)
1946



QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.
Meeting Place: State Service Building, Elizabeth St., City.
Meeting Night: First Friday of each month.

The chief item of news for you fellows this month is that Frank Nolan, 4FN, has been made a member of Council and is our "Amateur Radio" representative. Our country members who, it seems have been a little disgruntled of late, will be pleased to learn that Frank Shannon, 4SN, is now looking after their interests. We can't think of a better man for the job, as an ex-country man should know what's wanted.

The practice of using high-powered bottles in medium powered rigs has been the cause of a few snarls between the Department and some of the local lads. According to a late flash just received, the position is now under control which means that by the time you read this, if you are a "B" class licencee, it's still OK to leave your 813 running with up to 50 watts input.

The majority of news this month will be devoted to country men, the reason being that there is more country news than local to work on. We see that our old "high-

A.G. HEALING

LIMITED

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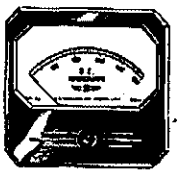
Electrical and Testing Instruments for all purposes made to British Standard specifications. Each instrument is accurate, + or —, to 2 per cent., and parts are heavily plated to prevent corrosion even under tropical conditions. "Healing" Electrical Meters equal the best imported types and will give accurate service for long periods under the most exacting conditions.

No. 10A round production mounting Black Bakelite Case.

Type No. 30A 4" square semi-flush Black Bakelite Case.

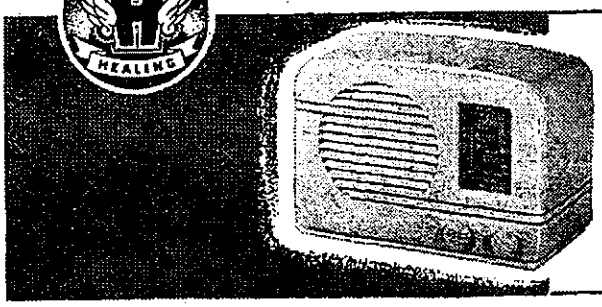


No. 20A 2½" round flush mounting Black Bakelite Case.

These, and all other Healing Radio Electrical Testing Units, are manufactured in our own factories and available from A. G. Healing Ltd.

OTHER INSTRUMENTS INCLUDE:
Oscillators — Multi-Testers — Signal Tracers, etc.

ALSO MANUFACTURERS AND DISTRIBUTORS FOR



Golden Voice RADIO

A. G. HEALING LTD., MELBOURNE, SYDNEY, ADELAIDE

Hz.FP

power" friend, 4HZ, is still ill-treating his final with 2 watts input to a 19. Max is working plenty of ZL's with this outfit but is anxious to get hold of an FS6. 4LN already has an FS6 but is striking trouble loading any sort of antenna. Is having fun and games with a 2 element beam which so far refuses to "beam." 4SN, the voice of Tamborine, has a 2 stage rig going with 12 watts from a vibrator. Frank has plans for a Vee beam and fone. The leading chemist of Longreach, 4RQ, is striking the usual troubles one strikes with a badly regulated 240 volt DC supply. They have been chasing the dust off the rig at 4OK where 7 Mc/s. activity is reported, using the 1D4 in the Rx as modulator for the screen of the 6V6 PA. The antenna coupling arrangement is also a 4OK patent. Jack and George have two series condensers in the PA and the antenna feeder is coupled to the mid-point, providing, we are told, an effective method of tuning and antenna coupling. He thinks "A.R." needs overhauling to bring it into line with overseas publications (What are your suggestions—Editor).

We have pleasure in informing 4HK that we have spent considerable time in trying to get onto disposals gear for the Ham. The only suggestion we can make is to become a VK3. We here in Brisbane thought that 4HR was working more DX than most if not all VK4's. However we hear that 4DA, up in Dalby, has worked 54 in the last couple of weeks. Has an FB rig with 100 watts to an 813. Nice work Max! This week's high spot is the appearance of 4XG, late 4JN, on 54 Mc/s. Congratulations OM, and in more ways than one if you know what I mean! Then there is this "Believe it or not," 4FN, under the shadow of a local BC station, gets **110 Ma. in his antenna.** Frank says if it was his he would not mind! We take the opportunity of advising once again that Great Circle Maps are obtainable to members at the cost of 2/- each.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.
Meeting Place: 17 Waymouth Street, Adelaide.
Meeting Night: Second Tuesday of each month.

The monthly general meeting of the W.I.A. was held at 17 Waymouth Street on Tuesday night. Among the visitors present were Messrs. M. H. Coltman, P. M. Williams, A. S. Dunnecliff, L. Rankine, E. Menkins, G. Warner, W. E. Wegner and I. S. Wall. Visiting hams included VK5CJ, VK5DC. Mr. Roy Buckerfield (VK5DA) delivered an interesting lecture on "Selective Amplifiers" and a vote of thanks to the lecturer by Mr. Jack Lester (VK5LR) was received with acclamation.

Mr. Buckerfield in his lecture on "Selective Amplifiers for Receivers" divided the subject into two sections. Firstly dealing with crystal filters, demonstrating the requirements with graphs and circuit diagrams. He explained how a crystal filter could be constructed to give variable selectivity enabling it to be used for phone signals whilst still retaining its selective properties for CW. "Buck" also described how this could be achieved using parts readily available in the Ham shack, and also the revamping of I.F. transformers and condensers for use in this circuit. Secondly dealing with selective audio amplifiers whereby with the use of positive feedback and a tuned circuit to resonate at approximately 1,500 C/s. placed in the grid circuit of the output tube in place of the usual grid resistor, switches being used to cut in the feedback, tuned circuit or grid resistor. A detailed explanation of this was given with circuits, graphs, curves, etc., and concluded with a practical demonstration using a two stage audio amplifier with positive feedback, tuned grid circuit, B.F.O. and a recording containing code signals of about 1,500 C/s., static, QRM and phone signals. This demonstration was the highlight of the evening.

The recording when played back through the amplifier minus feedback or tuned circuit was just a hash of QRM and the code signals were down in the mud and practically unreadable, but when the feedback and tuned grid network were switched in the effect was astounding to say the least. The 1,500 C/s. code was the only signal audible, the rest of the hash having disappeared entirely. Judging by the remarks passed and the intelligent questions asked it was apparent that the lecture and demonstration was probably the most successful of the year. It was generally agreed at "Smoko" that lectures of this type are "just what the doctor ordered" for ham gatherings.

The VK5 division is to hold a field day in the near future and a working committee has been formed consisting of Joe McAlister, Charlie Cheel (5CR), George Bruce (5GB) and "Tubby" Parsons (5PS). Arrangements are going ahead and the tentative picnic area will probably be Long Gully, principally due to its suitability for hidden transmitters and also its proximity to the train service. Everybody is urged to make an attempt to attend, in fact bring a friend and swell the crowd. Hot water and all the necessary facilities for the inner man will be attended to and the only regret is that the committee cannot provide the "eats" as well. The list of trophies is impressive; being to date, three cups, one each from the local commercial broadcasting stations 5KA, 5AD, 5DN, Newton McClaren an 807, Unbehaun and Johnstone a trophy, Healings an extra good slow speed dial, Gerard and Goodman a 6L6, Radio Wholesalers an order for three guineas, Phillips an 807 and Australian General Electric an 807. We are hoping for more so you can see it will be worth while to come along. Watch the W.I.A. page in the "Advertiser" for further particulars. Just in passing the Ham must be held in high esteem in VK5, because it was found hard to refuse double the amount of trophies, but felt we were being treated extra well and did not want to "bite" the dealers for too much.

The fact, as disclosed at the October General Meeting, that "A" class amateur licences were apparently available to Hams without the necessity of sitting for examinations, came somewhat as a shock to the members present. As the hour was late very little discussion was permitted by the chair but judging by the talk among the boys after the meeting, the P.M.G. Department should be flooded with applications for "A" class licences by Hams with qualifications as good or better than those already granted an "A" licence. Preference is a good thing in some instances but not in Ham Radio.

Disposals gear has been very scare in VK5 and were it not for the generosity of the VK3 gang our share would be very poor. The gesture by VK3 division is appreciated by VK5 Hams.

The ultra high position is deteriorating in VK5. The 54 Mc/s. gang has deserted this band for 166 Mc/s. and I am afraid the lure of 14 Mc/s. has caused almost a cessation of activities on " 50 and up."

Mr. H. Roberts (5MY) will again act as code instructor for the new A.O.C.P. classes recently formed.

The tentative opening date for the new A.O.C.P. class has been given as the first Monday in November, but intending students will be officially advised as soon as these arrangements are definite. The appointment of Mr. A. Lum (5AL) as technical instructor is also announced.

WESTERN AUSTRALIA

Hon. Secretary: H. B. Lang,
42 Ord Street, Claremont, W.A.

Meeting Place: Builders' Exchange, St. Georges Ter., Perth.

Meeting Night. Third Monday in each Month.

Since the last general meeting was reported in last month's notes, we are more or less confined to local news and notes. However it will be of interest to local Hams to know that some excellent lectures have been

lined up for future meetings. Make a point of keeping that third Monday as your free night.

Western Activity

6KW—Congrats. Ron, our second VK6 WAC fone. His three element beam sure is a fine job as is all his equipment. 6HL—Still spending most of his time on 28 Mc/s. Is trying hard to find a really satisfactory all-band antenna. Latest is vertical folded dipole. Reports very good results. 6DD—Still getting his share of DX. Spending more time on 28 Mc/s. and is also testing on 50 Mc/s. band. 6RU—Not on so frequently of late, but still finds time to be in on the European contacts round 1000 GMT. Will soon have three element rotary on 14 Mc/s. band.

6CM—Very consistent CW operation and doing well. Has nice fist and FB signal. 6MB—Very consistent also. Bill will be devoting less time to radio and more time to cricket from now on. Is one of our first grade cricketers. 6KE—Another new one on 14 Mc/s. CW. Seems to reach out well but has receiver troubles. 6WS—Getting into his stride again. Skipper has new Receiver and can be heard working Ws almost nightly. 6PJ—Peter is landing some good European contacts on 28 Mc/s. Now has close-spaced rotary beam. Is satisfied they work.

6ZO—Heard working Ws frequently on CW. So we have at least one active Port station. 6DF—Now back on 28 Mc/s. and doing well. Has changed his 813 for a single 807. I wonder why? 6EV—Very consistent CW on 28 Mc/s. Has new three element vertical. How's DX John? 6KB—Nice CW signal. Very consistent but on bad spot for CW. Too much fone there OM. 6EL—At Geraldton, is running a three stage rig on 28 Mc/s. ending up with PP 6L6Gs, powered from DC mains (180 volts sometimes) with input varying between 8 and 12 watts. Receiver is converter ahead of BC receiver and has been doing excellent work. At the moment Ern is lining up a rotary beam and I believe hopes to increase power to 20 watts. Thanks for dope Ern.

6WZ—Another Geraldtonite, running 4 watts plate modulated fone to an 807 and doublet 21 feet up. Bruising thumbs and gashing fingers building 32 feet wooden tower. Best DX so far is SU1HF. 6AH—Another of our country members can be heard fairly regularly on 7 Mc/s. band with good fone at good strength. 6WH—Yep, still there keeping 7 and 3.5 Mc/s. bands alive in VK6. What's wrong with 28 Mc/s. these days Ted?. Other stations operating are 6MU, 6MW, 6HM, 6SA, 6RF, 6WM, 6FC and possibly others though not heard. Each week new call signs appear and activity in VK6 seems to be livening up. Conditions in VK6 have been rather peculiar particularly on 28 Mc/s. band, however of late European signals have been excellent from 0900 GMT till as late as 1400 GMT. 14 Mc/s. produces the usual DX plus of course, the inevitable QRM.

The local boys are thinking of vacating the band since FZR6 seems to occupy 90% of the band and more.

Here is an example of the "excellent" operation of a commercial station (sez you!) The sooner we get the rest of the band back and crowd him out the better. What do the authorities concerned think of such a transmission? I don't know—you tell me!

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.
Meeting place, Photographic Society's Rooms, 162 Liverpool Street, Hobart.
Meeting Night: First Wednesday of each month.

Last month's meeting was held at the University Extensions. Sandy Bay Rifle Range by virtue of the fact that our lecturer for the evening was Mr. G. Fenton, B.Sc., the subject being the Geiger Counter.

A brief council meeting was held at 7.45 p.m., present were Messrs. L. Jensen (7LJ) in chair, J. Brown (7BJ), T. Connor (7CT), A. Finch (7CJ), F. Gee (7RF), C. Walch (7CW), A. E. Allen (7PA). Minutes were read and confirmed and correspondence read and received. Two new membership applications were passed on for general meeting acceptance. The secretary reported the registration under the Company's Act of alterations to Articles of Association. Several letters from members and replies thereto were read, meeting then closed.

At 8 p.m., general meeting took place. Present were as for Council with Messrs. Richardson, Lipscombe, O'May (7OM), Stevens, Lockley, Morrisby (7VJ), Loveless (7ML), F. Medhurst (7AH), Hopwood (7GJ), Koglin, Kelly (7LL), T. Allen (7AL), Conrad (7TR), Nichols (7RY). Clark, Russell (7AC), Conway (7CL), Allenby, W. Watson (7YY), D. Watson (7DW); Visitors: Messrs. Durkin, Rayner, Nicholas, Brown, Russell, Morris, and our lecturer (Mr. Fenton).

The chairman expressed pleasure at seeing our G.O.M. (7AH) present at the meeting and wished him continued good health. Minutes of previous special and general meetings were read and confirmed. Correspondence from F.H.Q. re log books and badges, also disposal matters, and a letter from Western Australian Division re regulations interpretations were read. The VK6 letter caused some very lively discussion. (F.H.Q. correspondence, now in the hands of the Secretary, should clear the air on this matter considerably.) R. K. Kilby (7RK) and D. Hildyard (7DH) were unanimously elected to membership.

A local field day is to be held on the 24th of November and from the preparations reported it seems we are going to have some competition. It is hoped to arrange a State field day early in the New Year, this matter was raised by 7JH who suggested that the Waddamana district could be chosen, it being fairly central. Jack could possibly arrange a visit to the Power Stations as a climax.

The lecture for next meeting is to be given by W. Watson (7YY) on his experiences with shipboard operating. This being all the business the meeting then closed.

The chairman (Mr. L. Jensen, 7LJ), then introduced Mr. Fenton to the meeting and in reply, Mr. Fenton said he was delighted to be present and was interested to note that W.I.A. was having the same trouble with disposals as the University had experienced, he was pleased to hear that we had been able to put Tasmania on the map (referring to the new badge design) applause. Mr. Fenton then outlined the development of apparatus for the investigation of Radio Active Matter from its early stages and illustrated the various devices used from the Gold Leaf Electroscope up to the present Geiger Tube, basis of the Geiger Counter. Several amplifiers of varied design using the ever popular 6J7G were described and the activity of various radio active substances explained, in many cases up to 2000 volts are applied to these valves and it seems they don't mind. The main course of the University's investigations centers particularly on Cosmic Rays and the source of their origin of which little as yet is known.

The lecture was exceptionally well prepared in a lecture room that is ideally arranged, and in moving a vote of thanks to Mr. Fenton, seconded by Mr. D. Watson (7DW), Mr. Jenson thanked him for the great trouble he had gone to and asked him to convey our appreciation to Professor McAuley, Professor of Physics in the University of Tasmania, for the generosity he had shown in making the lecture room available and the lecture possible. This was one of the most outstanding lectures to date as was shown by the way in which the vote was carried. At this juncture members were invited to inspect the Geiger Counter and its associate equipment set up in an adjacent building, small groups being the order owing to space limitations. There a most interesting array was grouped on a bench, a "Geiger Telescope" (two tubes so connected that only rays passing through both tubes actuated the circuit) followed by a 4 stage amplifier to a gas tube operated mechanical counter setup and a C.R.O. visual indicator.

One interesting point brought out at question time was the fact that during the recent Bikini Atol experiments, no change in Radio Activity was noted in Hobart, although barometric pressure showed some changes. The experiments so far have revealed that Cosmic Rays are recorded without any indication of unifomity, not conforming to any particular pattern but appearing entirely at random as was seen on the C.R.O. screen.

7GR recently aspired to phone and putting out FB quality, nice work OM. 7BJ has been flat out with the Quiz Contest hookup on National Network which was such a success. 7ML to be congratulated on a recent new arrival—a boy! 7AL in Repat. under stress of Malaria, says cards are mounting up at QRA but will clear them as soon as possible. 28 Mc/s. is showing some signs of activity in Tasmania again recently.

SIMPLE HAM RECEIVER.

being wound on celluloid strips and are 1-inch diameter and 7/8-inch long. The 3.5 and 7 Mc. grid coils are wound with 30 g. E. and spaced to cover ¾-inch, the 14 Mc. grid coils and the 28 Mc. osc. grid coil are wound with 20 g. E. and cover ½-inch. All the primaries are interwound at the earthed end of the grid coils, using fine D.S.C. wire obtained from an old R.F. Choke.

	Aerial		Mixer		Oscillator	
	Pri.	Sec.	Pri.	Sec.	Pri.	Sec.
28 Mc.	3	7	 4	7	.... 2¾	3¼
14 Mc.	3¾	8¼	.... 5¾	8¼	.... 2¾	7¼
7 Mc.	7¾	19¼	.... 9¾	19¼	.... 3½	17¼
3.5 Mc.	10¾	33¼	.... 14¾	33¼	....As for 7 Mc.	

I.F. Coil

Sec.—33 turns 30 g. E. 1¼-inch diameter close wound.
Tickler—5 turns 30 g. E. 1¼-inch diameter close wound and spaced 1/8-inch below the secondary.
All coils are wound in the same direction.

SELECTIVITY.

used to improve selectivity and while it does help considerably it results in rather poor shape-factor. These figures therefore are quoted to enable the amateur to appreciate the operation of the I.F. channel and perhaps help to explain the lack of selectivity apparent in the use of 1600 Kc/s. I.F. transformers. It must be remembered too that with the exodus to the V.H.F. bands better selectivity will be required than at present if they are going to become like "ten" and "twenty."

The conclusions, therefore, are that improved selectivity, while maintaining the advantages of and in some cases the necessity of a high I.F. frequency, can only be obtained by improved coil design—somewhat remote in the present light—the use of crystal filters and the use of the "double-super." It is hoped to be able to give details of both these at an early date.

A VISUAL TUNING INDICATOR EMPLOYING A THYRATRON.

A Thyratron with AC plate supply is controlled by a grid bias combining an AC supply of the same frequency but different phase and a DC component obtained by rectification of the tuned signal. Change of the DC bias by tuning alters the striking point of the plate voltage cycle and the mean plate current. The current is used to operate a meter or lamp indicator.

(L. S. Joyce, "Electronic Engineering", June, 1946).

CORRESPONDENCE

Correspondents are requested to keep their letters short and to the point. The Editor reserves the right to delete anything he may think fit. The views expressed by correspondents are not necessarily those of the proprietors.

The Editor, "Amateur Radio,"

We read with interest a small paragraph in the August edition of "Amateur Radio." The paragraph deals with Coils and I.Fs., etc., being spoilt for the proverbial "h'peth of tar."

We take this opportunity of inviting your attention to the mounting of this firm's Coils and I.F. Transformers, which mounting system, we claim, is an improvement over any other known type, together with the fact that all Coils and I.Fs. are, and have been for some time, supplied complete with mounting nuts.

Yours etc.,

AEGIS MANUFACTURING CO. PTY. LTD.

FOR SALE, EXCHANGE, WANTED

9d. per line, minimum 2/-.

HAMAD

FOR SALE.—Two only ATR2 (CW) transceivers, less power supply, crystal controlled, frequency coverage 3 to 7.5 Megacycles; all new valves, price £10 each. Also three only AR10 battery operated Communications Receivers, less batteries, brand new; complete with telescopic aerial, S meter, B.F.O. and in canvas covered carrying case, operates from 90 v. HT supply and 1.5 v. LT supply, price £15/10/- each. Apply Mr. Hildebrand, 410 Swanston Street, City, Phone FJ 6958.

PRESENCE OF STANDING WAVES IN WOODED COUNTRY

During a recent test with portable 50 Mc/s. equipment operated from a car, an interesting phenomenon in connection with standing waves was noted. The apparatus in use consisted of a MOPA transmitter using an HY615 equivalent in a TPTG circuit driving an 807 with 1.7 watts input, and an 8 tube super receiver using a 954 RF 954 Mixer and 955 Oscillator. Both transmitter and receiver were connected into a simple horizontal half wave doublet antenna by means of 75 ohms co-axial cable. The radiating portion of the antenna consisted of two lengths of ¼ inch hard drawn copper tubing 3 feet long with lengths of similar 1/8 inch tubing sweated into the ends, the total length of each section being 4 feet 7 inches. These sections were supported on pairs of 1½ inch standoffs near the centre. The antenna, which was maintained broadside to the direction of the incoming signals, was 14 feet high and was secured to the back of the car.

Contacts were made with three stations from the top of a hill 1500 feet high overlooking Melbourne, and 23 miles distant, and signal reports were exchanged. The car was then allowed to roll down the hill on the far side and directly away from the signal sources, which at this stage were transmitting continuous tone modulation. As soon as the antenna had fallen below the level of the top of the hill, i.e. reception was no longer line of sight, it was noticed that the signals dropped about 3 "R" points and then began to surge up and down in a regular manner from this level to about 18 DB down. As this was rather unexpected, measurements were made between the troughs—the latter being more sharply defined than the maximum points, and to within a few per cent the distance was found to be 9 feet—a half wave on 50 Mc/s. For the most part this was maintained with great regularity, but occasionally a trough would be less well defined or even missing. Troughs and crests from the several stations taking part in the test did not co-incide, but were noticeably and regularly "out of phase."

It was concluded that the surges resulted from the presence of standing waves, and as standing waves must be due to reflexions, it appeared that neighboring trees were responsible. Fencing wires and telephone lines were parallel to the road and few in number, and as the irregularities noted above seemed to correspond fairly accurately to large branches, that occasionally overhung the road, it was concluded that the wires were not responsible. The weather was wet, with occasional showers, and the foliage was therefore moist. The phenomenon persisted for one third of a mile until the car ran out into a clearer area where the surges vanished.

The presence of such standing waves may be important under certain conditions at fixed locations where trees or other objects capable of reflecting waves exist, especially if they are in close proximity to the antenna itself. For example with respect to one station the antenna might be on a crest of the wave and the signal therefore strong, while for a second station of identical power, distance, etc., the antenna might be in a trough and the signals a 3 "R" points lower. This may indeed explain certain anomalies already noticed in the reception of stations in the metropolitan area. One station received at the writer's location is never more than R8 although most others are R9 plus from comparable distances. Metal ridging on part of the nearby roof is regarded as the culprit when the antenna is turned in the direction of this transmitter.

Perhaps as well as rotary beams we should instal antennas capable of moving through one half wavelength in any desired direction!—VK3NW.

QSL BUREAUX.

is Jock Speer, heard on 80 from the old family location at Corop, Vic. Jock has his old callsign VK3FF but have not noticed that brother Tom has lifted out VK3TS as yet although Tom is well and truly on deck. Jock, whose wife was a W.A.A.A.F. and has operating ability, now has installed AC at the home location and should do well.

VK3XK is again away visiting lighthouses, this time at the Hunter and Three Hummock Islands and Cape Nelson. The weather indicates that Russ should have had a more placid trip this time.

Hams in VK3 country cities and towns willing to distribute QSL's to the locals would assist the QSL Manager by advising of their willingness.

VK3 stations not attending the divisional meeting, and expecting cards, should send a large stamped addressed envelope to the Bureau, 23 Landale Street, Box Hill, E.11.

TASMANIA

Non-members as under are advised that QSL cards are available to them at the Bureau on receipt of a stamped addressed envelope: VK7's CA, CF, FL, IL, JT, KR, QZ, XR, ZY. The Bureau address is T. A. Allen, 6 Thirza Street, New Town.

According to RCA's "Relay" the Chinese went to a lot of bother in overcoming their paper shortage. For example after running receiving tape through an inking recorder they turned it around, top for bottom, and ran it through again using a different colour of ink. Two more runs could be made after it was turned over on the other side. Then they rewound it and ran it through a perforator and into a transmitter head. Five runs for one piece of tape! . . . . . That's really saving paper . . . . QST.

MACHINING POLYSTYRENE.

We are indebted to Messrs. Etholex Plastics for the following information in connection with the working of Polystrene. "Stylon" is the name under which Messrs. Etholex Plastics market Polystrene.

"Stylon" can be easily machined on standard equipment provided the correct technique is used. This thermoplastic material begins to soften at about 180 deg. F. and because it will become gummy, at about 230 deg. F., excessive heating during all machining operations must be prevented. When overheated, even if gumming does not occur subsequent cracking and surface crazing is possible.

By avoiding excessive friction, aiding chip removal and when possible using a coolant, no difficulty will be encountered whether using hand tools or high speed automatic equipment. "All tools should be kept sharp and free from knicked or burred edges."

Coolants.—Water, or soap and water are the most satisfactory cooling lubricants for any machining operation. Tallow, soap or methylated spirits have also been used on equipment not fitted with automatic lubricating devices.

Petrol, kerosene or mineral oils should never be allowed to come in contact with "Stylon" as they tend to soften it.

Cutting.—A hacksaw can be used but the process is slow and the material will tend to overheat and the saw to stick. To avoid any local overheating and subsequent cracking due to surface strains introduced, the saw should be freely lubricated with water.

For high speed production, any band or circular saw as used for wood may be employed but a hollow ground circular saw is desirable. It should be 3/32-inch thick to avoid vibration. When cutting material less than ¼-inch thick, a saw with 12-15 teeth per inch is used.

Heavier sections are best cut with a 9-inch diameter saw having 8-10 teeth per inch running at 2,000 r.p.m. and freely lubricated with water.

Filing.—Clean, sharp files with fairly coarse teeth are best. Overheating can be avoided by dipping the file in water occasionally, this also assists the removal of chips and produces a finer finish.

Drilling.—With ordinary care, standard twist drills can be used successfully. Drills ground for hard metals have a tendency to pull in to the material and cause grabbing in much the same manner as with copper and aluminium. This may be overcome by using drills modified to the following specifications. Flute angle 15-17 deg., lip angle 70 deg., lip clearance 4-8 deg. A general guide to speeds is as follows:—

1/16-inch diam.—7,000 r.p.m.
1/8-inch diam.—3,500 r.p.m.
1/4-inch diam.—2,000 r.p.m.
3/8-inch diam.—1,200 r.p.m.
1/2-inch diam.—1,000 r.p.m.

Water, or soap and water should be used as a lubricant and the drill backed out frequently to remove chips.

Turning.—Etholex Polystyrene can be readily turned, excellent results are obtained by using standard high speed tool steels, a large clearance and very slight or even a negative rake are best, the cutting edge should be 5 deg. below the horizontal centre of the work. For heavy cutting and internal boring water lubrication is essential.

Milling.—Standard milling machines are used when a high degree of accuracy is required. Cutters having low side friction are desirable.

Wood sharpers and routers are much faster and will give excellent results on both contour and step cutting. Cutters should be cooled with water or by using an air blast.

Threading and Tapping.—Standard taps and dies may be used, coarse pitch threads are preferred because of their added strength, care must be taken to remove chips frequently. Use water as a lubricant.

Polishing.—A soft cotton buff 10-inch in diameter, running at 500-800 r.p.m. will give the best results. Scratches and other surface marks are readily removed if the buff is "dressed" with tripeli compound. A high lustre is obtained by finishing with a dry clean wheel.

Local overheating due to excessive pressure or keeping the buff on the one position for too long a period will cause surface crazing.

Assembly.—At atmospheric temperatures, "Stylon" should never be deformed more than ½%, therefore screws tapped into holes should not be more than hand tight. "Stylon" cement should be applied to the screw if it is necessary to prevent loosening caused by vibration. When attaching flat panels to a frame, care should be taken to avoid bending the panel and if bolts are used, they should be placed so that the load is evenly distributed. Cork or rubber gaskets will aid in distributing the pressure.

Brown areas on the screens of cathode ray tubes employing electro magnetic deflection and electro static focusing are eliminated by the use of ion trap gun now being incorporated in the tube such as the DuMont 10BP4.

Ions which are much heavier than electrons are also emitted by the tubes cathode. They are practically immune to deflection by magnetic fields of the intensity generally used and consequently bombard the centre area of a cathode ray screen causing its disintegration. The ion trap is mounted around the neck of the tube before the focus coil and it separates the ions from the electron stream by means of combined magnetic and electric fields. . . . . QST.

Vectolite the first non-metallic and non-conducting permanent magnet material ever made has been announced by G. E. It is a hardened dross like combination of iron dust and Cobalt oxide mixed when still in powder form. Permanent magnets of Vectolite are light in weight prevent electrical losses due to current induction and are highly resistant to de-magnetising forces. . . . . QST.

AN AUTOMATIC OSCILLOGRAPH WITH A MEMORY.

This instrument has a flat response up to 30 megacycles, and can be used for problems concerning randomly occuring transients. Three cathode ray tubes allow simultaneous indications of interrelated quantities. The screens which have a long afterglow are continuously excited and the occurance of a transient pulse releases a camera shutter and interrupts the beam so that events prior to the photographic exposure are recorded. Illustrations of sporadic disturbances in mercury arc rectifiers are given. The system is completely automatic and 40 photographs can be taken without the aid of an operator.

A. M. Zaren, (Trans. American Institute E.E.), March, 1946.

AMATEUR RADIO

DECEMBER 1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

FOR THE EXPERIMENTER & RADIO ENTHUSIAST

6D.

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

AMATEUR RADIO

VOL. 14 DECEMBER, 1946 No. 12

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.
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20 Queen St., Melbourne, C.1.
Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.
Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

Let us get a few matters clear in our minds, to try and reduce the welter of confused ideas that have been current concerning P.M.G. Regulations.

With one main exception—the two class licencing system—the Regulations do not differ materially from pre-war, and certainly the Chief Inspector of Wireless places no different interpretation on them. Nor has his attitude, or that of his staff at Treasury Gardens, changed, towards the Australian Amateur. In some States, however, the interpretation placed on certain Regulations has been startling to say the least.

We have pointed out before, however, that during the settling in period after the war, some patience is necessary. The re-establishment and extension of P.M.G. Administration is a large task, with problems familiar to anyone who is engaged in restoring a business to pre-war activity. Nevertheless, it must be emphasised that the effect of any misinterpretation of a Regulation would have been greatly minimised, and its duration reduced to hours instead of weeks, if the Amateurs involved had used their organisation—the W.I.A.—to handle their case, instead of taking local independent action.

For a quarter of a century, the W.I.A. has had a procedure for handling cases of Hams in some form of trouble when they believed they were "in the clear." The procedure is simply this: If an Amateur receives a direction from a Radio Inspector, which he believes is a misinterpretation of a Regulation, he passes the necessary information to his Divisional Secretary who arranges for suitable representation to be made personally to the local State Superintendent. If no reversal of the instruction is forthcoming, and the Secretary believes the case sound, he sends full details at

(Continued on page 17)

IN THIS ISSUE

V.H.F PORTABLE TRANSMITTER

By G. M. BOWEN, VK5XU*

Some peculiarities encountered using Class B receiving tubes, such as the 1J6G, in Modulated Oscillator Circuits.

The main purpose of this article is to stimulate the reader into contributing his ideas on the subject, however trivial and unimportant he might think them to be. Naturally, the scope of the subject is broad and this article deals with only a few aspects of it, so it is hoped that if the facts and hypothesis presented herein do not agree with what the reader has himself found, he will contradict or amend them forthwith.

A 1J6G was chosen because it has a low value of quiescent plate current, high output when driven, 2 volt filament, quick heating for T/R change over, and because its counterpart, the 19, had been successfully used in a V.H.F. transmitter in a meteorological instrument. The 1J6G did the job required of it after the peculiarities associated with its use had been discovered (by the hard way!). Once the relative data had been collected and collated with the valve characteristics, the unusual behaviour of the tube became understandable.

The following figures show the average operating conditions per section of the tube, but it must be remembered that they are only a guide and will be amended in sections of the article.

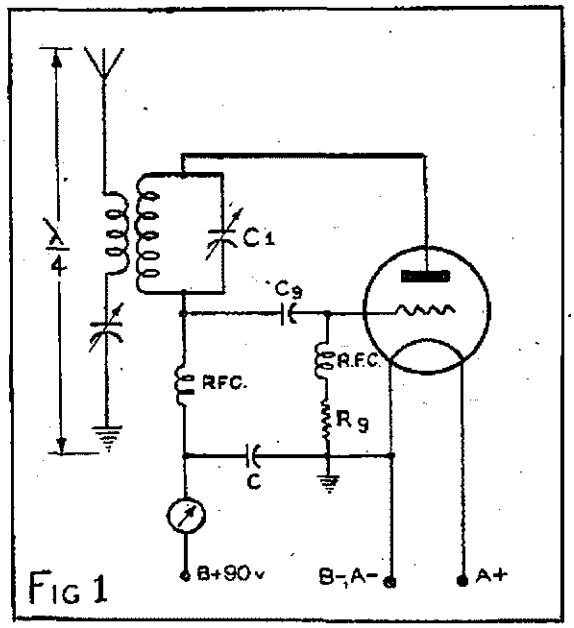


FIG 1

Non-Oscillating

Plate Voltage	90 Volts
Grid Voltage	0 Volts
Plate Current (Zero Signal)	3 Ma.

Oscillating (No Load Conditions)

Plate Voltage	90 Volts
Grid Voltage (R.F.)	25 Volts R.M.S.
Cathode Voltage (Self Bias)	—10 Volts R.M.S.
Plate Current	16 Ma. (per Section)
Grid Current	1.5 Ma. (rect. Grid Current)
Grid Resistance	10,000 Ohms
Driving Power	20 mW. (approx.)

Two circuits were experimented with and will be treated separately. The usual component values were used. Grid resistance was the subject of considerable experimentation and the value for R.F.C. was critical, but once adjusted did not have to be altered for the small frequency coverage involved.

With no load, the above circuit in Figure 1 gave instant oscillations and the following results were obtained from which the conclusions were drawn:—

1—An expected constant average plate current Ip of 32 Ma. for the double triode connection.

2—The value of the grid resistor Rg had a wide effect on the power in the plate tank, and on the degree of frequency stability especially under plate modulation.

3—There is a minimum value for C1 beyond which there must be no decrease or oscillations will cease. The minimum value is necessary to raise the Q of the L1 C1 circuit to a value where the decrement is such, that with the power lost to the grid circuit and the R.F. resistance, the tube still presents a negative resistance to the circuit. The effect of increasing C1 is not linear, and larger values of C1 which give increased power and ensure more stable operation up to a point, result in increased power loss proportional to the square of the R.F. current in the tank circuit.

4—The decrement of an ordinary coil and condenser circuit at V.H.F. is high and consequently the efficiency of the oscillator is low. Resonant lines couldn't be used because of their size.

By applying a pure resistive load across the tank, the circuit decrement increases. Less power within the tank as "flywheel" energy results in less R.F. voltage developed across the circuit impedance. Therefore there is less grid drive and with a Class B triode operating on zero fixed bias, a consequent fall in plate current occurs. There seems to be no critical value of grid resistor which can be chosen to buffer this change, although some measure of compensation will occur by the choice of the right value. A value can be found which varies for individual tubes whereby the plate current can be kept substantially con-

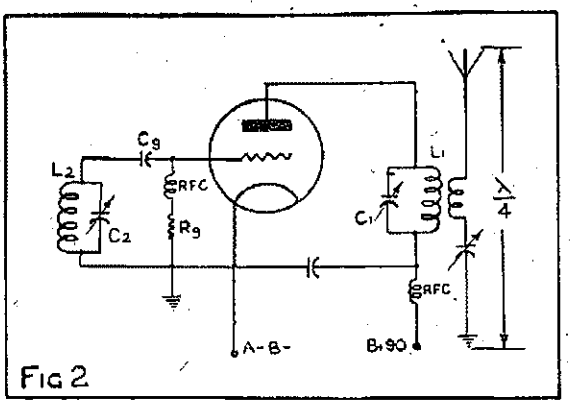


FIG 2

*73 Portrusch Road, Toorak Gardens, South Australia.

stant over quite a big range in tank loading, but it was found that the value was high and resulted in a high negative bias developing, to the detriment of output power with the limited portable battery supply.

If the load is reactive, reflection of reactance into the tank circuit causes frequency change and a loss of power transfer from tank to the output coupling coil. As the antenna is tuned to resonance the loading coil reflects pure resistance into the tank and on the same basis as outlined above, the plate current of the tube falls. That is, the antenna is tuned to resonance by tuning to a dip in plate current instead of a rise.

The TPTG circuit was tried (figure 2) and finally induced to give quite fair results.

Since the grid and plate tank circuits must be near resonance for oscillations to be maintained, another effect appeared which differed from the usual tuning procedure, with no load on the plate tank.

With no oscillations, zero signal plate current of 3 Ma. occurred. Then as C1 was rotated to bring the plate tank into resonance with the grid tank just as resonance was approached from the high frequency side, i.e., C1 was increasing in capacity, plate current dipped and then rose sharply to approximately 30 Ma. again falling sharply to 3 Ma. on the low frequency side of f(r) as the reactance of the plate tank became capacitive and the phase conditions were incorrect for maintaining oscillations. Coincident on the rise of plate current, R.F. appeared in the plate and grid tanks.

As with the ultraudion circuit the application of a pure resistive load caused a fall in plate curent, the fall varying with the load until the load created such excessive damping that oscillations ceased. Since space was a vital factor in the design of the transmitter it was not possible to increase the Q of the tanks by using parallel lines, thus with the natural high decrement of the plate tank, the loading was fairly critical. The decrease in the magnitude of plate tank R.F. could be due to two factors. Firstly (the apparent one), the applied load constituting a parallel resistance across the tank and thus dissipating the R.F. energy. Secondly, the consequent reduced R.F. feed back voltage for grid excitation which lowers the peak value of the plate current impulses and reduces the maintained R.F. oscillations.

The automatic reduction in self bias due to less grid rectification does not fully compensate to maintain the plate current at the unloaded value. It was found that any attempt to provide some measure of compensation by increasing the size of Rg resulted in instability even with B+ constant and a tendency to "squeg" became more pronounced since the tube has a high grid current (see characteristics).

Peculiar conditions occurred when the resistive load was replaced by the antenna. With the antenna off resonance reflected reactance caused detuning of the plate tank, less R.F., therefore less feed back and less plate current. On the other side of resonance the antenna reflection caused capacitive reactance in the plate tank and incorrect phasing between plate and grid tanks so oscillations ceased immediately. As the antenna was brought near resonance (thus approximating to a pure resistive load), plate current first dipped a Ma. or so and then

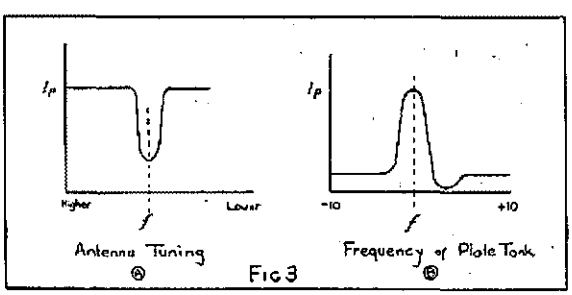


FIG 3

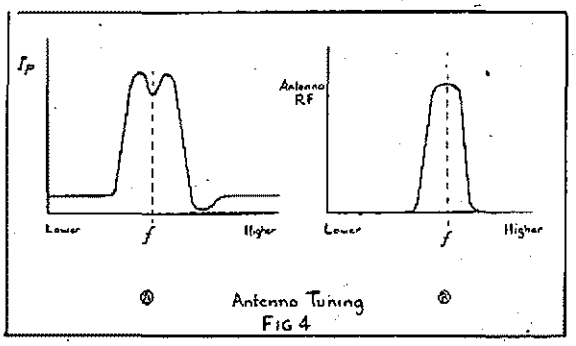


FIG 4

rose sharply to a value which was less than the unloaded value. Then as resonance was reached plate current dipped and the R.F. reached a maximum in the antenna. Passing through f(r) caused a rise again and then a sudden fall as the reflected reactance to the plate tank created incorrect phase conditions for the maintenance of oscillation.

Decreased coupling coefficient between the antenna coupling coil and plate tank made the rise of plate current more pronounced with less dip at resonance. However this looser coupling did not restore conditions to what is expected as normal tuning, and it was concluded that the degree of antenna coupling was not the primary cause of the double humped effect in the plate current curve, as the antenna was tuned through resonance.

After much data had been collected and the whole collated with the tube characteristics, the following summary seemed to be the logical explanation of the peculiar reversal in the tuning procedure:—

1—A Class B tube, such as the 1J6G, has a very low quiescent plate current with zero bias and only draws plate current with grid excitation. Therefore until oscillations are initiated by tuning the plate tank near to resonance with the grid tank (in TPTG) there will be no grid excitation and no plate current of any magnitude. The slight dip in plate current (to about 2 Ma.) will occur for an instant as oscillations start (normal in self biased oscillators). If the bias resistor is small the dip will also be small. As soon as R.F. feed back increases plate current will rise rapidly, due to the high mutual conductance of the tube.

2—As any load is applied and the decrement of the plate tank is increased, less R.F. voltage will develop across the plate impedance and this will result in less R.F. and drive. Thus plate current will fall.

3—As the antenna is tuned to resonance then the change from reactive to resistive loading will increase the decrement of the tank with the maximum occurring at antenna resonance. Thus at this point, there will be a dip in plate current instead of the expected rise due to effect 2 above.

PARASITICS

The base connections given for type CV6 on page 8 of "Amateur Radio" for November, were unfortunately incorrect. The correct connections are as follows:— Heater Nos. 2 and 7. Cathode 8.

The name of the Author of the Article on "Selectivity" (Page 5, November "A.R.") was unfortunately omitted. He was Mr. A. F. Nickson VK3NB.

CLEARING THE ETHER.—Series II, Part VII

By G. GLOVER, VK3AG*

CONSTRUCTION AND OPERATION OF MODERN TRANSMITTER (Continued)

OUTPUT COUPLINGS (To Aerial and Feeder Systems)

The object of the coupling device is to transfer the maximum energy from anode circuit to aerial or feeder system with minimum loss. It is assumed for the purpose of this discussion that the rule governing L/C Ratio or "Q" Factor of anode tank have been observed, and that tank is to be operated at resonance with load reflecting pure resistance unless otherwise stated; therefore we are only concerned with matching impedance of aerial or feeders to tank. The efficiency of the coupling may be defined as the ratio of useful energy in the tank circuit to that available at the terminals of output coupling when terminated in a pure resistance. The writer employs the term "useful energy" with the object of eliminating from discussion the normal losses of tank circuit itself. In determining the total anode efficiency the latter must be taken into consideration; but here we are only interested in comparing the efficiencies of actual coupling circuits.

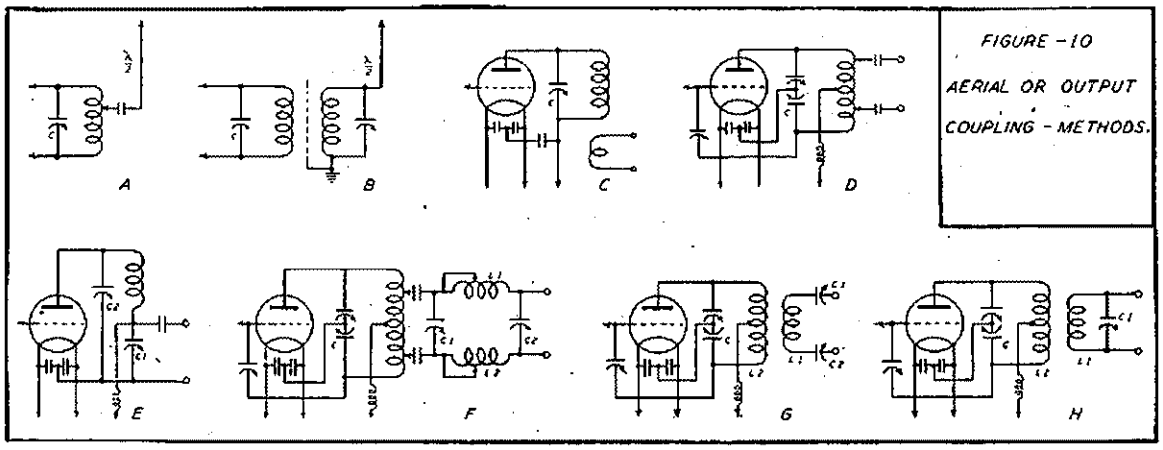


FIGURE - 10

AERIAL OR OUTPUT COUPLING - METHODS.

Figure 10 (a) depicts "Capacity Coupling," often referred to as "Direct Coupling." The capacitor in this case is tapped on to the tank coil at point determined by impedance ratio of anode and aerial circuits. In cases where the capacitor is connected "direct" to the aerial the tapping point is at high impedance point for voltage fed aerial, and should be tapped much further from the "cold" end of the tank than for low impedance current fed aerials. The principal disadvantage of this system is harmonics and parasitics introduced by the taps, and necessity for bringing the aerial itself right into the shack.

Figure 10 (b) shows how to overcome the harmonic and parasitic problems by employing separate inductively coupled aerial tank, isolated from anode tank by Faraday shield, and using L and C values which will give the correct impedance when optimum degree of coupling is employed.

The two methods of coupling dealt with so far are normally used only for mobile equipment where ease of installation is a prime factor. With the exception of single wire feed system, which employs single untuned feeder, other forms of feeding aerials involve the use of one of the following mediums: Co-axial Line, Co-axial Cable, Twin Cable or Twin Open Wire Line. The first two being known as unbalanced and the last two as balanced feeds. This subject will be covered more fully when "Aerial Systems" are under consideration.

Untuned Coil

Figure 10 (c) depicts standard method of tight coupling open wire non-resonant line to anode circuit by means of small untuned coil. Loading in this case is varied by changing either the number of turns in the aerial coil, or the degree of coupling to anode coil. In order to cancel out residual reactance it is necessary to retune the tank circuit slightly.

Taps on Tank Circuit

Figure 10 (d)—A method which is often employed with open wire lines is to tap each line on to balanced anode tank coil, via a pair of block-capacitors, adjusting the impedance by moving taps to or from centre of coil while maintaining equi-distance in order to avoid upsetting balance to ground. As in previous case residual reactance is balanced out by readjustment of tank capacity. This form of coupling suffers from harmonic and parasitic bugs.

Pi-Section Coupling

This method, illustrated in Figure 10 (e), is employed in portable rigs where quick matching to wide range of impedances is essential. It is in effect a capacity voltage divider—C2 being readjusted to resonance every time C1 is varied. The usual method employed is to adjust C1 until anode current reaches the prescribed value at resonance, reducing the value of C1 increases impedance at output terminals. Relatively large value capacitors are required to give desired range.

Pi-Section Filter

By employing balanced low-pass filter shown in Figure 10 (f) matched coupling is possible between a fairly wide range of impedances. This method has in fact become very popular and when properly adjusted is most effective. Correct adjustment should be carried out as follows:—

First, having disconnected the filter from transmitter tank, tune latter to resonance, indicated by minimum anode current. Then guesstimate the positions of taps

*Glorad Engineering Services.

on L1 and L2—the higher the frequency the less the number of turns required—replace input clips on balanced tank coil, equi-distant from the centre. (A balanced tank circuit is essential for twin lines.) C2 is then set to half scale and power applied, after which C1 is adjusted for minimum anode current. If the minimum value does not coincide with desired full load value, try new setting for C2 and repeat operation. If after exhausting all settings of C2 the anode current is still too high or too low, experiment with new locations of taps on L1, L2 and tank coil. **Tank capacitor must not be varied while lining up filter circuit,** and C1 must be carefully adjusted to exact minimum when final setting is reached, otherwise haramonics will not be minimised.

If difficulty is experienced in obtaining correct loading with resonant lines, vary the L/C Ratio of filter over much wider range than normally necessary.

Series Tuning

When tuned feeders having current loop at input end are employed series tuning as shown in Figure 10 (g) will effectively maintain balance of line to ground, while artificially adjusting length of feeders to resonance and cancelling out residual reactance. Tuning procedure is as follows:—

With C1 and C2 at minimum, loosely couple aerial (L1) and tank coils (L2), adjust tank capacitor to resonance (minimum anode current). After observing anode current increase C1 and C2 simultaneously for maximum anode current, re-resonate tank, and tighten coupling between L1 and L2; then repeat the whole operation until the required minimum current is reached.

Parallel Tuning

In some cases resonant lines are used with voltage loop appearing at the input end. Under these conditions parallel tuning as depicted in Figure 10 (h) can be employed, that is, coupling coil, tuning capacitor and line are all connected in parallel. Providing that the line is non-reactive aerial circuit may be tuned without upsetting the resonance of tank circuit. The frequency range of this form of coupling may be further extended by equipping L1 with tap. Tuning procedure is as for series tuning.

Link Coupling

From constructional point of view isolating aerial tuning networks from the transmitter by means of link coupling has much to recommend it. Particularly where push-pull unit is to be connected to an unbalanced feeder system, because one of the biggest problems is to get tubes to equally divide the load when capacity unbalance is reflected by coupling coil with one end at ground potential.

NEUTRALISATION

Neutralisation is one of the most important aspects of amplifier design and operation. Unfortunately many people have been lulled into false security by believing that the use of tetrode and pentode tubes eliminates necessity for neutralisation; however this view is entirely incorrect, as in spite of all the external shielding precautions one may take, there comes a time, or frequency to be more correct, when the grid-anode capacity of the tube provides sufficient positive feedback to cause self sustained oscillation. In fact, when such conditions do arise the very low value of capacity causing feed back is responsible for many headaches, due mainly to the difficulty of achieving an equally low value of capacity for feed back circuit.

Neutralisation might well be described as the process of introducing into the input circuit, by artificial means, sufficient negative feed-back to counter-act or neutralise positive feed-back provided by aforementioned grid-anode capacity of the tube. Not only must this feed-back be negative in character, but also it must be 180° out of phase, and equal in amplitude, to the cause of oscillation. That is the real nigger in the wood pile where low grid-anode capacities are involved, because of irreducible distributed inductance, distributed capacity and RF resistance introduced into the neutralising circuit by unavoidable length of necessary connections.

Anode Neutralised Circuits

When neutralising energy is fed back from the anode circuit as shown in Figures 11 (a), (b) and (c), amplifier is said to be "anode neutralised."

In the case of Figure 11 (a), circuit depends for its operation upon the extension of tank coil, and is satisfactory over a limited range of frequencies only, due to the fact that the amount of coupling between the two sections of tank coil is varied with the value of capacity C. In practice Cn increases as value of neutralising section of coil is decreased.

In Figure 11 (b) the tank condenser C is connected across the whole of the centre-tapped tank coil. Under these conditions Cn is approximately equal to grid-anode capacity of tube; however, neutralisation is completely effective at but one frequency, due to the unbalancing of tank by grid-anode capacity being placed across one half only. The effect of unbalance is further aggravated by the difficulty of locating tap at exact electrical centre of coil.

By employing balanced split-stator capacitor as in Figure 11 (c), plus small compensating capacitor across the lower half of same, to balance grid-anode capacity which is connected across the top half, complete neutralisation can be secured over a wide range of frequencies. In practice where value of capacitor C is very large, in comparison to grid-anode capacity, the compensating capacitor may be omitted without serious effect.

Grid Neutralising Circuits

Sometimes the neutralising voltage is taken from grid instead of anode tank. The remarks regarding unbalance discussed under anode neutralisation apply equally well to grid neutralisation. In view of the fact that grid neutralisation has many disadvantages as compared to anode neutralisation, especially in the case of modulated Class "C" amplifiers, we will not spend any further time on this subject.

Inductive Neutralisation

Figure 11 (d) outlines method of applying inductive neutralisation by employing links arranged to convey out-of-phase voltage from output to input circuits. The voltage induced in the grid circuit thereby cancelling effect of grid-anode capacity. When correct degree of coupling and correct phasing is employed complete neutralisation is obtainable, but only at frequency for which it is adjusted, owing to change in mutual inductance as frequency is varied.

Figure 11 (e) depicts another system of inductive neutralisation known as the "shunt method." In this case the inductance is shunted directly across the grid-anode capacity of tube via blocking capacitor C2, the latter merely isolating the anode DC supply from grid circuit. In practice neutralisation is effective only at resonant frequency of coil and grid-anode capacity.

Inductive neutralisation is particularly useful for tetrodes or high impedance triodes possessing very low values of grid-anode capacity.

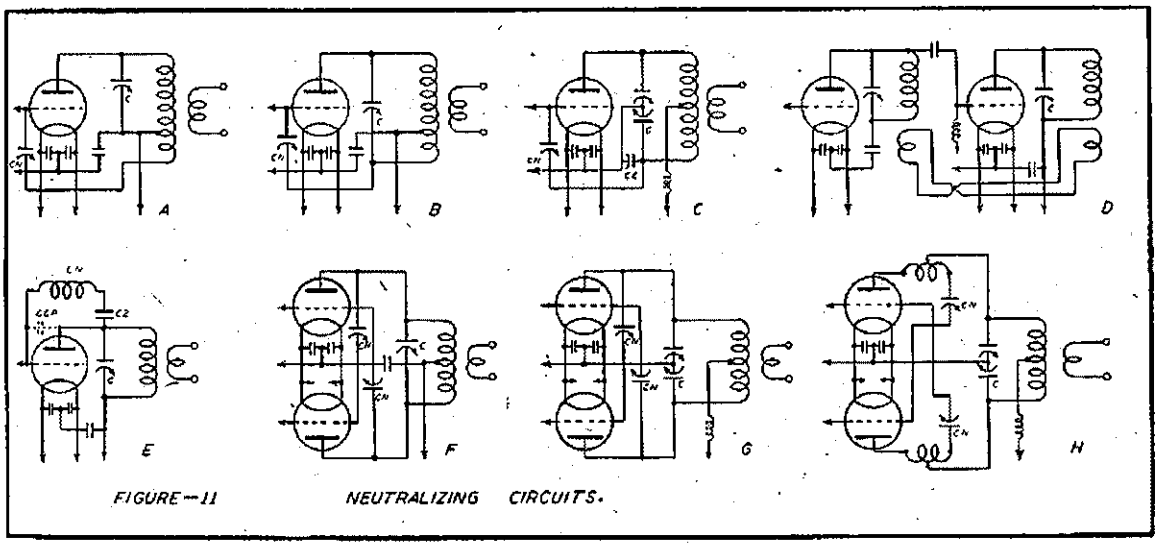
At V.H.F. a form of inductive neutralisation employing a resonant line as neutralising element, instead of coil, may be employed for operation at single frequency.

Push-Pull or Cross Neutralisation

In the case of push pull circuits depicted in Figures 11 (f) and 11 (g) the two neutralising capacitors are "cross connected" from tube to tube in the form of a capacity bridge entirely independent of grid and anode tanks. Except in cases where dissymmetry exists in lay out, neutralisation is completely independent of frequency. Circuit employed in Figure 11 (g) offers the best circuit balance by virtue of balanced split-stator capacitor used.

Frequency Effects

As the frequency of operation is increased, the necessity for absolute symmetry in circuit, and the employment of short leads, especially in neutralising circuit, becomes more and more apparent. The reason is not hard to seek. Distributed capacity and inductance of leads becoming very important factors in V.H.F. circuits. Input loading effects upsetting the phase relationship



FIGURE—11 NEUTRALIZING CIRCUITS.

make it difficult to completely neutralise the stage. There is much to recommend the naturally symmetrical push-pull circuit for V.H.F. work.

Neutralising Capacitors

Maximum, or should we say minimum, voltage rating of neutralising capacitor should be at least equal to the applied RF voltage plus the sum of DC components of anode and grid voltages, plus modulation where applicable. Capacity values will depend upon the circuit employed.

Figure 11 (h) illustrates circuit employing triodes in push-pull with parasitic bridge applied to neutralising circuit. Reference to the figure will reveal that the anode of tube and neutralising capacitor are connected at opposite ends of centre-tapped parasitic coil.

Neutralising Procedure

The methods employed in neutralising are fundamentally the same for all circuits.

Without anode voltage applied, but with filaments heated and grid excitation applied to stage to be neutralised (assuming that parasitics are not present) it should be possible to swing the anode tank capacitor through resonance without reflecting change in the grid current meter. Thus, by making use of this fact we can vary the values in neutralising circuit, in small steps, until correct neutralisation is achieved. It must be emphasised that it is essential to re-adjust grid tank to resonance each time change is effected to either neutralising capacitor value or neutralising tap on coil.

In the case of push-pull circuits the capacity of both neutralising capacitors should be kept as nearly the same as possible.

The reaction exhibited by single ended circuits employing split-stator neutralisation will depend upon the type of tube employed, for example, when tube has high grid-anode capacity the grid meter will indicate gradual rise and fall when anode tank is tuned through resonance, maximum indication will co-incide with true resonance when the circuit is completely neutralised.

A neon bulb may be very effectively employed both as an indicator of neutralisation and parasitic conditions. For the former purpose it is placed in contact with anode of tube during neutralisation process, when it will glow if neutralisation is incomplete, that is, of course provided driver has the necessary power. WARNING! Applying neon bulb to "hot" spot may give false results by unbalancing circuit, hence it may be necessary to slightly increase neutralising capacity after removing bulb in order to compensate for reduction of stray capacitance introduced by bulb.

When employed as an indicator of parasitic conditions it will be found that by running the bulb around the circuit elements, particularly RF chokes, nodes and anti-nodes may be indicated by reactions of bulb, thus enabling one to get some idea of the frequency of parasitic. In practice it is not unusual to find several waves standing

(Continued on Page 28).

ORIENTATION OF BEAM ANTENNAE.

By E. P. L. WALL, Navigation Instructor, Australian National Airways*

Out of one hundred QSOs between Amateurs, 75% mentioned the question of Aerials in their conversation, and at least 58% made some mention of Parasitic-Element Systems of a directional nature. Either they had already erected a two, three or four element beam, or were making alterations to them, or were actually in the course of constructing them, before actual erection.

This type of aerial, as everyone knows, involves a considerable amount of work, both in putting together in the first place, and in suitably erecting and connecting up in the second place, and to complete one's labour it is really necessary to have some working ideas on the important question of "Direction" to bring one's labour to the fullest fruition. It is purely the question of Orientation that is discussed in this article.

Everyone knows that a Radio Wave travels on a "Great Circle," and perhaps a definition and description of a "Great Circle" might not come amiss at this stage. A "Great Circle" then is a circle on the surface of a sphere the plane of which passes through the centre of the sphere and divides it into two equal parts. **The shortest distance between any two points on the surface of a sphere is the smaller arc of the Great Circle joining them.** Thus the Equator is, in itself, a Great Circle, and so also are all the Meridians, running North and South, and of course there can be any amount of Great Circles running in any direction over the globe, provided that they bisect the earth equally into two halves.

A Small Circle, mentioned just by way of interest, does not cut the earth into two equal halves, and, as an example, any parallel of latitude is a small circle. As an example, slice the globe right through at the parallel of 40° South, and you will not get two equal portions, by any means!

Most of us are very familiar with the ordinary Mercators Projection of the World, one sees it everywhere; in books, atlases, advertisements and the like, and its main feature is that the Meridans are parallel on the paper from top to bottom of the sheet. Further, a straight line drawn beween any two places appears to the eye on a Mercator's Map to be the shortest distance between any two points, whereas in fact it is the longest, and, to follow this route the bows of a ship, or the nose of an aircraft never point directly to the objective until it is almost in sight!

In short, such a projection is totally unsuitable for measuring the direction of a wireless wave, either from or towards any given point! And furthermore, the orientation of a beam aerial based on measurements of direction from such a projection would be so much in error that the effect of building and installing a beam directional aerial would be quite lost, and all one's labour woud be in vain!

Thus the only correct method of obtaining exact orientation for a beam aerial is that of measurement from a specially drawn Great Circle Chart, these charts are known as Gnomonic Projections, as opposed to Mercator's Projections, and, of course are not generally obtainable, and are, furthermore rather costly.

I propose, therefore, to give a list of general Great Circle Bearings to most countries of the world, as taken from Melbourne. It may be stated that the result of using such Bearings from any part of Victoria would not effect their accuracy to any great extent, especially when taking into account that the final adjustment for maximum signal strength can be obtained from movement of the beam itself in the horizontal plane of 360°. Furthermore, despite the accuracy of the bearings given, varying conditions of locality and surroundings will, in individual cases, cause a slight difference from such bearings, so that they may be said to be a general good all round guide, and no more. It is for this reason that they are listed only in general terms of sections of countries in varying parts of the world.

As a check on these, if you happen to own a globe of the world, such as is often seen in schools, you could stick a pin in your own position and another pin in the position of the station with whom you intend working, then stretch a small elastic band between and across the two pins, and there you have the track of your signal, and, also, the angle at which to set your beam is shown by the angle at which the elastic cuts the Meridan that passes through your location. Very accurate results are not obtainable by this rather crude method, but a most excellent idea of just what is happening can be obtained. From it, also, you can see the rather conflicting statement that to fly on a direct Great Circle Course an aircraft has to continually alter it's course, whereas to fly on the indirect Mercator's Course it does not have to change its course, and yet is never heading directly to its destination, until the very last lap! These points are only mentioned in passing, as a matter of interest.

We now come to the list of Countries, with the approximate angle, as measured from TRUE NORTH, at which to set the beam in order to effect maximum communication strength, purely from the "Directional" viewpoint. If you have a globe, as I mentioned above, you will see, by using the method suggested, exactly what countries your signal will pass through, en route to the desired recipient, and, furthermore, knowing the direction of an ordinary single wire aerial, together with it's own radiation pattern, you will soon ascertain exactly what countries you can, under such fixed aerial conditions, work best, from the directional viewpoint.

Approximate Great Circle Bearings From Various Capital Cities

Country	Melb.	Syd.	B'ne	T'ville	Adel.	Pth.
Canada, North	030	030	030	040	030	035
Canada, South	050	050	045	050	045	040
U.S.A., North	060	060	055	060	065	052
U.S.A., Central	070	070	065	070	070	060
U.S.A., South	090	075	070	080	082	070
Panama	115	100	100	120	105	130
S. America Nth. Half	130	130	125	130	130	170
S. America Sth. Half	160	150	155	155	160	180
S. America E. Coast	170	165	160	165	170	185
Pacific Is. General ..	040	070	060	080	070	070
Japan	355	350	345	345	352	015
Burma	310	310	300	300	308	340
India, North	300	300	295	290	310	325
India, South	290	290	285	280	300	312
Europe	295	320	310	300	320	315
U.K.	310	330	330	325	330	320
Africa, North	270	270	260	260	280	290
Africa, South	230	230	220	220	235	250

Bearings given as from Melbourne are sufficiently accurate for normal use in Tasmania.

Lastly we come to the very important point of determining the TRUE North, the point from which all the above bearings are measured in a clockwise direction. Without this knowledge the bearings, as given, are without value. The simplest and most efficient method is by the use of the Sun, at Noon, and by Noon, I do not of necessity mean 12 o'clock by the watch! As you know, Eastern Australian Standard Time is for the Meridan of 150° East, and thus our watches will not correspond to "Sun Time," even if we are situated on the 150th Meridan, simply because our watches cannot follow the aberrations of the sun in its 365 day cycle.

*10 Ontario Street, Caulfield, S.7

A few simple corrections, therefore, are required, to calculate the exact moment of NOON, by the Sun, so that the shadow, as it falls from any perpendicular erection, such as the corner of a house, the mast for your aerial, a telegraph pole, or the like, will give you the True North and South line, with unfailing accuracy—remembering, of course, that the shadow always falls SOUTH of the object, provided you are situated South of Latitude 23½° South of the Equator.

The first step in finding out the true alignment of North, then, by shadow cast by the sun, is to find the time by your watch, which is presumably set to the Standard Time of your State. Next, from an Atlas find the longitude of the position in which your station is situated—this should be easy enough, as it would be a very strange thing if you did not know your permament location.

Having obtained the Longitude, to the nearest 15 minutes of arc, get the difference between this and the standard Longitude for your State time, and multiply this difference by "4"—this will give you the difference in time. SUBTRACT this correction from 12 o'clock by your watch, set to Standard Time, if you are EAST of your Standard Meridan. ADD if you are West of your Standard Meridan.

Here is an example:—

Standard Meridan for Victorian time is	150°	E.
Your Station is in Essendon, Longitude	144° 55'	E.
Difference	5° 5'	

5° 5' × 4 = 20 mins. approx.

As you are WEST of 150° this correction will be added, so that as far as you have now gone, it will be Sun Noon at 1220 by your watch. There is, however, another correction which is supplied from the table below, and the final application of this correction will give you the exact time by your watch when the sun's shadow will align exactly on North and South. Here is the table:—

January	+ 6 mins.	July	+10 mins.
February	+ 3 „	August	+14 „
March	— 6 „	September ..	+ 7 „
April	—15 „	October	— 1 „
May	—14 „	November ..	— 3 „
June	— 2 „	December ..	+ 1 „

Thus to complete the problem:—

Watch Time	1200	Hours
Long. Correction	+20	(Because you are West of 150°)
	1220	
Month October	—1	
Final Time	1219	When shadow is True North and South.

In case you are not sure what the Standard Meridans of the various States are, they are given here:—

Queensland, N.S.W., Victoria, Tasmania	150° E.
South Australia	142½° E.
Western Australia	120° E.

Of course the alignment of your house, fence, streets, etc., will in most cases give you a true North and South line, but, if you are in doubt the above explanation will remove all doubt, I hope!

Here, then, are the rules again, in concise form:—

To Find Direction of True North by the Sun

(a) Set your watch to the correct Standard Time of your State.
(b) Find from an atlas the Longitude of your location.
(c) Get the difference between your own Longitude and the Longitude that is the Standard Time Longitude for your State, as given above.
(d) Multiply this difference by 4.
(e) ADD this amount to NOON by your watch if you are WEST of your State's Standard Meridan, but SUBTRACT it if you are EAST of your State's Standard Meridan.

(Continued on Page 21).

INTERNATIONAL PREFIXES

Many requests have been received for publication of the International Prefix List. We shall endeavour, from month to month to correct any alterations which may take place.

This list is merely a guide and does not claim to be correct. It is based on pre-war allocations and information gleamed from various recent international publications, DX contacts, etc. It is impossible to be accurate because of:—

1—The number of undercover stations using self allotted prefixes and calls, e.g.: YR5X, XQ4BB, PR4AA, YR5USA, RL and RV are one and the same station —from R.S.G.B., July 1946.

2—Recent alterations where countries have changed their sovereignty, and no recent information is to hand.

3—Divergence of opinion by hams in some localities where no governing body has issued licences as to the correct prefix to use.

4—Re-allocation of prefixes frequently, e.g. VS 3-4-5 JH.

AC4—Tibet
AR—Syria
C—China
CE—Chile
CM-CO—Cuba
CN1—Tangier Zone
CN8—Morocco (French)
CP—Bolivia
CR4—Cape Verde Islands
CR5—Port. Guinea
CR6—Angola
CR7—Mozambique
CR8—Port. India Goa
CR9—Port. Macau
CR10—Timor Island
CT—Portugal
CT2—Azores
CT3—Madaeira Islands
CX—Uruguay
D2—Germany, Brit. Zone
D4—Germany, USA Zone
EA—Spain
EA6—Belearic Islands
EA8—Canary Islands
EA9—Morocco (Spanish)
EI—Ireland
EK1—Tangier Zone
EL—Liberia
EP-EQ—Iran (Persia)
ES—Estonia
ET—Ethiopia
F—France
FA—Algeria
FB8—Madagascar
FD8—Togoland (French)
FE8—Cameroons (French)
FF8—Fr. West Africa
FG8—Guadeloupe
FI8—Fr. Indo China
FK8—New Caledonia
FL8—Fr. Somaliland
FM8—Martinique
FN—French India
FO8—Tahiti (Fr. Ocean.)
FP8—Miquelon and St. Pierre Islands
FQ8—Fr. Equator. Africa
FR8—Reunion Island
FT4—Tunisia
FU8-YJ—New Hebrides
FY8—French Guinea
G—England
GC—Channel Isles
GI—North Ireland
GM—Scotland
GW—Wales
HA—Hungary
HB—Switzerland
HC—Ecuador
HH—Haiti
HI—Dominican Republic
HK—Colombian Republic
HP—Panama
HR—Honduras
HS—Siam
HZ—Hediaz
I—Italy
I6—Eritria
J—Japan
J4—Brit. Forces in Japan
J8—Chosen (Korea)
J9—Marshall Islands
J9—Formosa (Taiwan)
KA—Phillipines
KB6—Baker, Howland Is.
AM Phoenix Group
KG6—Guam
KH6—Hawiian Islands
KJ6—Johnstone Is.
KL7—Alaska
KM6—Midway
KP4—Porto Rico

KP6—Jarvis Is., Palmyra Group
KS6—Samoa (U.S.A.)
KV4—Virgin Islands
KW6—Wake
KZ5-NY—Canal Zone
LA-LH—Norway
LU—Argentine
LX—Luxembourg
LY—Lithuania
LZ—Bulgaria
MX—Manchukuo
NY—Canal Zone (U.S.A.)
OA—Peru
OB—Was in Sarawak area
OD—Lebanon
OH—Finland
OK—Czechoslovakia
ON—Belgium
OQ5—Belgian Congo
OX—Greenland
OY—Fareroes Is.
OY—Jan Mayen Is.
OZ—Denmark
PA—Netherlands
PJ—Curacao
PK1-2-3—Java
PK4—Sumatra
PK5—Borneo (N.E.I.)
PK6—Celebes & Molucca Islands
PK6—Dutch New Guinea
PX—Andorra
PY—Brazil
PZ—Surinan
SM—Sweden
SP—Poland
ST—Sudan
SU—Egypt
SV—Crete
SV—Greece
TA—Turkey
TF—Iceland
TG—Guatemala
TI—Costa Rica
U-UA-UK—U.S.S.R.
VE—Canada
VK—Australia
VK4—Also Papua
VK7—Tasmania
VK9—New Guinea
NO—Newfoundland
VP1—British Honduras
VP1—Zanzibar
VP2—Leward Is.
VP2—Windward Is.
VP2—Antigua
VP3—British Guinea
VP4—Trinidad & Tobago Island
VP5—Cayman Is.
VP5—Jamaica
VP5—Turks and Caicos Is.
VP6—Barbados
VP7—Bahama
VP8—Falkland Is.
VP8—Sth. Georgie Is.
VP8—Sth. Orkney Is.
VP8—Sth. Shetland Is.
VP9—Bermuda
VQ2—Nth. Rhodesia
VQ3—Tanganyika
VQ4—Kenya
VQ5—Uganda
VQ6—Brit. Somaliland
VQ8—Mauritius
VQ9—Seychelles Is.
VR1—Gilbert, Ellice, and Ocean Islands
VR2—Fiji
VR3—Fanning Is.
VR4—Solomon Is.
VR5—Tonga (Friendly Is.)
VR6—Pitcairn Is.
VS1—Sts. Settlements
VS2—Fed. Malay States
VS3—Non-Fed. Malay St.
VS4—Brit. Nth. Borneo, and Sarawak
VS5—Labuan and Brunei
VS6—Hong Kong
VS7—Ceylon
VS8—Bahrein, Khuria, & Muria Islands
VS9A and another letter—Aden
VS9K and another letter—Kamara
VS9P and another letter—Perim Island
VS9S and another letter—Socotra
VU—India
VU7—Bahrien Is.
W—U.S.A.
XE—Mexico
XU—China
XU4—Mongolia
XZ2—Burma
YA—Afghanistan
YI—Iraq
YJ—As FU8
YL—Latvia
YM—Danzig
YN—Nicaragua
YR—Roumania
YS—Salvador
YI-YU—Yugoslavia
YV—Venezeula
ZA—Albania
ZB1—Malta
ZB2—Gibraltar
ZC1—Tranjordania
ZC2—Cocos Island
ZC3—Christmas Island
ZC4—Cyprus
ZC6—Palestine
ZD1—Sierra Leone
ZD2—Nigeria
ZD3—Gambia
ZD4—Gold Coast, British Togoland
ZD6—Nyasaland
ZD7—St. Helena
ZD8—Ascension Island
ZD9—Tristan Da Cunah
ZE—Sth. Rhodesia
ZK1—Cook Island
ZK2—Niue
ZL—New Zealand
ZM—Br. Samoa (West.)
ZP—Paraguay
ZS—South Africa
ZS3—South West Africa

DIRECT DISC RECORDING

PART IV: THE CUTTING HEAD.

(Based on a Lecture presented to the Sound Recording Institute of Australia by Mr. L. T. Garrioch.)

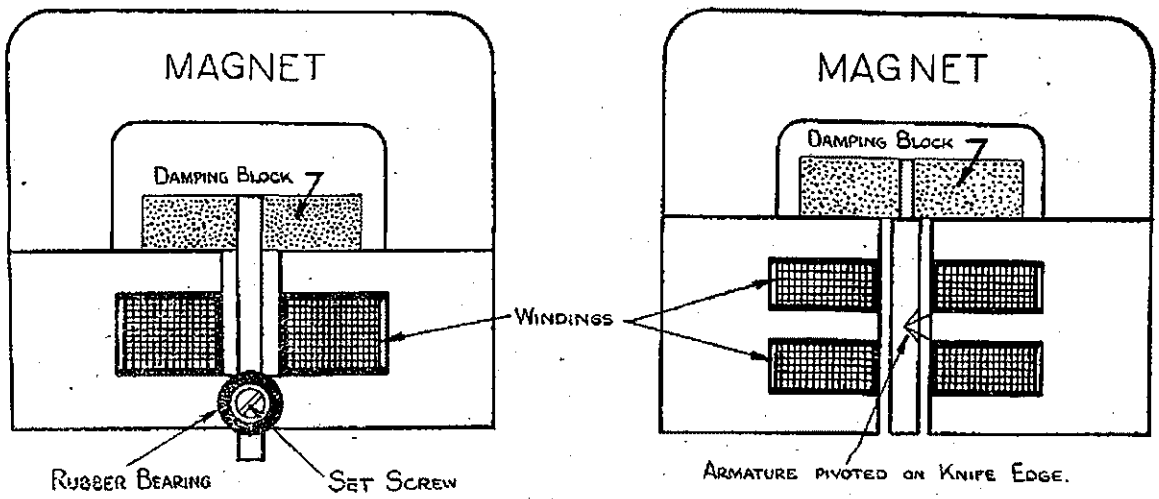
The preceding instalments of this article were published in the March 1946, May 1946, and July 1946 issues of this Magazine. Interested readers should refer to these three issues.

In the earlier articles of this series, little or no reference has been made to the term "Direct" disc recording, and this has been due largely to the fact that the subject matter has been applicable to all forms of disc recording. Now that the question of cutting heads has been reached, however, it becomes necessary to provide some insight as to the meaning of the term in order to describe adequately their action.

"Direct" or "Instantaneous" recordings are cut on discs which have been coated with Cellulose Nitrate, Gelatine, Casein, or some similar material which is sufficiently stable to withstand being played back by means of a normal reproducer. The action of cutting a disc therefore constitutes the whole recording process, and reproduction can be effected immediately this has been done. Commercial recordings, on the other hand, are cut into wax-coated discs which are subsequently electro-plated to form stamping dies from which a large number of plastic copies can be made. The wax recording is not sufficiently robust to enable the usual type of reproducer to play it back without damaging its surface.

The difference in the physical properties of these two types of recording media is a factor which also influences the design of a cutting head to suit each type of recording. It will be readily appreciated that a wax surface will offer negligible resistance to the cutting stylus, while those materials used for direct recordings will definitely resist it. The resistance offered by direct recording materials has two components—viz.: a tangential component due to the "drag" of the stylus through the material, which is largely influenced by the depth of the groove being cut, and a radial component which resists the side-to-side motion of the stylus when a signal is impressed on the disc. The first component is practically constant and is effectively borne by the cutting head carriage mechanism, so that it has no effect upon the finished recording. The second component however, does influence greatly the character of the recording by imposing a heavy damping load on the stylus excursions. It has the unfortunate property of not being constant, and varies both with the frequency and amplitude of the sound being recorded.

The cutting head is a device which transforms the electrical energy fed into it from an amplifier into mechanical energy, and in so doing it possesses certain properties like those of a band-pass filter. Such a filter requires a terminating impedance (which preferably should be purely resistive over the audio range being handled), and in the case of direct recording discs, this is partly provided by the damping effect of the disc material. (In the case of wax recorders, a tuned rubber tube is arranged to resist the movement of the armature, and this makes the resulting cutting head far less compact than those for direct recording purposes.) Since the damping provided by direct recording materials is only portion of the total required, additional damping requires to be included within the cutting head itself, usually in the form of small blocks of rubber or viscaloid which can be clamped with varying pressures against the armature, and so resist its motion.



Turning now to the more specific aspects of cutting heads for direct recording, we find that they fall into two distinct classes—viz.: magnetic and piezo-electric—and in each case they are closely analagous in general construction to their play-back counterparts, their principal differences being mainly in the matter of mechanical robustness and degree of internal damping.

Dealing first with magnetic cutting heads, it can be said that fairly satisfactory results can be obtained from the better grade magnetic pickups providing that certain adjustments are made. One of these is to tighten up the

rubber damping pads so that the armature is less free to move. This tends to flatten the frequency response curve of the unit by reducing the effect of armature resonance, etc. If the windings are of the high-impedance type suitable for feeding directly into the grid circuit of an amplifier, further improvement can be effected by replacing them with lower impedance coils. This also reduces the risk of accidental burn-outs during peak signal levels because of the heavier wire employed.

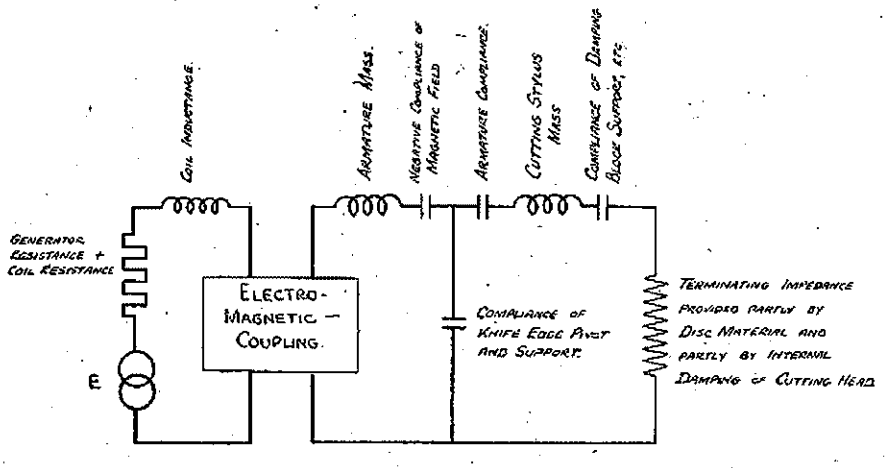
There is a limit however, to the improvement which can be secured from a converted device such as this, and sooner or later the progressive recordist will be forced to consider either the purchase or manufacture of a cutting head specifically designed for the purpose. The principal limitations occur at the higher frequency end of the audio spectrum (as is the case with all recording equipment), and one of the most prolific sources of such loss in cutting heads is the pivot about which the armature moves. In converted pickups, this pivot usually takes the form of a rubber lined journal bearing in the lower pole-pieces, and at higher frequencies the residual "give" is sufficient to reduce considerably the motion delivered to the stylus point. The cure for this condition is obviously to seek some positive pivoting method, and the most frequent choice in this regard is that of a hardened steel knife edge pressing firmly into an appropriate groove in the armature.

Another source of loss can be attributed to the unbalanced arrangement of forces acting on an armature which is pivoted at one end. Dynamical considerations show that the moment of inertia can be greatly reduced by arranging for the pivot to lie at the mid-point of the armature, and for the magnetic coils to operate with a push-pull effect upon each end of the armature. A typical arrangement embodying these refinements is shown in Figure 1, where a comparison with a conventional pickup is indicated.

when all these factors are considered, and it can be seen that impedance matching can exert a profound effect upon the resulting frequency response curve. For a cutting head of some given nominal impedance, it will be found that satisfactory performance can be secured with amplifier output impedances which are above and below this figure, but that the frequency response may be different for each. Generally speaking, if the amplifier output has a lower impedance than that of the cutting head, there will be a tendency to accentuate the lower frequencies at the expense of the high frequencies; the reverse effect can be observed when the amplifier output has the higher impedance. This fact may prove useful when making final adjustments to a recording system for optimum frequency response, but must be applied intelligently as serious mis-matching can cause serious loss in the efficiency of power transfer, or, worse still, can introduce distortion.

Magnetic cutting heads are inherently constant-velocity devices, and as will be remembered from the introductory article of this series, this means that the amplitude of the cutting stylus excursions will decrease by half with every octave by which the frequency is raised when the sound energy level is kept constant. The need to modify the lower frequency end of the spectrum so that a constant-amplitude characteristic is followed, has already been discussed, and with magnetic cutting heads this is usually done with equalizers either within, or following the recording amplifier. Since there is a normal tendency for the cutting head response to fall slightly at the lower frequencies, the equalizers should be designed to give only the degree of attenuation which will yield a uniform fall of 6 DB per octave as originally described.

The second class of cutting head, namely those employing a piezo-electric crystal element, were widely used overseas before the War, and will no doubt again appear on the market in due course. They differ from magnetic



Matching the cutting head to the amplifier is the next item for review, and while it is usual to refer to cutting head impedances as "so many ohms," it must be remembered that this rating is purely nominal in character, and that the true impedance varies widely with frequency, and probably to a far greater degree than in the case of a dynamic loudspeaker. The various mechanical parts of a cutting head, their relative masses and compliances, and the interaction of magnetic fields involved, sets up a complex situation with regard to the resulting input impedance, which is therefore not merely governed by the inductance and resistance of the exciting coils, as might at first be thought. In Figure 2 is shown a possible equivalent circuit of a balanced-armature cutting head

heads in one very interesting respect, and that is that they are inherently constant-amplitude devices. This means that for making records for reproduction by conventional reproducing devices, they require appropriate equalizing to modify their performance and yield a constant-velocity characteristic. Without such modification, the recordings would be sadly lacking in bass response unless the play-back system were suitably equalized. (Note: There are certain advantages attending constant amplitude recording, however, and it is hoped that these may be reviewed later in this series.)

The construction of crystal cutting heads is generally similar to that of torsion-type crystal pickups, but of a more robust nature. The crystal element is usually of

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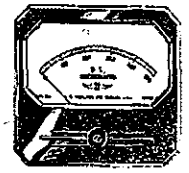

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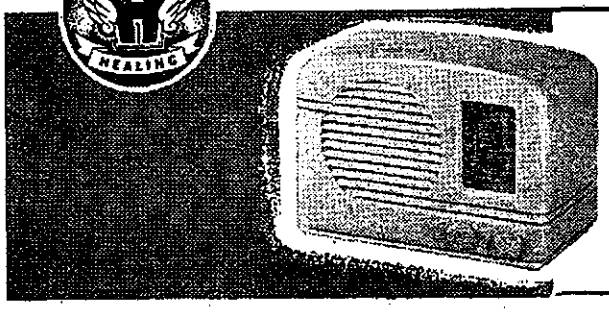

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4-ply construction and its inherent stiffness provides the necessary damping during recording. The arrangement from an electrical point of view is essentially that of a condenser, and as a result its impedance is capacitative and decreases as the frequency increases. The frequency at which the amplifier output matches the cutter impedance determines the "cross-over frequency," above which the response will be constant-velocity, and below which it will be constant-amplitude. If this frequency is chosen towards the upper end of the frequency spectrum (say 6000 C/s. or above), we have the unit operating as a constant-amplitude cutter. If the frequency is chosen close to 250 C/s., we get the conventional recording characteristic.

The determination of the output transfer secondary impedance to give any desired cross-over frequency is very simply done by considering the crystal cutting head as a pure condenser. Taking its internal capacity as 0.005 mfd. (a fairly representative figure), its impedance at 100, 400, 1000, and 5000 C/s. will be respectively 318000, 79000, 318000, and 6370 ohms (as calculated from the well-known formula: $Xc = 1/2 \pi f C$). Then for a cross-over at say 400 C/s. we merely make the secondary impedance of the transformer 79600 ohms.

Such an impedance is high for the general run of output transformers, and may lead to difficulty in use. In view of the good sensitivity of crystal cutters, however, it is possible to gain the desired impedance match by using a series resistor to help build up this figure, while permitting the use of a lower secondary impedance in the transformer. The usual practice is to distribute the desired total impedance equally between the two.

Where constant-amplitude characteristics are desired, simple parallel-feed from the output tubes of the amplifier may be used, provided that the plate impedance of the tubes does not exceed about 4000 ohms (measured plate-to-plate, if it is a push-pull stage).

Crystal cutting heads suffer one possible disadvantage, namely, fragility. A magnetic head can certainly be burnt-out, but care and patience can do much to help in rewinding it. A crystal which is "busted" through overloading, stays "busted," and one merely has the option of either nonchalently tossing it out, or nailing it to the wall as a warning to future generations. However the precautions against such disasters can be readily applied, and protective circuits are simple to instal.

The first Golden Rule is to keep DC potentials off the cutter terminals, and likewise between either terminal and the (usual) metal case. Nor should the unit be subjected to temperatures above 125°F. (Hay and Booligal Hams please note!) Operating voltages should not exceed 250 volts RMS, with 500 volts as the limit for instantaneous peaks.

Constant-amplitude recording rarely gives any trouble in this respect, as average modulation can usually be secured with as little as 50 volts RMS applied to the terminals. However when cross-over frequencies between 250 and 800 C/s. are used, about 150 volts RMS are required, and the margin of safety is therefore much reduced. (A fairly linear operating voltage relation exists between these two extremes if other cross-over frequencies are chosen.) Protective circuits normally employ glow-lamps of the neon type arranged to bridge the cutter-circuit at some point where the voltage is likely to rise sufficiently to cause ionisation. It may be necessary to arrange several such lamps in series so that they do not break down before the maximum overload voltage is reached, in which case equalising resistors of about one megohm should be bridged across each of them (in much the same way as is done with electrolytic condensers in series), in order to equalise the voltage drops.

A final word should be directed to amplifiers before concluding this chapter. The varying impedance of all types of cutting heads has been somewhat stressed in this article, and this makes triodes output tubes the only

(Continued on Page 28).

FEDERAL AND VICT. QSL BUREAU

Interesting details of the activities of Danish Amateurs together with particulars of band restorations and power restrictions are to hand from the E.D.R. Postboks 79 Copenhagen, K. Writing under date of August 31, the president (OZ8T) states that the power limitation has been raised from 5 watts in the antenna to fifty watts input. Band restorations are similar to our own with the exception that the 3.5 Mc/s. band has not yet been restored. Telephony however is not permitted on the restored portion of the 7 Mc/s. band, and only within prescribed frequency limitations in the other bands. 28 Mc/s. activity is very great and week-end activity with telephony on this band is reminiscent of the pre-war days on the 3.5 Mc/s. band. Practically all OZ experimenters incline towards suppressor grid modulation. Portable and mobile operation is permitted only in the 58-59 Mc/s. band with exemption for hidden transmitter hunts—a popular radio sport in OZ.

Jeff Mason (VK5VC, ex-VK3VC), writing from Millicent, S.A., complains that the high QRM level on the DC mains there, renders all DX inaudible and has confined his activities to local and Interstate contacts on the 7 Mc/s. band.

AC4YN, Reg Fox, British Political Mission, Lhasa, Gyantse P.O., Tibet, via Calcutta, in a note covering the despatch of a bunch of VK cards states that his station is the only one in that country and is naturally much sought after by foreign Hams, each one wanting a QSL. Reg claims it would be financially impossible to QSL each one direct so therefore he must use the Bureaux as a means of distribution for QSLs. He adds "I don't know how many Hams there are in the world but they all want a QSO with AC4YN." Do you blame them?

In reply to a letter seeking clarification of the VS1 situation, R. Price of the Radio Signals Club c/o. A.L.F. Signals, Singapore, S.E.A.C. states that up to the time of writing (14/10/46) the only callsigns issued fall within the following limits: VS1AA to VS1AK and VS1BA to VS1BZ. The stations signing VS1FB and VS1QB are unknown to his club.

The vacation dates of the Federal QSL Manager, shown in November "A.R." were put back a fortnight by the incidence of the transport strike in Victoria and consequently extended to the end of November. These notes written on 7th November, are being penned from Walhalla, where the writer is pursuing the elusive yellow metal. From the surrounding heights he is "almost" in optical and audible range with VK3WE, the "old man of the mountains." All these preliminaries are a lead up to an apology for the brevity of this month's notes.

Cards handled at the Federal Bureau during October represented an all time high for inward cards—over 4,000 being put through, so much so that enlarged filing containers had to be constructed for VK3 country and VK3 metropolitan cards. The continued growth in traffic is accepted as a tribute to the efficiency of the VK Bureaux but further growth will necessitate one of the locals being co-opted as an assistant—VK3RJ.

FEDERAL HEADQUARTERS.

Federal Executive is keen to apply itself to the establishment and advancement of standards of amateur radio, both technically and administratively. We believe that if a goal is set for amateurs to reach in their methods of operation and experimentation, the fraternity will achieve merit and recognition which it would not have done otherwise. We mention this just briefly so that you may know what is contemplated, and if you have any ideas for the advancement and improvement of amateur radio, do not hesitate to communicate with us at any time.

BREAK-IN OPERATION

We received a number of queries recently regarding interpretation of regulations, and we are advised by the P.M.G. Department that break-in operation is permitted subject to the requirements concerning identification and time limitations. In the case of break-in phone transmissions, the carrier must not be maintained unmodulated. In other words, phone transmissions should be "push to talk."

We also received a ruling which permits a licenced amateur operating another amateur's station in the absence of the owner, on condition that the owner takes responsibility for the operation of his station by the visitor. The owner's station call sign is to be used, not the visitor's call sign.

50-54 Mc. ACTIVITY

We have a report that VK3HK has been heard in Queensland on the 50-54 Mc. band, also that two Sydney stations were heard recently on this band in Melbourne. It seems that this band can do with a lot of experimenting. How about some more amateurs trying it? (See Stop Press in 50-54 Mc. Notes—Editor.)

BADGES

Lapel badges have been ordered and we expect early delivery, so keep your fingers crossed!

EDITORIAL.

once to Federal Executive who takes the matter up with the Chief Inspector of Wireless. In a typical case recently, when that procedure was adopted, the matter was cleared up in 24 hours. If the case is a reasonable one, and not a case of deliberate law-breaking (which the W.I.A. will not handle), you can expect an immediate decision one way or the other.

Most of the troubles have concerned transmitter components, and the power for which stations are licenced. Here are the facts.

You can, and always have been, able to use individual components including tubes, condensers or transformers with ratings in excess of your licenced power, provided your transmitter is not deliberately designed to operate in excess of that power. For example, if you have obtained an 813, through Disposals, there is no reason why that tube cannot be used with a "B" class licence, provided the transmitter is not built to operate that tube at its full rating. Nor do you require special permission to use it. That has been the situation for 20 years and it differs not one iota today.

Many adverse criticisms have been received that the troubles are caused solely by the broad general wording of the Regulations. With this we disagree, and would cite the experience of the Australian Amateur in the "between wars" period. Then we experienced no trouble of the type under review, and on the contrary, through a kindly Administration with a liberal interpretation of the Regulations, found the situation a favourable and satisfactory one.

Our panacea is simple, and proved by results—exercise reasonable restraint and patience on the one hand, and use your Institute to handle your case on the other, should you be the recipient of a chit which you consider not in line with the intention behind a Regulation.

V.E.M.

RAMBLINGS ON THE DX BANDS

Now that we have received most of our old bands back, the 28-30 Mc. band is no longer the sole DX band, and in consequence it has been decided to eliminate the special section previously devoted to this band.

The future policy will consist of the doings on the various DX bands.

We received from VK2 two long lists of DX worked on the 28-30 Mc. band and the 14 Mc. band. While it has been the intention to publish these lists, this now becomes impossible due to their length. VK2ADT seems to spend all his time on the air as his list comprises of 240 DX contacts which does not include VK and ZL contacts or repeated QSOs. Harry Hawkins, VK2YL, is another who must spend considerable time on the air as his list totals 214 stations and all in one month!!!

Roy Jonasson, VK3ND, of Castlemaine, writes: "This is rather a belated letter but as time is very fully occupied, I don't have much time on the air. The average is about six hours per week and those hours spent at probably the worst time of the day for 14 Mc., which band I am concentrating on at the moment. As I still have my gear among the cups and plates my activities are seriously restricted. Shortage of building material has prevented completion of the shack and as I find the best hours for 14 Mc. here in Castlemaine are between 5 and 7.30 p.m. I have to give way to the inner man. Under present conditions the transmitter is a top the kitchen cabinet with a 15 feet link to the antenna tuner on the kitchen sink hi! I have spent quite a lot more time listening than operations and hear lots of DX, too long a list to itemise. Conditions as I find them here are patchy. Usually I hear a lot of Europeans around five to six o'clock and have worked quite a few especially Gs, which are easy to raise every Sunday afternoon. The past few weeks at different times I have heard a lot of Africans just after 12.30 a.m. coming through FB and managed to work a few. VEs are very regular and of course the Ws very regular. From the north, J, CR, and XU usually about after 9 p.m. but a bit hard to raise. South America seems the hardest for me to raise and just missed W.A.C. in four hours operating last week-end as over that period I had worked G6CJ, PA0UN, XU1AW, CR9AN, VE7ZM, VK6DJ, VK4DO, several Ws, ZS6BS, ZE1JI and hooked LU7AZ but lost him in the QRM in the second over after calling him three times.

"I do hear quite a few VK3s and VK7s on 14 Mc. but none seem to answer my calls hi! I also helped VK3AIR back on the air at Kyneton. Niel Ireson is an old timer with a new call and will be on 14 Mc. with a small 18 watt c.c. two stage job I lent him. Unfortunately the crystal I lent him doesn't allow him to operate on 7 Mc. under present restrictions. Our old friend 3RG apparently giving the game away here at Castlemaine. I used a lot of persuation but to no avail. Gil says he hasn't time to spare and is more interested in 200 meters stuff I think. Gordon Wyneton of course is away in Japan and I don't expect to see him for some months unless I can contact him through some of the J boys.

"The rig I am using is still the three stage job with 807 final, running about 35 watts. The antenna is two half waves in phase with ¼ wave feeders and does a good job. Erected in the form of a wide V with about 38 feet clearance at each end down to 18 feet in the centre, running N.N.E. and S.S.W. The receiver is a 7 tube super, EBF2G, ECH35, 6AC7, 6K7, 6F6, 6C5 B.F.O. and 5Z4. It does a good job on 7 and 14 Mc. and as yet to be tried out on other bands. I expect to be on fone within a week or two now with series modulation, as I have the modulators partly built. Refrigeration keeps me pretty busy at this time of the year and doesn't mix too well with

radio. On 18/11/46 at from 10 p.m. to 1.40 a.m. the 14 Mc. band was really open. Contacts made were VQ3, VQ8, GW3, ZS5, ZE1, ZS6, PK6, VS1, XZ2, Ws. South America only place not heard. I will be forwarding a bunch of cards along in case the boys are getting anxious."

VK3YV, Harold Wohlers in Wangaratta says: "Re the letter published under "DX of the Month" from VK3YP. I would like to inform him that his notes on 28-30 Mc. are very much appreciated by 3JK and myself. The reason why I have never sent in any reports for these notes is I never seem to work a Ham that "Patto" hasn't already reported. The notes so far published by 3YP, 3CP and 5NR are excellent and certainly makes one envious. Once again I wish to express my appreciation to them and should I ever be lucky enough to land some "very juicy ones," I will certainly drop you a line.

South Australia reports that countries heard on 28 Mc. last month included VA, XZ, F8, G, VS1, VU, VE, YZ, ZL, J9 and KA. Countries heard on 14 Mc. included J2, KA, XE, G, ON, VS1, OZ, XU, VA, KZ5, F8, J9, CX, YV, FM8, VP9, PK6, HK, ZK, TG, TI, VR, LU, VP5, XZ, HC, EI, CR, YR, OK, HB, and SM.

50-54 M/cs.

Active in Melbourne on this band have been VK3s HK, YS, ABA, ZD, QO, AFQ (who has shifted his QTH to the neighborhood of Maribyrnong), NW, GG, KU, YJ, MJ, AJH, BW, and LS. 3YJ is having some trouble with BCL QRM on 50 Mc. and it must be admitted that BCL interference can be quite bad on some of these higher frequencies. The signals appear to be picked up on the grid or grids of the audio tube or tubes and after rectification, pass through. By passes on the grids often effect a cure or low resistance suppressors in series may be beneficial. One wonders whether it may be still worse at 166 Mc.! However we hope you get the trouble eliminated shortly Jeff so that you can take an active part in the game. 3AJH is a new comer to the Ham game and is to be commended for having his first QSO on 7 Mc. and his second on 50 Mc.!! Apparently 7 Mc. didn't look too good Jack, eh? Well you wont be troubled by QRM on 50 Mc. Jack is using crystal control and puts out a nice signal locally, but due to antenna problems, has not got out very far as yet. Bon, 3GG, now has his beam up plenty high, 43 feet we believe, and his signal is now one of the loudest on the band.

Quite a number of country chaps are threatening to break into the band: 3QC, 3NK, 3DI, 3TA, 3KX, 3IZ, and a number of others, and great interest is being shown by them.

On Saturday, 16th November, a small field day was held. Fred and Jim (3YS and 3ABA) both took their portable to Macedon and 3NW took his outfit to Mt. Donna Buang. Stations contacted from both these locations included MJ, GG, LS, QO, KU, HK, BW and CO (operating on 7 Mc. and listening on 50 Mc.). Signals at all points were R9 to R9+ and the contact between the two portables (60 miles) resulted in R9+ signals both ends also. Unfortunately 3IV, from Ballarat, was unabe to go to Mt. Buninyong, so that we were not able to make what would have been a 100 mile contact. However 3NW had his eyes on some of the higher mountains further out such as Mt. Buller, which should yield results.

As yet no sign of the band opening for longer distances. W1AW is transmitting at 7, 8, 9 and 10 a.m. E.S.T. for 10 minutes and listening thereafter for 10 minutes periods each day and we would urge those that are in a position to listen to do so.

VK4 have responded to our appeal for notes from Interstate and the Editor hopes they will be forthcoming each month in future. The following VK4 Hams are on, almost nightly, and during the daytime at week-ends: VK4s AW, RY, XG, FB, ZU and HR. All rigs are crystal and the receivers mostly supers. They have found vertical antennas the best for cross-town contacts—as yet no DX has been heard! On a recent Saturday afternoon the 50 Mc. gang had a little excursion around the town in 4XG's car, calling in and inspecting the "works" at each shack. They were surprised to find liquid cooled bottles in the rigs at a couple of the shacks. Had never heard of tubes bearing the name of XXXX myself!

STOP PRESS — FLASH !!!

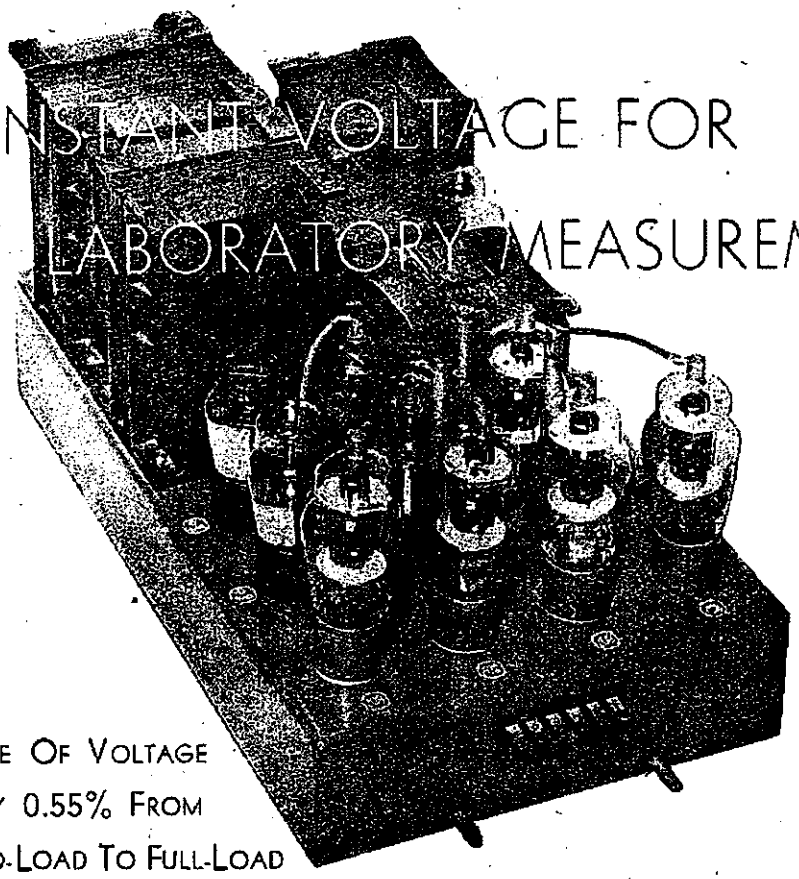
The 50 Mc. band has at last opened up and VK3s have made a number of contacts with VK2s and VK4s with excellent signal strength both ends.

The first signs of the opening appeared on Saturday, 30th November, when 3HK, operating portable at Croydon, heard VK4ZU testing at about 6.45 p.m. Signals were Q5 R5 and lasted about three minutes. 4ZU was also heard by 3PK (a regular listener), of East Kew, at the same time. On Sunday, 1st December, 3HK heard a VK2 for 20 seconds at 8.12 p.m. R5/6 and 4ZU again at 8.20 p.m. for 30 seconds at R6. VK3MJ heard a VK2 at 8.25 p.m. Advice was received that VK2WJ had heard 3HK at R8 and that 2OC, of Wyong, had heard him at 20 DB over R9 at about 7.15 p.m. on Sunday. With these results the 50 Mc. band enthusiasts were properly on the go and excitement ran high to see when a contact could be made and who would be first to make it.

This honor fell to VK3MJ who was on the job at 6.30 p.m. on Thursday, 5th December. He heard the automatic CQ of VK2NO and as soon as Don stopped to have a listen Dave called him and the first Interstate 50 Mc. QSO in history was accomplished. 2NO's signals were Q5 R5/9 and 3MJ Q5 R8/9. Shortly after this 100% contact, 3MJ hooked VK4HR for the first VK3-VK4

(Continued on page 28)

CONSTANT VOLTAGE FOR LABORATORY MEASUREMENTS



CHANGE OF VOLTAGE ONLY 0.55% FROM NO-LOAD TO FULL-LOAD

MANY testing processes require constant voltage to be applied to valves or other equipment during the time that the test is in progress. It is useless to have instruments correct within 1% or less if the voltage is going to vary while the current or other feature is being read.

This is particularly important in the testing of radio valves in which some of the characteristics are critically dependent upon the applied voltages. An example of this is the Characteristic Tester recently constructed in the Laboratory of Amalgamated Wireless Valve Co. Pty. Ltd. at Ashfield. This equipment is used for the checking of a percentage of all valves manufactured each day, to see that the accuracy of the factory testing is maintained, and to carry out other tests not normally applied to the whole production owing to their complexity.

The equipment uses an electronic voltage regulator on the plate, screen and grid supply voltages. The input is from the 240 volt A.C. mains, the output is variable in voltage from 0 to 300 volts with a maximum current of 200 mA. With the maximum output voltage, the percentage voltage drop is only 0.55% for a change of load from 0 to 200 mA.

The equipment uses Radiotron type 807 valves, four of which carry the current of 200 mA. between them. The 807 is probably the most satisfactory type of valve for this purpose owing to its high current capability (72 mA. per valve maximum) and its high amplification factor. This is only one of many applications in which Radiotron type 807 may be used with every satisfaction.

Radiotron

MADE IN AUSTRALIA

IN REVIEW.

EDDYSTONE COMMUNICATION TYPE 504

From the Birmingham works of Messrs. Stratton and Co. Ltd., Manufacturers of the well-known range of "Eddystone" radio equipment and components, comes the latest addition to the communication receiver line, the "Eddystone" 504 Communication Receiver.

The basic circuit of this receiver is a 9 tube superheterodyne using two R.F. stages, frequency converter, two I.F. stages, with crystal filter, combined A.V.C., second detector, and audio amplifier, noise limiter, beat frequency oscillator, output tube and rectifier.

The tuning range of the receiver is from 10 meters to 500 meters (30,000 Kc/s. to 600 Kc/s.), in five overlapping switched bands.

The tuning control is fitted with a special vernier indicator, and the gearing reduction ratio is 140-1, giving an effective scale length of 36 inches.

Sensitivity.—It is claimed that sensitivity is better than 2 micro-volts input on the highest frequency range for an output of 50 milli-watts.

Selectivity.—Crystal out—30 DB down at 5 Kc/s. off resonance; crystal filter in—30 DB down at 500 cycles off resonance, and 50 DB down at 2 Kc/s. off resonance.

Image Ratio.—

At 20 Mc/s. the image ratio is 35 DB down.
At 10 Mc/s. the image ratio is 50 DB down.
At 5 Mc/s. the image ratio is 60 DB down.
At 2 Mc/s. the image ratio is 75 DB down.

Output.—The output of the receiver is greater than 3 watts. Provision is made for either the connection of a speaker of 2.5 to 3 ohms impedance or high impedance headphones.

Input Impedance.—The aerial input circuit is arranged to match an average co-axial feeder.

S Meter.—The S Meter is calibrated in S units and above S9 in DBs. Each S unit corresponds to a change in carrier level of 6 DB.

Construction.—The receiver is fully tropic-proofed. The die-cast panel and chassis assembly ensures extreme rigidity of construction which enhances the stability of the receiver. The finish is battleship grey with an attractive blue panel. All fittings are chromium plated and the entire set presents a very attractive and unobtrusive appearance.

Dimensions.—Overall width 16¾ inches. Depth, 10¼ inches. Height, 9 inches. Weight, 40 lbs.

Further information on this receiver, and on all other "Eddystone" parts can be had by contacting Mr. R. H. Cunningham, at Messrs. Keith Harris and Co. Pty. Ltd., 51 William Street, Melbourne.

BEAM ANTENNAE.

(f) Apply the correction from the table for the month.

(g) With your own watch set to the correct standard time for your State, the interval you have now just calculated will give you the time by your watch when the Sun's shadow is due South of any vertical object.

You can then make a baseplate for your beam, arrange for a pointer, and place the baseplate in the correct orientation that you have found from the sun's shadow, and the orientation of your beam is solved, once and for all.

Slight local aberrations will be found in many cases, but at least you will have the satisfaction of knowing that you are with 95% accuracy of the correct direction.

As remarked upon before, although these corrections and directions are worked out for Melbourne, they will be reasonably correct for any other part of the State, and not seriously out for other districts.

May you get added DX with better orientation!

FREQUENCY ALLOCATIONS AVAILABLE FOR USE BY AUSTRALIAN AMATEURS

3500 Kc.— 3800 Kc.	50 Mc.— 54 Mc.
7000 Kc.— 7200 Kc.	166 Mc.— 170 Mc.
14000 Kc.—14400 Kc.	1345 Mc.— 1425 Mc.
28000 Kc.—30000 Kc.	2500 Mc.— 2700 Mc.
	5250 Mc.— 5650 Mc.
	10000 Mc.—10500 Mc.

DIVISIONAL NOTES.

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX,
Box 1734 G.P.O. Sydney.
Meeting Place: Science House, Gloucester and Essex Streets.
Meeting Night: Fourth Friday of each month.

Friday, 25th October, was the date of the monthly general meeting of the Division, held at Science House. The attendance was a large one, extra seating being required to accommodate some late comers. Mr. John Moyle, 2JU, was in the chair. Visitors included two Hams who motored down from Newcastle especially to attend the meeting, and 2OJ from Albury. We were particularly pleased to welcome our Federal President, Mr. Vaughan Marshall, 3UK, who happened to be visiting Sydney on a business trip. On a motion passed at the previous meeting, the business of the evening was given over to a discussion of amateur "politics," including matters such as the Regulations and their effect on amateur radio as a whole. After considerable debate it was obvious that the general feeling of the meeting was that the regulations, as they existed, were badly in need of amendment. Many of the regulations were so badly drafted as to apparently contradict each other. Some of them were ambiguous and incapable of being reasonably enforced. On the whole, they imposed such a barrage of restriction on amateur activity as to seriously hamper useful work. The operation of the Advisory Committees was also discussed, the general feeling being that these should be somewhat more democratic in their nature.

The presence of the Federal President was most appropriate at a meeting of this nature, and after much debate, the Chairman invited him to address the meeting. In his typical, racy style, Vaughan was able to give first-hand information on the activities of F.H.Q. in most of the matters which had been raised, and to assure those present that positive effort was being made to have them remedied. He outlined the difficulties encountered by F.H.Q. in conducting negotiations, which by their nature, could not be concluded overnight. In concluding he stressed that the best way any amateur could help the Institute in its job was to become a member, and to see that others did the same. Inasmuch as the Institute's voice was powerful in direct proportion to its membership, "he who was not with us was against us." At the conclusion of the meeting, the Chairman assured Mr. Marshall of the Division's fullest support for the efforts of F.H.Q. in obtaining better conditions for the amateur, and in consolidating the Institute.

It has been decided that the distribution of Disposals equipment on hand, including co-axial cable and some of the valves ordered some months ago, will be undertaken at the next general meeting, to be held on 22nd November.

The December general meeting, to be held on 20th December, will probably be devoted to a showing of films dealing with radar equipment as used by the Services during the last war. These films have been made available by the R.A.A.F. which used them widely for instructional purposes.

At a recent Council meeting, Mr. Don Reed (VK2DR) was co-opted as Asst. Secretary, in order to relieve the

Secretary in his efforts to cope with the large amount of business which seems to increase as time goes on. Don is not without experience in Institute matters, and should be a great help to the Council.

Efforts are being made to arrange a Field Day to be held at Wyong in the latter part of January. The assistance of Owen Chapman has once again been solicited, and it seems likely that another enjoyable event will take place according to schedule. Details and final arrangements are on the way. We hope that this, our first post-war outing, will be well supported.

A new set of A.O.C.P. classes have commenced under the leadership of Mr. Jack Howes, the Class Manager. Anyone interested is invited to write to him at the P.O. Box 1734 G.P.O., Sydney.

Coalfields Zone

Conditions improving generally on 28 Mc/s. though 14 Mc/s. very patchy at the moment. 2XT—Still not active but talking of building new shack and beams, etc. 2YO—Operating 14 and 7 Mc/s., though no information regarding George's activities. 2KZ—One of the reliables exclusively on 28 Mc/s. with his share of contacts. Max always a good QSO. Has intentions of making a few improvements, has been toying with fone. Max makes a habit of getting around the local shacks now and then to keep a personal contact. 2DG—Keith operating 14 Mc/s. only, has DX up to 60 odd mark; been trying new antennas and uses fone at times. Keith put some time into the contest but work prevented full time operation. 2TY—Bob just back from a holiday to VK4 and consequently not much activity at home for month. 2LB, 2MK and 2PZ only heard occassionally and nothing to report. 2ADT—Still getting the usual DX on 28 and 14 Mc/s. with occasional bursts on 7 and 3.5 Mc/s. 28 Mc/s. is Jack's pet band and has DX up to 57 countries. In one calendar month from the time of writing previous notes Jack has had 355 contacts. 28 Mc/s. DX is 53 countries as follows : fone 43 and CW 10—besides four countries additional on 14 Mc/s., making up his total of 57 post-war, not bad for a single 807 and 30 watts. 2YL—No alterations, mainly on 14 and 28 Mc/s. with sufficient DX contacts to keep 2ADT busy. With Jack 2ADT, enjoyed our visit to the last W.I.A. meeting, and hope to make the trip again soon.

Newcastle and District

All Hams in this zone are active and every phase of the game is being covered by different numbers. Some research on 50 Mc/s. is being carried out by 2CI, 2OC, 2BZ and 2AHA. 2BZ and 2AHA have had no difficulty in contacting one another but so far have not made contact with any "DX." 2OC at Wyang has been listening to the Sydney boys on 50 Mc/s. and transmitting on 3.5 Mc/s. Understand he has heard quite a few of the gang including 2NO, 2LZ and 2WJ. There has been great activity on 28 Mc/s. and those who have gone to the trouble of erecting rotary beams have been well rewarded with some nice DX. Sunday, 20th October, between 1900 and 2300 hours is considered the best period ever experienced for European contacts and well over 100 contacts were made by members of this zone. Old timers from 3.5 Mc/s. will remember 2KQ, Jack, who used to operate old 2CR from Tamworth. He is now active on 3.5 and 7 Mc/s. from Toranto. 2ZC, who probably has the best outfit in VK is active on all bands. He has some nice recordings of some phone contacts giving him a prominent record of another WAC on phone. 2AGD has been active on 28 Mc/s. George has push-pull T20s with three element rotary. He has well over 40 G contacts. Old timer, 2FP, very active on 28 Mc/s. with single 807 and rotary. Ernie has made WAC. Frank Torrant has been active on 28 Mc/s. with his old call 2UF. Has had some receiver trouble but is OK again.

Lionel Swain is now "ashore" after much service with the Senior Service. Reliably reported to be drilling many

holes so maybe 2CS will be heard soon. Lou MacDonald, 2WU been active on 28 and 14 Mc/s. and as keen as ever. 2KB active with a new outfit and was heard working a ZS at 2 p.m. on 14 Mc/s. fone. 2AMM active on 7 Mc/s. 2AEZ now at Gasford after many years with R.A.A.F. Ernie has been heard on 14 Mc/s. 2OE at Foster has been heard working 28 Mc/s. DX. 2PA has been active on 3.5 Mc/s. fone from Port Macquarie. 2XQ active on 28, 14, 7, and 3.5 Mc/s. at week-ends. Anxious to contact zone members in order to obtain first-hand news for this publication.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne. WM 1579.
Meeting Night: First Tuesday of each month.

BUSH FIRES EMERGENCY COMMUNICATIONS IN VICTORIA

In response to a request by the Lilydale branch of the Bush Fire Brigade Association, members of the Technical Advisory Committee have been devoting much of their time in assisting to establish an emergency communication network in the Lilydale district. It is desired that communication be established from any point in this area (about 200 square miles) to central control station, located at the police station, and that the equipment be so designed that a technically qualified man would not be needed to operate the sets. The T.A.C. considered that the most suitable set that was readily available, the FS6, could be altered without much difficulty to meet the requirements of the Bush Fire Brigade and the R.I., and recommended that three sets be purchased.

The FS6 has a really good battery receiver and a two stage transmitter (M.O.P.A. with 807 in final) with provision for grid modulation. Preliminary tests with these sets in the City area were not entirely satisfactory, so that it was with some misgivings that we set out for Lilydale on the morning of October 27 with two FS6s, VK3WI portable and a Teleradio set, secured by Jack Groves, from the Research Lab., complete with call sign VL3AA and frequency 4310 Kc. for this occasion. Securing this frequency was very fortunate because it fell within the normal range of the FS6 which would have required altering to enable them to work on either 7 or 3.5 Mc.

The party comprising Jack Groves, 3GU, 3BD, 3PW, 3JI and 3JO arrived at Lilydale about 1000 hours and proceeded to instal FS6s in various trucks. The Teleradio and one FS6 were installed in the Police Station and 3JO took 3WI portable along with him just in case the FS6 didn't get through. Four trucks with FS6s installed were to proceed along different routes, stopping first about one mile out to "net" with the C.C. Teleradio, and then at any point along their particular route where it was suspected that contact with cenral control might have been difficult and at every half hour, wherever they might be, to contact control.

This programme worked very well and a perusal of the logs returned shows that in practically every case contact with good signal strength was obtained by all the portables with control from distances as far as ten miles away, though the FS6 at control was not heard at all well. This was later found to be due to a defective aerial lead and when corrected, signals from the FS6 were received at good strength by the portables. Only one case of two portables contacting each other was reported, but, generally, it was not possible to hear other portable sets. This, however, is not a disadvantage as it is intended that all messages from portables are to be handled by central control.

The antenna systems used, in the case of the portables, were about 10 or 12 feet vertical and so arranged that they could be readily erected. At control a longer horizontal aerial was erected. At times during the afternoon

reception at control was impossible because of interference from nearby electrical equipment.

The tests proved that the FS6s, even as they stand, could do the job, but that desirable alterations would be to change to crystal control (to satisfy the R.I. and prevent any trouble in making contact with control because of off frequency operation), to abolish the grid modulation and instal cathode modulation (the modulation percentage with grid modulation is very low and the higher percentage to be obtained with cathode modulation could make the difference between getting messages through or not making contact at all), to simplify the controls of the set so that any one, whether technically qualified or not, can put the set into operation and get results. It is also desirable that the set be as water tight as possible so that a burst hose or mis-directed jet of water could not put it out of action. Another difficulty is that of noise, both A.F. and R.F., when the set is operated in close proximity to a water wagon with pumps running.

At the moment of writing a definite frequency allocation, 4660 Kc., has been received, and plans for the alterations having been completed, the actual work will be commenced as soon as crystals and modulation transformers are available.

Now Lilydale district is only one of many in Victoria and it is easy to visualise that very shortly such radio communications networks will be established in all other districts. **This is a huge undertaking and it is little wonder that the Country Fire Authority is looking to the Hams for assistance in such things as servicing the sets, where possible operating central control during emergencies and tests and, in short, establishing an auxiliary which they could approach for assistance in overcoming radio communication difficulties. An emergency network amongst the Hams throughout Victoria has been suggested and the sooner this gets under way, the better. Any member (metropolitan or country) willing to help in any of these ways is requested to write without delay to the Secretary of the T.A.C. stating the particular branch of activity in which he is best able to assist.**

QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.

Meeting Place: State Service Building, Elizabeth St., City.

Meeting Night: First Friday of each month.

Attendance at the October general meeting was smaller than usual, for some unaccountable reason. Keith Schleicher (4KS) spoke at length about efforts to secure Disposals gear for Hams. 4KS, 4RC and 4JU have spent a great deal of time in an endeavour to get on to gear, but it seems that the Amateur is not in the race against business interests. However, we got on to a limited number of tubes and any country men desirous of purchasing same can contact 4SN, c/o. Box 638J, G.P.O. Brisbane. The tubes available are IM5, 1K7, and 1C7.

We featured another showing of films last month, one dealing with teleprinter operation being particularly interesting. A number of the local gang have been hard at it during the contest, 4RC being rather consistent. 4HR, with 86 countries, is not leaving much by the way side and 4AP on 28 Mc/s. seems to be working them in the old AP style. The QRM from power lines has proved a stumbling block for a lot of the City Hams, who cannot hear those juicy ones because of the racket.

We are advised by the P.M.G's. Department that a new callsign list is in preparation and should in fact be available about the time this appears in print. Hams who have changed QTHs during the war might do well to remind the Department of the fact. Also, we advise once again that non-members who wish to claim cards from the QSL Bureau can have them by forwarding a stamped addressed envelope.

For all his old friends, Sandy MacPherson (VK4MC) advises that he will be back again on the air shortly. Mac is a keen bowler and has won several championships. Would like to pit his skill against other VKs with kindred spirits. We will have to match you with 4RQ OM!

On Sunday, 17th November, VK4XG conducted some tests on 50 Mc/s. from the Maleny Ranges. A portable generator delivered 25 watts input to a rig using an 832 in the final. The location was about 60 miles from the city, and the Brisbane boys did some listening. 4ZU was also listening on a portable receiver at Cape Moreton, about 35 miles from Brisbane. At time of going to press the results were not to hand.

Country news this month comes via 4SN who reports as follows: 4HK, Harry and the boys in Cairns, are anxious for disposals gear. (Have already related the sad story OM) Harry very interested in W.I.A. doings and writes regularly to country representative 4SN. Would like other country men to follow suit. 4EA, Eric, keen to get new rig going. That's the spirit Eric, will watch out for your sigs! 4OK, Jack and George, put out FB QRP fone on 7 Mc/s. Uses a 1D4 to modulate a 6V6G. They expect to be using an 807 and new power supply soon. Good luck boys! 4RQ, Bob, helped the local BC station get on the air after a disastrous fire. How about a little activity at 4RQ Bob? 4LN is putting out FB fone on 7 Mc/s. What about that letter OM. 4CU, Charlie, putting FB fone sigs in here at Tamborine Mtn. Heard on most Sunday mornings. Let's have some dope on the doings OM. How's V.H.F. work? (Yes, how it is? —4ZU). 4SN, Frank, wants to hear from country men. All letters welcomed and will be sure of a reply, so what say boys? Contact him on 7150 Kc/s. fone or CW. 4HZ now has a FS6 but is having trouble feeding the antenna. Any suggestions welcomed by Jim. And for country men, 4HA puts over any dope on Sundays at 7 p.m. on 3.5 Mc/s. band.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.
Meeting Place: 17 Waymouth Street, Adelaide.
Meeting Night: Second Tuesday of each month.

The monthly general meeting of the W.I.A. took the form of a visit to the School of Mines Radio Section, where an inspection of apparatus associated with the training of Naval Radar Mechanics was undertaken. More than one hundred, visitors and members, comprised the party and one and all agreed that a very pleasant and instructive night had been spent. It was to be regretted that any practical demonstration of the principles of Radar could not be attempted owing to the severe electrical storm which was prevailing at the time.

The results of activity during the week-end DX contest showed that either the amateur is not ready for such a contest or that prevailing conditions and QRM proved insurmountable. Pre-war contests even with the extended frequencies then in use were considered as endurance contests and with our present restricted frequencies it has become almost impossible to work for any length of time. Many amateurs came on for short periods to give the DX stations a contact and even so, extreme difficulty was experienced in exchanging ciphers.

The Wireless Branch is to be congratulated on its list of Experimental Wireless Stations issued last month. This publication, which is available at the enquiry counter, is probably the best of these lists so far issued.

The U.H.F. amateurs have recommended to the Council that the proposed field day be postponed until the new year. Examinations, transport, and storage of "B" batteries being main reasons for recommendation.

A surprising number of failures in "Regulations" were reported from the last A.O.C.P. examinations. This is difficult to understand as "Regs" are printed in black and white, cannot be altered in text, nor is there anything tricky in any of the questions. It behoves intending amateurs to give serious consideration to the Regulations section, for without them chaos would soon reign on the amateur frequencies.

The U.H.F. gang in VK5 decided to hold a meeting and see what could be arranged to make the proposed field day a success. The meeting unofficially opened on a Saturday afternoon at the Windmill Hotel and concluded rather hastily when two constables asked Bob Manuels (VK5RT) whether he thought it was time to go home to tea. Bob offered to discuss folded "dipoles" with them but seeing that the policemen did not appear very interested he was reluctantly led away. The meeting officially opened on Tuesday, 22nd October, at 8 p.m., at the QTH of George Bruce (VK5GB). It was a terrible night, rain starting to fall about 6 p.m., and by meeting time it was coming down in torrents. Joe McAllister and the writer arrived a few minutes early and found George looking very dismal, and all agreed that we would be lucky if any more Hams arrived on such a night.

Apparently we underestimated the enthusiasm of the U.H.F. boys because by 8 p.m. the following Hams and enthusiasts were gathered in 5GB's shack: VK5s QR, RT, KZ, RQ, GF, CR, PS, Messrs. Bartlett, Gaslaf, Bergen and McAllister. George Bruce was appointed the Chairman and the meeting was soon under way. In the manner of all Ham meetings extreme difficulty was encountered in trying to keep the discussion on the field day. On the slightest provocation 5RT would turn toward any subject except the main one, and just as we were preparing to muzzle him, he started to discuss field days in general and all was well.

Ten o'clock came and with it Charlie Cheel (VK5CR) who looked as if he had been cycling up and down the River Torrens. The meeting was now forced to adjourn inside the house owing to Reg Galle (VK5QR) nearly being electrocuted making room for Charlie. When we were ushered into the house we were greeted with a nice supper provided by George's XYL, to which the boys did full justice. No trouble was found in keeping the conversation going and about 11 p.m. it was decided to close the meeting. Joe McAllister made a gem of a

speech thanking Mr. and Mrs. Bruce for their gesture although some of his words were a trifle blurred through having to compete with a sausage roll.

The meeting then broke up and reformed immediately in George's shack and as far as I know it may still be going on. Joking aside, it was worth going out in the rain to see the keenness and enthusiasm of the U.H.F. gang in VK5, and if Hams will venture out in such weather just to talk "shop," then a U.H.F. section of the W.I.A. (VK5 Division) appears to be called for to enable them to gather together at least once a month. The writer intends to submit this to Council and feels sure that they will give it their earnest consideration. He would like to refute the suggestion that he was so full of cake and coffee that he had to be assisted to the tram. After all he has to look after his figure!!!

Members of the Council recently were the guests of the I.R.E. at a screening of technical films dealing with radar. The gesture of the I.R.E. was appreciated, as was the supper provided at the conclusion of the screening.

It was with sincere regret that the resignation from the Council of George Luxon (VK5RX) was accepted. George who is with the P.M.G's. Department finds shift work interferes with the Council meetings but will still be able to carry on as the QSL officer.

Mr. Hal Austin (ex-VK5BN) has been appointed to fill the vacancy on the Council created by the resignation of Mr. George Luxon (VK5RX). Hal is too well-known in Ham Radio to need any introduction and will be a decided asset to the Council.

Enthusiasm ran high at the last general meeting when the Treasurer (Mr. C. H. Baseby, VK5BZ) was presented with his first W QSL card, post war. Mr. Thomas (VK5IT) in making the presentation was quite overcome, but his last words were lost in the terrific burst of cheering from the assembled members. Membership of the VK5 Division has now reached an all time of 263 members and no sign of a let up in applications. It was agreed at the last Council meeting that provision should be made for the reception of visitors at the General Meetings, yours truly was appointed official host to the visitors at all meetings. I am not sure whether it means wearing any distinguishing uniform or not, but please, no cracks about Host Holbrook!

Who was the Ham who rode his bicycle to the last general meeting and chained the cycle by its back wheel to a post, only to find on his return that someone had detached the bike from its back wheel and moved on. Disgusting.

Apparently every State in VK has its "dillpot" brigade who, by their actions when on phone, do more to discredit the amateur than any other two faults put together. We have a couple of "Beauts" in VK5 and whilst any Ham is entitled to act and do as he likes on the air providing he breaks no regulations, at the same time the Ham today is on a much higher plane than pre-war, and it would be a pity for an odd Ham or so to bring us into dis-credit just because he wants to play broadcasting stations. Whilst on the subject might I say that a DX station may be experiencing difficulty with his English, but at least he can be understood and certainly does not expect a reply in pidgin English. This sort of thing is unpardonable.

WESTERN AUSTRALIA

Hon. Secretary: H. B. Lang,
42 Ord Street, Claremont, W.A.
Meeting Place: Builders' Exchange, St. Georges Ter., Perth.
Meeting Night. Third Monday in each Month.

The November meeting unfortunately has had to be cancelled due to the absence of lighting and more particularly the transport problem. The strike (now in its

second week) may or may not continue for some time. The next event of importance is the Dinner to be held on Friday, 6th December. All members will be circularised as to the time and the place, and it is to be hoped that by the time the date arrives both lighting and transport troubles will be solved. An excellent evening's entertainment has been arranged and the Committee responsible for the arragnements have left no stone unturned to ensure the evening being an unqualified success.

It has all the trimmings to suggest a real Xmas Party and we expect to see a real bumper attendance. Between now and then we hope that sane reasoning will prevail in the negotiations for an early return to work of the Railways and a complete lifting of the blackout.

Western Activity

The old saying goes "once you do a thing it's easy." Evidently this is correct or VK6 would be led to believe so, as not content with being WAC fone on 14 Mc/s., VK6KW calls and works three South Americans within the hour on 28 Mc/s. fone on the morning of November 3. Oh yes, other stations were calling them too. I feel sure every active VK6 on 28 Mc/s. was calling but NDG. They just got tired of it and went back to the job of chasing extra points in the contest. Congrats Ron and we hope you get plenty more.

VK6RU—Jim had a hard time getting his three element rotary up for the contest. Nearly lost same but it's now a going concern. As yet untuned due to the strike and no power being available. Maybe you will get it done before Xmas Jim.

VK6HL—Very busy converting his rotary into a three-element array. Has hopes of getting it tuned during one of those brief periods when we get power for three hours.

VK6EV—Yet another convert to the close spaced rotary. John managed to get his up for the contest and finished the job just in time. There were plenty of Europeans calling you John so that beam must be beaming

VK6DD—Not heard much lately. I believe John has been down with a real bad attack of flu. Best wishes for speedy recovery John and hope to hear you soon. (When we get power, hi!)

VK6WH—Still as consistent as ever. Ted keeps the 7 and 3.5 Mc/s. bands well and truly open in this State. Maybe you will have more company soon, Ted.

VK6RF—Very consistent CW both on 28 and 14 Mc/s. and seems to get some nice DX contacts.

VK6DJ—Heard Bill calling CQ contest so guess he has a very respectable score. Bill is a snappy operator and if the DX was there you may rest assured he will be in the running.

Getting these notes together is somewhat of a problem this month. No power so no can listen. However our country brethren are active and will therefore keep VK6 on the map. With such members as 6HT, 6WZ and 6EL known to be active we are looking forward to hearing of their efforts in the DX contest.

VK6WS—Has almost completed his new dual 28 and 14 Mc/s. three element rotary and expects to really go after the DX as soon as it's up and going.

6CM, 6DN, 6KB, 6MB, 6FC all very consistent on CW though did not hear them calling in the contest—why fellers?

VK6HS—Has just completed his 8JK rotary and is now waiting on power to give it the works.

VK6FL—Also bemoaning the fact of no power, enjoyed first week-end of contest, but the second—the least said the better. He hopes to have three element 14 Mc/s. up soon.

VK6RG—Lost his "plumbers' delight" in recent blow. Will soon have array up again correctly tuned and fed with co-ax. Maybe those Gs will come back now Ross.

VK6MW—Still busy but not on the air. You have an excellent opportunity to finish the house now Bill, whilst these power restrictions are in force.

Conditions in VK6—well don't ask me. I wouldn't know. Anyway, when those Railway guys go back to work and the power comes on, the air around Perth will be just "burnin' up." I know—I'll be one of them.

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.

Meeting place, Photographic Society's Rooms,
162 Liverpool Street, Hobart.
Meeting Night: First Wednesday of each month.

Council meetings are now being held on the Friday night nearest to midway between general meetings and until we can procure a club room they will be rotated around the shacks of the Council members, this enables business to have much more time devoted to it and leaves the normal meeting night free for general meeting business, excepting any urgent matters that may arise. This has become necessary owing to the rapid growth of the Division and the amount of business being handled.

The first meeting under this arrangement was held at the secretary's home on 18/10/46 and looked like developing into a mothers' meeting from the chatter that followed the business. Business has priority? Decidedly, but after!!?? All joking aside though, this system has much to commend it for amongst other things it brings the Council together bi-weekly thus expediting urgent business handling and maintaining closer contact generally. Present were 7BJ, 7CJ, 7CT, 7CW, 7LJ and 7RF. Apology from 7PA. L. Jensen (7LJ) was in the chair and the time devoted to business far exceeded that possible under the old system.

November general meeting was held at the rooms on 6/11/46, present were L. Jensen (7LJ) in chair, J. Brown (7BJ), C. Walch (7CW), T. Connor (7CT), M. Loveless (7ML), R. O'May (7OM), R. F. Gee (7RF), T. Allen (7AL), D. Watson (7DW), R. Conrad (7TR), D. Hildyard (7DH), G. Richardson (7GR), A. Allen (7PA), Koglin, Clarke, Nielson, W. Watson (7YY), K. Kelly (7LL), Lipscombe, Durkin and R. Harrik. Apologies from A. Finch (7CJ), Moore, C. Oldham (7XA), S. Dahl, A. Morrisby (7VJ), F. W. Medhurst (7AH). Correspondence from F.H.Q.—Differentiation in licences, etc., and P.M.G's. Department re revision of regulations, etc. Outward to F.H.Q. was dealt with. On the motion of 7AL, seconded by 7DW, correspondence as read was received.

Two new Associate Members, Trebilcock and L. Durkin were elected unanimously.

General Business.—7LJ advised the meeting that he had arranged a schedule with 3ZC on Wednesdays and Fridays each week at 7.30 a.m. to handle any W.I.A. traffic, this met with general approval. Copies of proposed Federal Constitution were tabled for members and certain items were selected for immediate discussion. Some caused lively discussion and a number of alterations and revisions were suggested, after a fuller study there should be more interesting views at next meeting.

Our first Field Day since reorganising is scheduled for Sunday, 24th November and weather permitting, promises to be a bumper turn out, 7BJ is to man the transmitter and 10 a.m. is Zero Hour, with three hours of operation. First prize is a meter presented by 7CW, 2nd prize a donation by 7AH. As the run is open to non-members a special prize for first non-member to come in unaided is being donated by 7TR. A vote of thanks to these members was proposed by 7LJ, seconded by 7PA and carried.

The subject set down to follow the meeting deviated from the usual technical one, W. Watson (7YY) giving a talk on his experiences as wireless operator aboard small coastal vessels and elsewhere which was much appreciated.

There is a fair amount of activity amongst the local gang judging by the QSLs I saw distributed last meeting. S. Dahl was seen in Hobart recently but no news of his doings. 7JH has struck the field day, it being his week-end out from Waddamana, says he hopes to enjoy the thrill of the hunt. He is on the air with a small rig at last—T.N.T. with room for additions, he does not want to overload Wadda Station yet. He is contacting a few Ws, etc., and would welcome a call from any of the gang. Arthritis in the feet is keeping him pretty close to the chair at present (some circles suggest it's gout?). In the North an interesting lecture on U.H.F. Therapy was given by Mr. Chris. Cullinan, Engineer of 7EX recently to which W.I.A. members were invited. 7BQ and 7LZ both are active in Launceston on 14 and 7 Mc/s., 7BQ is using fone. The northern gang had a visit from the R.I., Mr. Carroll, recently, and found no complaints with their treatment. This bears out our own experience here in V.I.H. Orders of Disposals Equipment are gradually coming to hand, wonders will never cease.

RECORDING.

logical choice if best results are to be obtained. Pentodes and Beam-Power tubes are likely to prove very disappointing if any substantial power is to be delivered to the cutter, unless some form of negative feedback is employed. Commercial practice favours triodes, and the 2A3 tube seems to be first favorite, either as a simple push-pull stage, or as parallel-push-pull where heavily damped cutters are to be used. The average power requirements for cutters vary from a humble 2 to 3 watts for a simple cutter to 8 to 10 watts for a highly damped professional cutter, but ample margin should be included to take care of peaks, particularly where orchestral works are involved.

50-54 MC.

contact. R9 this time. 3GG, 3HK, 3YS, 3LS, 3YJ and 3NW were on the job and many contacts were made. At the time of writing full details have not yet reached me (3NW) as to all the contacts made, but 3MJ worked 2NO, 2WJ, 2AZ, 2AHF, 4HR and 4AW. 3HK worked 2NO, 2AHF, 2WJ, 4HR, 4RY, 4XG and 4ZU. The writer (3NW) worked 2WJ, 2AHF and 4ZU. 3YS and 3GG are known to have made good contacts and 3LS, 3BW and 3YJ, who were on the band, probably got their share.

Conditions on the whole were good although all the signals were fading fairly badly and varying as much as 6 or 7 R points. Few contacts were lost, the band remaining open for nearly two hours. So far as is known no contacts were made between VK2 and VK4.

CLEARING THE ETHER.

on RF chokes, indicating that the frenquency of parasitic is several times greater than the natural resonant frequency of choke and allied circuit.

Another form of indicator used for neutralising is a loop consisting of a few turns of wire coupled to anode tank coil, and employing as indicator a pea lamp, R.F. thermo-coupled milliammeter, or diode operated DC milliammeter. This form of indicator should be coupled to the "cold" end of coil, and the degree, of coupling should be minimum required for effective indication.

Inability to completely neutralise circuit indicates stray coupling introduced by bad design, layout or construction.

FOR SALE, EXCHANGE, WANTED

9d. per line, minimum 2/-.

WANTED.—One CV6, will exchange one EF50, RL18 or VR136 for same. H. Voake, 22 Jessie St., Coburg, N.13.

EXCHANGE.—0-30 DC Voltmeter, Weston type 301, or 0-10 Amp. Meter, Weston type 301, for AC Voltmeter 0-10 or 0-15. L. E. RADCLYFFE, Patent Office, Canberra.