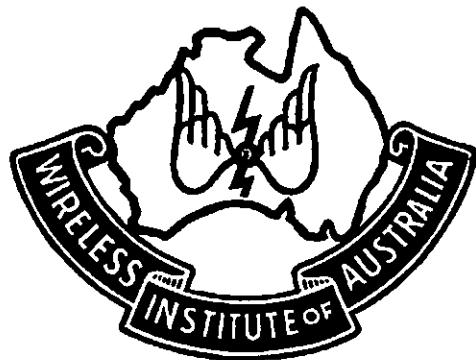


SIXPENCE

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POWER AND REALISM

(From an article by G. E. Morison, A.M.I.E.E.)

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In these days when much more use than formerly is 'being' made of reproduced sound in mass listening in factories, canteens, theatres etc., the equipment has been installed judging by results without considering what power is required to meet the conditions.

It is the purpose of this article to offer a guide to the estimation of power requirements for any conditions, starting from first principles. The formula which has previously used was:-

$$I = \frac{WT}{11.4V} \dots\dots(1)$$

This states that if a sound is radiated continuously in an enclosure until the steady state has been reached, then the sound intensity I is proportional to the watts W radiated and to T the reverberation time in seconds and inversely proportional to V the enclosure volume in cubic feet. The same formula appears elsewhere in other forms; for instance T may be eliminated by substituting for it the right hand side of:-

$$T = \frac{0.05 V}{Sa} \dots\dots(2)$$

This is the original sabine formula for reverberation time T which defines the time in seconds required for a sound of normal intensity level 60 db above the threshold of audibility to die away to 0 db in a reverberant room, the sound source having been cut off. S is the total interior surface of the enclosure and ' a ' the average absorption coefficient of all surfaces. From this an expression can be derived for W in terms of I , the dimensions of the enclosure and the factor ' a '. All formulae of this type, however, are open to suspicion in that they rely too much on an illusory steady state, which can be produced, but is not what we are dealing with in ordinary listening.

When sound is radiated in an enclosure there is a period from the moment radiation begins to that time when the steady

state may be said to be reached, during which the intensity is increasing exponentially. To find the true intensity at any point in the enclosure we would require to add the direct radiation from the source and to know the particular manner of this direct radiation. The period required for the sound intensity to approach its maximum may be called the building up time and may be quite long, as much as 1 second in a reverberant enclosure having $T = 6$ sec. For a more absorbent enclosure with $t = 1$ sec. the building up time is still considerable being 0.2 sec. There are the times required for the intensity to reach 0.9 of its maximum, this being, to the ear, indistinguishable from maximum intensity.

Now, in listening to speech or music we appreciate the whole by hearing, in proper form, intensity and sequence, the successive sounds which make up syllables or musical sounds, including many of a quite transient nature. It is accepted for instance that the duration of the average syllable in English speech is 0.2 sec and of some consonants only 0.02 sec while the diversity in music is even greater. That being so it is clear that the briefer sounds can never reach the steady state intensity implied in formula (1) unless the enclosure is quite remarkably 'dead', and if it is so then the building up process by reflection, can hardly be said to function with any effective increase of sound level. The use of formula (1) is thus not justified for power calculations and must give results showing less than the true power required for a given intensity.

Listening in the ordinary room there are three primary conditions which impair the validity of any calculation which is made on the assumption of a steady state and spherical radiation. These are :- (1) the individual sounds heard are of short duration (2) the loudspeaker radiation is of the type which fills a limited solid angle, as distinct from uniform spherical radiation (3) the average boundary absorption is such that the energy density in the enclosure is never uniform, the least of all for sounds of short duration. All these factors are such as to make the effective density at a point more nearly equal to that due to direct radiation only than to that due to reflected energy. Formula (1) fails as it exaggerates reflected energy.

There are two physiological factors which reduce the importance of reflected energy. It has been shown that the apparent loudness of direct radiation is greater than that of diffuse many times reflected radiation of the same intensity. Again, in the case of sounds of short duration the ear will accept and add together two wave trains quite considerable displaced in time or phase, but this accommodation extends only to identical sounds which arrive at the ear with a time difference not more than about $1/20$ second. Beyond this the ear begins to hear two distinct sounds. Therefore no reflected radiation in a room which arrives with a delay of more than $1/20$ second can be accepted as adding

usefully to the sound level. In this time sound travels 56 feet. Taking an average room, say 18 x 14 x 10 the distance between reflections, the mean path, is on average $4V/S$ where V is total volume and S total surface. This is less than the distance between walls because it takes account of short path reflections as at corners. The distance for this room equals about 8 feet so that useful reflections will include all those which happen to reach the listening point, even after seven ($56/8$) reflections. However those waves which reach the listening point by a roundabout route will be insignificant in their intensity. Yet a little consideration will show that most reflections must belong to this class, as first and even second reflections to a given point can only be very limited.

The complete determination of the precise gain in energy level, due to reflection, at a given point in our average room, is practically beyond calculation if we limit the time to $1/20$ second as required, but by using several approximations we find that the energy gain may be between 100 and 200 per cent or 3 to 4.8 db above what due to direct radiation at a distance of eight feet. If the listener is nearer the source it is less and conversely.

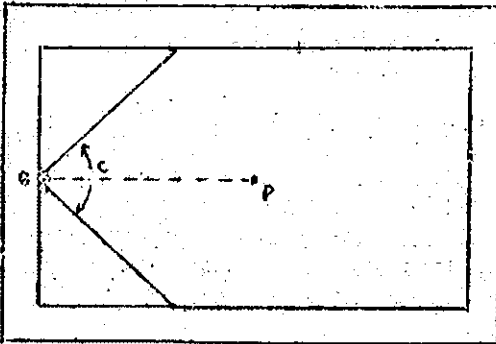
DIRECT RADIATION. It has been shown elsewhere that in a room 20 x 15 x 10 ft. the increase of sound energy (at 500 cycles) due to reflection is not more than 3db. It may be more below 200 cycles where the reflection factor increases rapidly. Thus for a given sound level in such a room, the transient power required is 50 percent of that in the open air, but for shorter sounds or higher frequencies the economy of power due to reflection in the room decreases rapidly.

We may conclude that a better starting point for power calculations would be to find what power is required to produce a given sound level at the listening point by direct radiation only. Then the assistance by reflection in a room becomes a small 'factor of safety' which we can accept as good engineering practice. If sufficient power is provided, without counting in reflected power, then we know that if any sound is re-radiated by the loudspeaker however transient it may be and whatever the room boundary absorption, there will be sufficient energy to establish the required sound level at the listening point. This makes reproduction real in the power sense, for in listening to original sound, if it is transient, then the intensity level is that due to direct radiation with no appreciable sound reinforcement by building up of repeated reflections. This is particularly true of orchestral performances which are normally heard in an enclosure where the 'building up' time is appreciable.

POWER CALCULATIONS. Once the idea is accepted that for realism a reproducer must be capable of producing at the listening point the required real sound level directly or (instantaneously) the maximum power required can be calculated if the intensity level relative to 10^{-12} watt/cm² is given in decibels. According to one authority the highest steady intensity level for

an orchestra is about 100 db. To produce this there is required about 10^{-6} watt/Cm². The total acoustic watts is then $A \times 10^{-6}$ where A is the area across which the power flows at the point chosen. To determine A we need to know the distance from source to listening point and the solid angle which includes all the radiated power. The average domestic receiver placed near a wall and with a back damped cabinet will radiate usefully about 120 degrees. In an average room with the listening point P eight feet from the loud speaker the total acoustic power required for 100 db level at P is about 0.18 watts. The electrical efficiency of small moving coil speakers working in a baffle is about 5%, hence the electrical power to be delivered to the speaker is about 3.6 watts. In order to take care of PEAK levels which are given as 105 db for orchestral music, the undistorted power required becomes $3.162 \times 3.6 = 11.4$ watts, where 3.162 is the factor for 5 db increase.

So far as home listening is concerned the importance of wide distribution for all frequencies is evident, if sound levels are not to be distorted by concentration. It is also evident that, although the room reflection at 500 cycles (0.6 sec) is not an important factor, it may be so at low frequencies where the reverberation time of the same room may be 1.5 sec. This would effect the reflection of power to sound level for sustained low notes. For the practical calculation of power required in watts we need to know only two variables:- the length in centimetres from the speakers to the main listening distance, which we call OP, and the



average angle of radiation of the loud speaker used called C . . The general formula is then:-

$$\text{Watts required} = \frac{(OP)^2 \cdot 2\pi \cdot (1 - \cos \frac{C}{2})}{10^6}$$

The following table gives values for $2\pi (1 - \cos \frac{C}{2})$

For further simplicity the table has been worked out using another multiplier (107.6) to convert to linear foot. The required watts (radiated) is then the last column value multiplied by OP^2 where OP is measured in feet. Finally to find amplifier output watts divide by $\frac{x}{100}$ when x is speaker efficiency in percent. The power arrived at is that required for a loudness level of 100 phons or 100 db.

ANGLE C covered by speaker...	Constant to be multiplied OP^2 (ft)
45 degrees	0.00044
60 "	0.00078
90 "	0.00170
120 "	0.00291
150 "	0.00432
180 "	0.00593

MAKE YOUR OWN METER SHUNTS

From an article by Stephen J. Varmecky

Many amateurs have meters which are limited in use by reason of the limited ranges. This can be rectified by the use of shunts which can be constructed for any meter by the method to be described. With reasonable care they should have better than 1% accuracy.

It is possible to make a set of shunts to be used with any low resistance meter, each shunt having a factor instead of a definite current range. That is, a certain shunt having a factor of 5 when used with an 0-1 ma meter would increase the range to 0-5 ma.

The wire used for making these shunts can be any type of resistance wire, the wire from an old rheostat being quite satisfactory. The only equipment necessary is a 45 volt battery and a variable resistor. The minimum size of the variable resistor may be calculated as follows $R = \text{voltage of battery} \times 1000 \text{ divided by current for full scale deflection of meter}$. Thus a 0-1 ma meter used with a 45 volt battery would require a 45,000 ohm resistor. Actually a 50,000 ohm or even a 100,000 ohm resistor would be close enough.

Connect meter, battery and resistor (set at maximum) as in

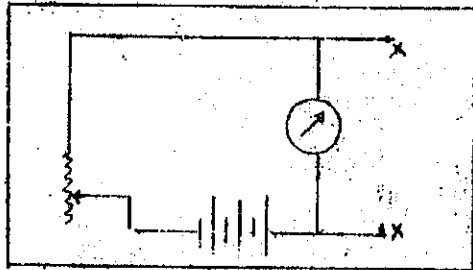


Fig 1. Suppose we have an 0-5 ma meter we wish to change to a 0-10 ma meter. First set the meter to read full scale by means of the variable resistor. Connect about 6 inches of the resistance wire across the points marked X and vary the length of the wire until the meter reads half scale. Use heavy wire for leads and be careful of the contacts to resistance wire

As half the total current is now passing through the resistance wire it is obvious that the resistance of the shunt must be equal to the resistance of the meter. Suppose the length of wire found necessary was 1/4 inch. Because of uncertain contact resistances this is too small a shunt resistance to use. In order to minimize the effect of contact resistance it is necessary to put a length of the resistance wire in series with the meter so that the shunt for the highest current range is not less than about 2 inches of wire.

An explanation to this is in order. The current in two parallel resistances will divide inversely as the resistance of each branch. That is, if one resistor has twice the resistance of the other it will carry only half as much of the total current.

Now, we have found that the meter's resistance is equal to $1/4$ in of resistance wire. This is the highest range shunt so we will make it 2 inches long. The resistance in series with the meter should then be 2 in minus the internal resistance of the meter ($1/4$ in) i.e. a total of $1\frac{3}{4}$ in of resistance wire.

A more common application would be the different current ranges in a set tester as shown. We have a 0-1ma foundation meter with the following ranges marked on the scale:- 0-1; 0-5; 0-25; 0-100; and 0-250 ma. The first step as before, is to find the resistance of the meter. It may require $\frac{7}{8}$ in. of wire the 0-250 ma shunt must carry the most current, so we will make it 2 in. long. At full scale deflection, the meter itself will carry only 1 ma and the shunt will carry the other 249 ma. Therefore the meter with its multiplier must have 249 times as much resistance as the shunt i.e. 41 ft $5\frac{1}{8}$ in. of wire on the multiplier. If it were made only 41 ft. long the error would still be only about 1%.

The 0-100 ma scale is next. The shunt must carry 99 ma and the meter 1 ma. Since the meter and multiplier have a resistance of 498 inches of wire, the shunt must be $1/99$ th of this or 5.06 inches long. The 0-25 and 0-5 scales are calculated in a similar manner. A factor which must be considered in the making of all these shunts is the heating effect; the resistance wire must be sufficiently heavy to stop the heating of the shunt.

If very high accuracy is not important, the highest current shunt can be made equivalent to only one inch of wire. In this way only half as much wire will be required and the shunt can be made more compact. Their accuracy will still be within 2%. As you have probably noticed the internal resistance of the meter is only a small part of the total circuit resistance, and the error would be slight if it was disregarded altogether.

The constructor may use any form of mounting desired. In one method, wooden dowel was slotted and the wire wound in the slots with two small holes drilled near the ends for the leads. With another method two pieces of hook-up wire were twisted together, insulation and all, and the resistance wire wound around the twisted part. The ends of the resistance wire are soldered to the ends of the hook-up wire.

If the shunts are to be used with AC, the resistance wire should be doubled before winding on the form in order to make them non-inductive.

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THE NEON-TUBE PARTS CHECKER

From an article in QST by W1FWH

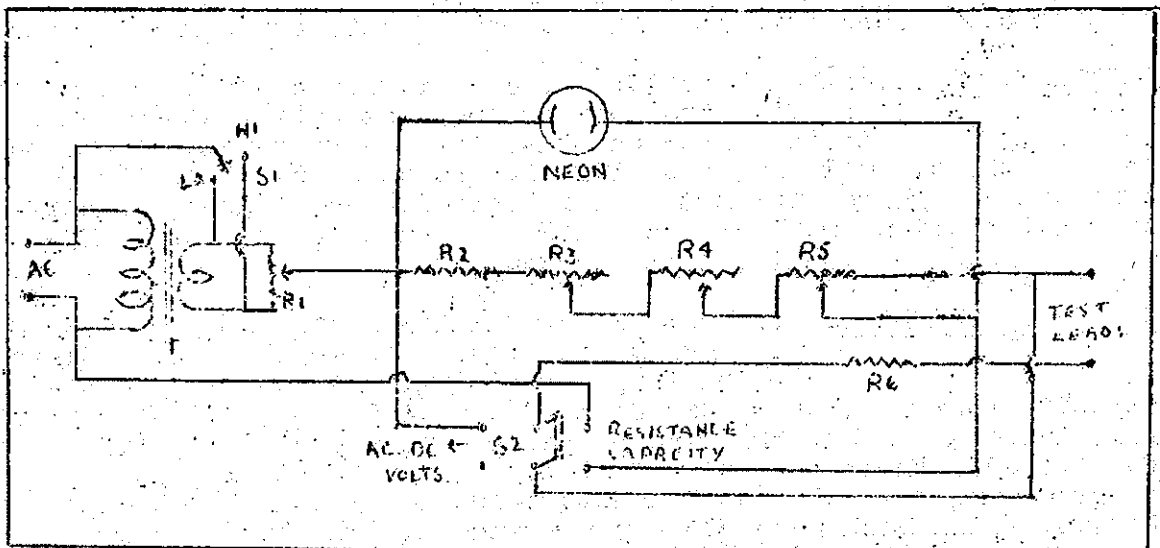
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Nowadays things are rather hard to get! and how. In consequence many parts salvaged from old BCB sets etc., come in handy. Frequently, however, it will be found that the markings of many of the resistors, condensers etc. have faded or been rubbed off. A means of measuring such values obviously is needed. Fortunately a checker of simple design can be built round a neon or argon tube.

By making use of the fact that the extinction value of such a tube is constant within reasonably close limits, it is possible to measure voltage, resistance and capacity over a useful range of values. The lamp is shunted across the variable portion of a voltage divider, and under different conditions of use the divider must be adjusted to bring the neon lamp voltage just to extinction point. The values to be checked can be read directly from a calibrated scale associated with the voltage divider.

D.C. volts between 70 and 1500 and A.C. volts between 50 and 800 may be measured fairly accurately. Insulation must of course be adequate. Resistances up to 500,000 ohms and capacities between 0.0025 mfd and 4. mfd may also be measured.

The circuit diagram for this checker is given in below.



R1..300 ohm potentiometer
 R3..5000 ohm potentiometer
 R5..500,000 ohm Potentiometer
 S2..D.E.D.T. toggle switch

R2,R6,..2000 ohms 2 watt
 R4..50,000 ohm potentiometer
 S1 S.F.D.T. toggle switch
 T..bell winding transformer.

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CHARACTERISTICS OF NEON LAMPS....The basic principle upon which this device operates is the observation that the extinction potential of practically all 1 watt neon lamps does not vary more than $1\frac{1}{2}$ volts when AC is the power source. With DC the variation can be as high as 4 volts, although with rectified AC (pulsating DC) there seems to be no variation. A 2 watt argon lamp has practically the same characteristics as the 1 watt neon. Because the DC ignition voltage required is at least 62 and the AC required is a minimum of 48, measurements below these figures cannot be made.

The transformer T, together with its associated switch and potentiometer provides a means of adjusting the voltage across the voltage divider, R2 and R6 (including the unknown resistance or capacitive reactance to be measured) to approximately the 96 volts required, regardless of the line voltage. The secondary voltage should equal the difference between 96 volts and the highest voltage encountered on the AC line. This means that, with S1 in the low position R3, R4, and R6 at minimum and the test leads shorted, adjustment of R1 should permit the neon lamp to be extinguished. The terminal to which R6 connects should be marked 'ground'. To ensure that this terminal is on the 'cold' side of the line, reverse the power plug until the neon tube glows when a test lead from the terminal connected to R5 is touched to an actual ground connection.

It should be noted that for all voltages below 500 this checker draws less current than the common 1000 ohm per volt meter.

CALIBRATIONS....Although scales for calibration could be calculated, probably the easiest and most satisfactory method is to borrow an ohm-meter and volt-meter and check against these. Calibrations will then be as accurate as the original meter from which they were copied. For a group of capacity calibrations readings can be taken on a couple of 1 mfd, 0.5 mfd, 0.25 mfd, 0.1 mfd etc condensers.

MAKING MEASUREMENTS....First allow an initial warm up period of about 2 minutes. To do this, snap S1 to the 'high' position, snap S2 to the ohm-capacity position, turn main dial (the 500000 ohm pot.) to maximum resistance and short the binding posts with a test lead; line voltage adjustment is the next step. Leave the binding posts shorted, and with all potentiometers except R1 at zero attempt to just extinguish neon glow by varying R1. The test leads are now clipped across an unknown external resistance. Turn main dial, R5, until the neon glows then slowly back off until it extinguishes. Take the reading on the ohms scale at this point. Condensers are measured in the same way. Electrolytics of course cannot be measured as power source is AC. The same procedure is followed in making voltage measurements, but S2 must, of course be switched to the volts position.

SLOUCH HATS AND FORAGE CAPS

By: 2YC

Happy New Year to everybody, where ever you read Amateur Radio, and may tons and tons of notes for 2YC be the New Year Resolution of each and every Ham..ahem..but don't break this resolution Oms.

To start the New Year-- It has been suggested to me from time to time that I'm a bit hard on the Navy, as I've got an Army Cap and an Air Force Cap on top of the column, but not a bit of space for the Navy, even when they provide (vide 4RF) most of my notes. Well, you see I can't work out a heading with Navy Caps in it... But come on you lads in Navy Blue...what can you think of...Send ideas into FHO, your Divisional HQ or to myself.

As 3IR was one of our firstline DX hounds here is an extract out of one of his letters to Bruce Marx 3SM.....

"I have had some great times since leaving home--wheh and what! I also have done a spot of touring at the expense of both Governments, seeing Sicily and this country. Italy is a beautiful place. Here we are in the mountains near the northern parts. When we came in February all was hushed and quiet with snow--beautiful--now it is spring, everything at its best. Hills are a vivid green grass, foot high, and the countless number of wildflowers. We are taken for walks occasionally, therefore see quite alot of the country and its people who are usually very friendly, and are very fed up with things generally. What your Father said about the number of workers per acre is well and truly 'xxx out--even to kids just able to handle a hoe. I am keeping mentally fit by running a radio class of 625 pupils. Starting right from the first electron, etc, no text books here but I have had lots of time to oil up the 'sub-conscious' as it were. I worked for Jerry for 8 months in Tripoli before coming here. Have met many Hams including a D. Have to finish now OM so cheerio, best of luck..SHOW." (How what kind of a D was her I wonder..2YC-)

Extract of a letter from Charles Stanford who was on many occasions at 3CE, 3HH and 3DM....."Perhaps I could give you a brief resume of what has happened since I last wrote. Early in October last I was shifted from my old section and sent to make part of a new one being formed. It meant leaving Wlex too. I was moved immediately to Cario area and then hurried on up the Western Desert in time to do our bit in the push there in Nov and Dec when we relieved Tobruk and Rommel was pushed back to agedoia. I got into some warm spots. I rather enjoyed myself in spite of being horribly dirty, water was so scarce that we seldom considered even washing our sox. In one rather awkward moment at the culmination of several days successes to Rommel I was able to assist by going places and doing things with a wireless van. We were quite used to being shot at by this time and sort of didn't care what happened to us and in that mood we accomplished several days work that took us through packed hours of exciting experiences. As a result I am wearing a ribbon indicating the award to me of the Military Medal, possibly you heard it over the

air or saw it in the papers. We were out of all that at Xmas time when we commenced a series of moves and waiting which would normally have landed us in a now battle zone, but instead we finished up at home in March. I've had a week at home, of course they were delighted to see us back. By fortunate coincidence Alex and I, tho' now in separate units came home on the same ship. Quite a good trip, one or two scares. Now we are taking to the old routine of the training camp again. Almost all of our work is signal work--wireless".

From ZAME who hopes I have not overlooked his TG9BA CSL-comes the following:- "A brief resume of George's-VK5KJ's-doings since hostilities, will not be out of place. On the outbreak He joined the Army, only to be kicked out a few months later on account of his health. The RAAF, unfortunately an examining doctor knew his history, so they wouldn't take him there....The navy also proved a blank after a long try. In desperation he took his commercial ticket and eventually secured a berth as 2nd op on a freighter. Since then I have received cards at odd intervals from various parts of the world. So far he has told me nothing more exciting than visiting his birth place in GM. Still when he comes back to VK, he should have some experiences to talk of, and he hopes to be back this Xmas. My last hearing of him proved rather a coincidence, as I had two cards by the same mail: one posted in Monte Video, the other in Edinburgh".

Congrats to Harry White ZIR, he snared a first class ticket last week and has been very busy interviewing photographers especially those dealing in glamour ever since. ..By the way, it was a pity that Harry could not be persuaded to say a few words when he attended a recent VK3 WIA meeting. Harry is well known throughout the "Andrew" as the 7/- a day tourist. His wanderings road more like a C.P.R. Luxury Cruise, or maybe he was following those cable routes one has to cram for the Commercial ticket. Shanghai, Singapore, (don't say too much about those two) Glasgow and Dublin, he knows them all. Then home via Montreal and Los Angeles.

Cap'n Bligh (ZUH to you) left us a few weeks ago and to date we have had no buzzers regarding his activities.

George Bonwell, 3KQ writes that he is enjoying the tropical sunshine --rig of the day being Jantzens and sun helmet.

3IV -- has been very quiet of late--no repetition of the run reported by ZIR... Austerity and all that. However during a SHORT visit to one of the better known Melbourne Inns he met a G from Liverpool. They has an FB QSO and the G was to accompany him to the last WIA meeting. Unfortunately 3IV received a crash draft and the night of the meeting found him quite a few miles away. But if the Liverpool lad turned up there is no doubt the boys would have made him more than welcome. Anti-climax--3IV couldn't find his name and call sign when giving this news. He says--sorry and all that--chaps.. (continued on page 14)

DIVISIONAL NOTES

FEDERAL HEADQUARTERS

November meeting of the Federal Executive was quite a busy and unique in this respect, that despite of the fact that the ban on transmissions had been in force for over three years, correspondence was received from every division with the exception of VK3. South Australia gave details of the negotiations leading up to the establishment of the ECM in that state. Tasmania forwarded names of VK7's who were desirous of joining the Federal Body. Western Australia forwarded a donation of three guineas to the P.O.W. VK4 gave details of the position of the Institute in that state. New South Wales brought under the notice of the Federal Executive certain proposals regarding Servicemen and spare parts.

The Chairmans report on the years activities was adopted on the voices and it was decided that it be printed in "Amateur Radio". (It's already been printed, .ED)

The main subject for discussion at the December meeting of the Executive was a request submitted by the New South Wales Division that the Federal Headquarters should communicate with both the RSGB and the ARRL in an endeavour to ascertain what steps, if any, had been taken in the respective countries regarding post war Experimental Radio. It was decided that this request be complied with, and in addition a copy of the Chairmans Report be forwarded to the I.A.R.U.

The Federal Executive would, through these pages, like to wish Australian Experimenters everywhere all the best for 1943.

EMERGENCY COMMUNICATION NETWORK

The network continues to make progress and recently the Control Station for the "A" network was installed and tested. This station has for its final amplifier a pair of 813's-beam power tubes capable of pumping two hundred watts into the aerial, which in this case is a vertical half wave 140 feet high. With the installation of this station several tests have been carried out with mobile units bringing back memories of WIA Field Days to many of the lads prominent among whom were VK2IQ and his brother VK2AIQ. The work that these two chaps did with their mobile unit is particularly appreciated by the Technical Committee.

Fixed stations are gradually coming into operation and each week sees another station installed at its permanent location. A word of praise is due to Section Leader Ern Hodgkin ZEH. As members of the network are aware, numerous applications for enrolment were received, but unfortunately locations were not at all decentralised, which meant that more than sufficient operators were available for some installations, whilst in other

cases the scarcity of operators caused no little worry to the committee. When allotting hams to the various stations two factors decided the issue. Firstly home location, and secondly place of business. 2EH came into the picture in the latter category, but as most amateurs know, once Ern becomes interested in any project he works wholeheartedly for its success, and despite the fact that the amateurs attached to this station were scattered in adjoining districts, under his inspiring leadership VL2JH was the first station to be completed and beam antenna erected. Congratulations to 2EH and his band of fellow workers, who include 2ABI, 2AKI and another young fellow who was just too late to get a call sign.

Another couple of lads working under difficulties are Charlie Fryar VK2MP and Jeff Thompson 2XP. 2MP was quite well known in the good old days for his beautiful 'fist', T9 note and his views regarding fone. Well Chas has developed a glass arm these days, but to hear him discuss the merits of this or that type of modulation is worth going a long way to hear. Incidentally, 2XP's station is something to look at and any ham would be proud to own it. Keep up the good work chaps, and when it's all over there will be another exhibition and the boys of the BOM will take some beating for the best complete station.

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NEW SOUTH WALES DIVISION

The December General Meeting of the Division was held at the YMCA Buildings on Thursday 17th December at 8 PM. As usual with the Christmas meeting formal business was very quickly disposed.

The Chairman extended a welcome to our old friend Bill Zech 2ACP, Charlie Luckman 2JT, Ron Hands 2ZD, and the "Bomb Happy Hams" Roger Torrington 2PJ and Jim Haining 2AMQ.

Donations are still coming along for the P.O.W.'s Fund and the NSW total now stands at £14,16.6. To date no member has come forward with the name of any ham known to be a Prisoner of War, despite the fact that the list recently released by the Japs contained the names of two hams known to the writer. Remember chaps, it is not necessary for the P.O.W. to be a member of the Institute, in order to receive a parcel. The Institute, unlike the RSCB, is broadminded in its outlook and endeavours to provide comforts for all hams. The benefits of the RSCB scheme is confined to Members only which is a very shortsighted policy and must only cause heartburnings in some cases. Imagine two hams P.O.W.'s, one a member of the society and the other not. It is mail day. One receives a parcel, the other does not. What happens? The parcel is shared, so why not make it an all in affair.

At the December 1941 General Meeting of the Division it was decided that in view of the critical stage that the country was in, no election of Officers would be held, and that the Council then in Office would function for a further period of twelve

months. Council at its December 1942 meeting decided that the annual election should take place as laid down by the Articles and Memorandum of Association. The Chairman in making this decision known to the General Meeting stated that Councillors were of the opinion that, in view of the large increase of membership during the last six months, members should be given an opportunity of expressing their opinion as to who should be in control of Divisional affairs for the next twelve months.

Remember Jeff Whyte of "Pencil Wire Beam" fame. Well as you know ZAHF lives way out in the Never Never where men are men and women glad of it. Sometimes it rains at Willow Point, via Wentworth; more often than not it doesn't. Jeff has been toying with the idea of locating water by means of radio and would be pleased if any ham could give him any details of any known methods. Letters should be addressed to R.J. Whyte, VKZAHF, Willow Point via Wentworth, N.S.W.

The President and Council of the Wireless Institute of Australia, New South Wales Division take this opportunity of wishing Members everywhere the Compliments of the Season and hope 1943 will be Victory Year.

VICTORIAN DIVISION
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It seems that during the past month members of Council of the Victorian Division have been well in the spotlight. Maybe those members wanted to keep it dark, but here it is...

One Saturday afternoon they met at the Rooms with the intention of painting the masts on top of the building. As one of the masts is still in the vertical position considerable discussion took place as to who was to demonstrate their powers as an Alpine Climber. Eventually Bert Burdakin (of potato fame) complete with pot of paint and brush commenced his upward climb. On reaching the top of the mast he started his job, while the rest of the gang went about their several duties on the masts in the horizontal plane. Ken Ridgeway was suddenly startled by a wet spot which fell from up above. On investigation it was discovered that there had not been any seagulls or other such birds flying overhead at the time, so the conclusion was, that Bert had accidentally spilt a little paint whilst he was at the top of the mast. Was Ken Relieved????.

At the last Morse Code Class prior to closing down before Christmas it appears that Chas Quin 3WQ was unable to control a couple of YL students. Charlie maintains that he remained seated during the proceedings, but somehow that doesn't seem natural to us. However when 3HX sets out to ring up 3WQ, with the intention of saying that he was the YL's Father, WQ comes back with "Yes Tom"..... Well what would you do?? HX had it all worked out that Chas would ring up Ken Ridgeway and warn him that there was trouble in the air. Of course Ken knew all about it.

From 3BM we learn that Bruce has been on constructional work but not radio. Fired with the ambition of handling bulk wheat quickly, he designed and built a unit which, to us, seems to be as good as anything that could be commercially manufactured. It consists of a hopper body on a 5 ton truck, holding 270 bushels and has sliding doors at the bottom, emptying into the silo in two minutes. The second unit is a power elevator on a trailer with a power takeoff from the gearbox of the truck, and will put the wheat into the truck as fast as a couple of men can unload the bags into a low-down hopper. Congrats Bruce.

Say chaps don't forget the next meeting of the Division. Its on Tuesday the second of February..

-----00-----

From our oldest correspondent-VK4RF at Canberra- we get the following- VK4RY continues to service supers, hang up skywires etc here at Canberra. VK5FA enjoys the change here after being so long at Darwin. VK4NO kept him company at that CRA, so things could have been worse. 2ANP is a little tired of being continually surrounded with WRAHS... (he and 3RF had better get together, Hi..2YC) wanting to know "How to do this".

VK2ACG continues to keep an eye on about a dozen high-power rigs including a 200 KW outfit, but he leaves the faults to be remedied by 2EO, when the develop. (VK2CX, please note whereabouts of 2ACG...his CRA, Belconnen Naval W/T Stn FCT)

W3FEX, W7LQ, W2HET and W9QCV/W6RBA spend their spare time chewing the rag with 4RF about ham radio after the war, even if it is on 5 metres.

4RF reports himself leading a "quiet" life, but after all he wrote it himself so we'll just say..Oh Yeah..to that bit of news.

And that thanks ever so much chaps, fills up two pages nicely. (Say Jim what happened..Its nearly three...ED). But don't rest on your laurels for the love of Mike. You see they (down at printing HQ) just squeeze it in a bit whenever it looks like too much. Oh, its a racket, and I only just woke up to it. First they said only a page, Jim, OM.. and they double spaced all the lines and had a big margin and everything was lovely. So I fell for "can you manage two pages, do you think Jim"... and as soon as I fell... away went the big margin, away went the double spaced lines... and now I'm down on my knees begging notes month after month... wouldn't it ????

So all notes before last week of the month to VK2YC..78 Maloney St. Eastlakes...N.S.W.

-----XXXXXXXX-----

**THE WIRELESS INSTITUTE
OF AUSTRALIA
VICTORIAN DIVISION**

191 QUEEN ST., MELBOURNE

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R. J. MARRIOTT, VK3SI; C. QUIN, VK3WQ.

Meeting Night—First Tuesday in each month.

**THE WIRELESS INSTITUTE
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N.S.W. DIVISION

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Meeting Place:

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VK2NG; R. SMITH, VK2AIU; R. MILLER.

The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

**DO YOU WANT TO BE
BACK ON THE AIR?**



**THE WIRELESS INSTITUTE
OF AUSTRALIA**

is the recognised spokesman of the
AUSTRALIAN AMATEUR

If you are not a member—

Join Now !

When the time comes that we can reasonably expect to go back on the air, we want to say that we represent—

EVERY ACTIVE HAM

in the Commonwealth.

Strengthen our hand by writing to The Secretary of the Institute in your State to-day.

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TASMANIA:

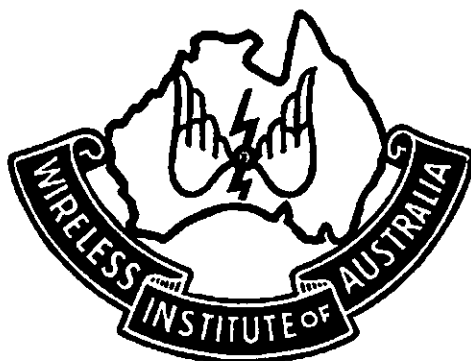
BOX 547E, G.P.O., HOBART.

SIXPENCE

FEBRUARY 1943

AMATEUR RADIO

THE
OFFICIAL ORGAN
OF THE
WIRELESS INSTITUTE
OF
AUSTRALIA



Published by the Victorian Division

AMATEUR-RADIO

INCORPORATING THE N.S.W. DIVISIONAL BULLETIN

Vol. 11. No. 2

February, 1943

VOLUME EXPANSION

Generally speaking, back in the days when the boys were pleased as long as they got 100% modulation with good quality speech, they did not become very interested in volume expansion or AF amplifier curves.

However, as now together with other things RF is off the market, here is a very absorbing and worth while field of activity and as yet is practically virgin ground.

The advantages offered by a single straight expanding unit as in Fig 1 are:- (1) A much more realistic reproduction of recorded music (particularly orchestral) either from receiver or through the pick-up, and by very careful adjustment the practical elimination of receiver background and pick-up needle scratch/.

In the adjustment of expanders three effects are to be taken care of:- (1) Time delay, controlled by the condenser and resistor in the rectified AF circuits. If the delay is too long, it greatly affects vocal reproduction, and if too short gives a harsh or blasting sound. (2) Percentage of expansion controlled by grid input to expander amplifier stage. (3) Bias of controlled amplifier to be adjusted so that there is no gain without DC is supplied by rectified AF from expander circuit. Thus the controlled amplifier tube cuts off when there is only needle scratch etc.

The foregoing, however is not the only avenue of benefit derived from the principle of expanding, as it can also be used to give almost any desired control over the curve of an amplifying circuit.

If a heavy low note response is desired, a filter network calculated to split the signal at the highest frequency it is desired to boost. Now the low frequency side of the network is fed to the expander and the high frequency is fed to a straight voltage amplifier.

The output of the two channels is then fed together to the main final amplifier, keeping phase relationships in mind of course. Fig 2 is a filter network with a wide range of adjustment.

FIG 1
EXTRACT
A.W.A.
HANDBOOK
EXPANDED
CIRCUIT.

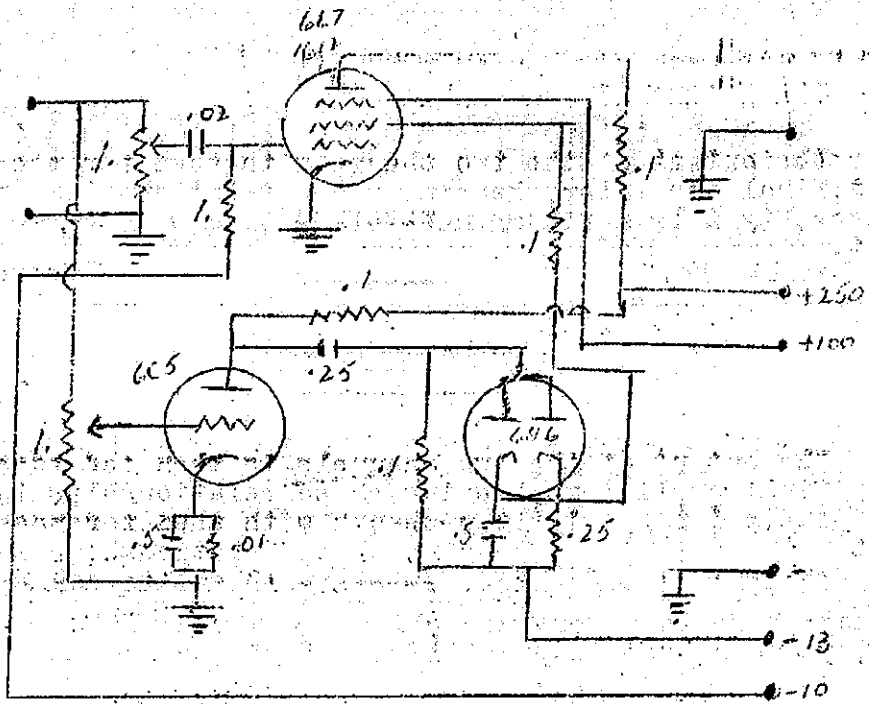
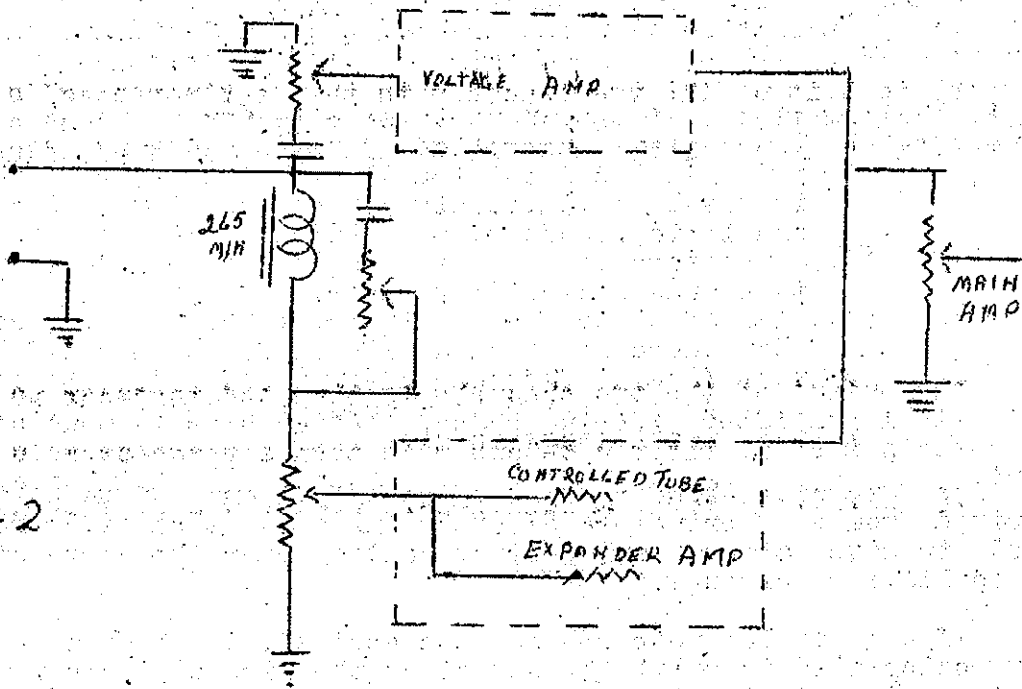


FIG 2



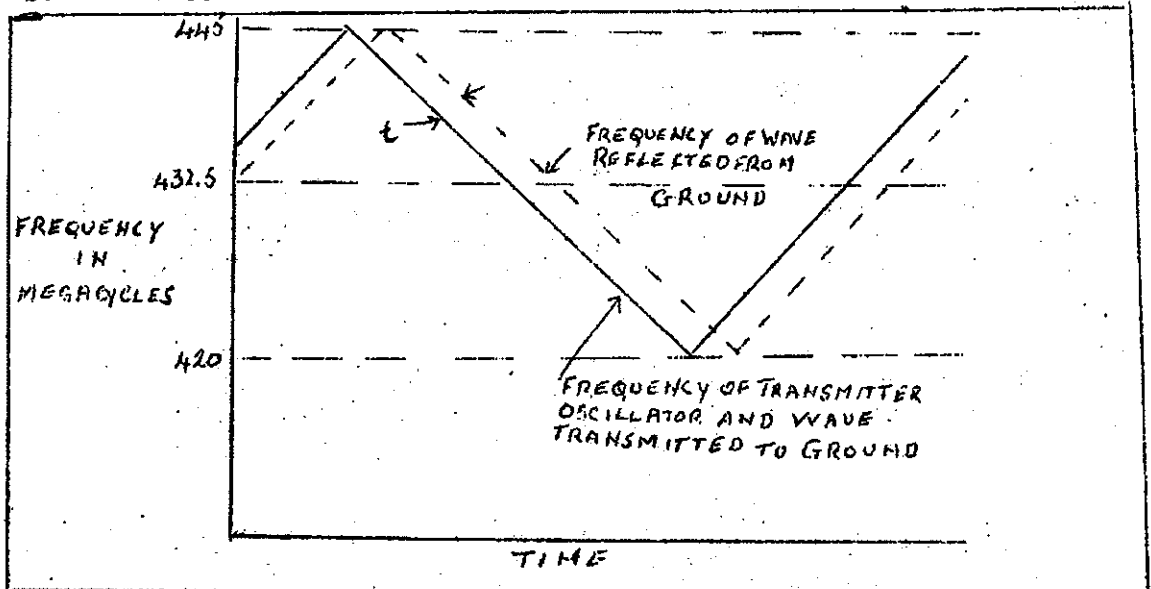
ALTITUDE BY RADIO

-----0000-----

Undoubtedly two of the most progressive sciences at the present time are radio and aviation. As all our readers are interested in the first, and most, we think, in the second, it would seem that any piece of apparatus common to both should be of considerable interest. Such a piece of apparatus is the radio altimeter.

The apparatus consists of a simple UHF oscillator, a corresponding receiver and a common power unit installed out of the way in the radio compartment and remotely controlled by the pilot. Under the plane are two small T shaped antennae in separate streamlined, dielectric housings; one for transmitting and the other for receiving. They are dipoles, each a foot long and set about six inches away from the wing. In front of the pilot, in a standard instrument case, is an indicator calibrated in feet. A small switch on the instrument panel puts the altimeter in operation and its operation is then automatic, continuous and practically instantaneous.

This is the way it works: The transmitter frequency is rapidly "wobbled" up and down, 60 times per second by a motor driven modulator consisting of a small rotating variable condenser. It is so arranged that the frequency change produced is linear. If we plot the frequency variation on a graph; we get a straight line saw-tooth pattern, as shown in the diagram in solid line.



Each complete 'tooth' represents the change of frequency from 420 to 445 and back to 420 mcs, taking place in 1/60 second.

That signal is directed towards the ground by one of the two antennae underneath the wing, with the wing acting as the reflector. When it reaches the ground it is reflected back into space and is picked up by the other antenna and fed to the receiver.

Now if we plot the received signal on the same graph as the transmitted signal, it would obviously have the same straight line saw-tooth pattern, but it will take place a little later. In other words the pattern of the received signal will be shifted in time.

The amount of that shift shows how long it took the waves to travel from the plane to the ground and back again. If we can measure the amount of the shift, we know our altitude; because radio waves propagate at a constant speed. We can measure the amount of the shift at any instant, by measuring the instantaneous difference between the transmitted and the received frequencies.

A portion of the transmitted signal is fed to a special radio tube, where it is mixed with the received wave; in other words we "beat" the received wave with the transmitted wave. The difference between the two frequencies, constant for a given height sets up an interference in the tube, and the greater the frequency difference, the greater the interference. The current thus produced, proportional to the amount of interference, moves the pointer of the radio altimeter--an ordinary milliammeter calibrated in feet.

-----XXXXXXXX-----

THE FAITHFUL FEW

When the meeting's called to order and you look around the room
You're sure to see some faces that from out the shadows loom
They are always at the meeting, and they stay until its through
The ones that I would mention are the Always Faithful Few.

They fill the many offices, and are always on the spot
No matter what the weather, though it maybe awful hot;
It may be dark and rainy, but they are tried and true-
The Ones you can rely on- are the Always Faithful Few.

There are lots of worthy members who will come when in the mood
When everythings convenient, they can do a little good;
They're a factor in the meeting, and are necessary too-
But the Ones who Never Fail Us are the ALWAYS FAITHFUL FEW.

(An extract from "Ham Chatter" Div 3 S.A. A.R.R.L.)

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A HANDY GENERAL PURPOSE OSCILLATOR

(From an article in Radiotronics)

The general purpose oscillator described is very simple to construct and tests have shown that satisfactory output can be obtained on any frequency between 200 cps and 24 Mc with only coil changes necessary.

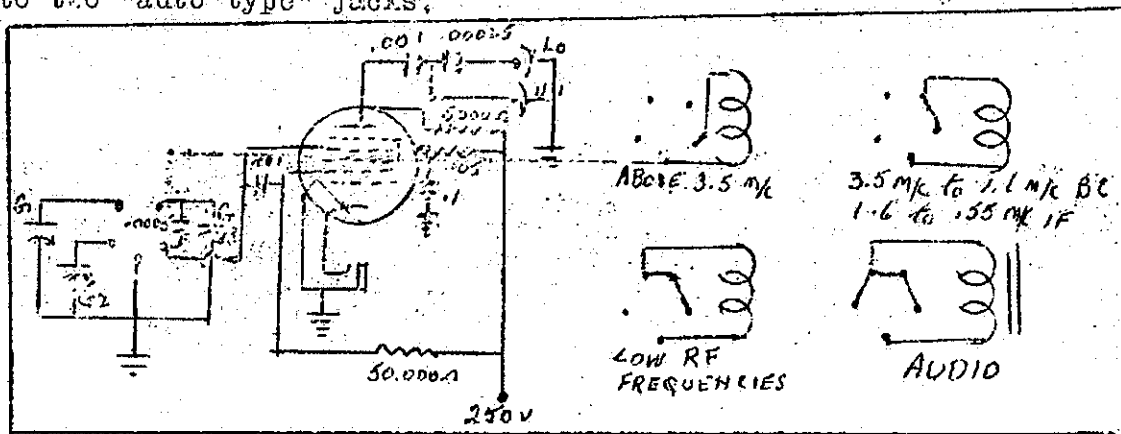
The oscillator can be used for a variety of purposes, among those for which this oscillator has been used is code practice and set line-up in conjunction with a magic eye tube which has its grid clipped onto the AVC line and so gives indication of maximum sensitivity. The oscillator has also been used to provide a beat signal for code reception on an ordinary broadcast receiver, and the writer intends to try it as a BFO for use on the Ham bands if transmitting licences are restored in post-war days.

To give good coverage on all bands and yet a certain amount of bandwidth on the high frequencies a three gang condenser was arranged so that by plugging in the appropriate coil, it connected the gangs in parallel, singly or in series with an .0005 mfd fixed condenser.

The coils were all arranged to plug into a five pin socket as a number of five pin 'Pilot' formers of 1 1/2" diameter happened to be available. No coil data is given here as most amateurs have coil data for various size coil formers.

Coverage on the broadcast band is obtained by using a single section of the gang and an old broadcast band coil. For IF coverage an old IF winding was mounted inside one of the formers, again only one section of the gang was used. On audio ranges, all the gangs were connected in parallel and one winding of an old (baby type) speaker transformer, or audio transformer plugged in.

As the main components are only tube, condenser and coil it is a simple matter to arrange a satisfactory layout. To cater for either high or low level output from the unit a pair of condensers were connected in series and two leads taken from them to two "auto type" jacks.



ANNUAL REPORT
WIRELESS INSTITUTE OF AUSTRALIA, NEW SOUTH WALES
DIVISION

To be presented at
33rd Annual General Meeting--Thursday 18th February

Gentlemen:-

Your Council take pleasure in placing before you the 33rd annual report of the Wireless Institute of Australia, New South Wales Division, and it is quite safe to say that, in spite of the fact that the ban on transmissions by Experimentors has been in force for over three years now, Divisional activities have never been greater, and the year 1942 will go down in history as one of the most outstanding periods in the annals of the Division.

Since the outbreak of war your Council has been untiring in its efforts to bring under notice of the authorities the value of the Amateur and his equipment in the event of an emergency. Several schemes were submitted at various times but despite early promises of success some insurmountable difficulty would crop up in the later stages of negotiation, with the result that permission was withheld by the powers that be. With the entry of Japan into the war the possibility of a breakdown of ordinary means of communication was more fully realised by both the Institute and other bodies. At a Council meeting held in December 1941 it was decided that the State War Effort Co-Ordination Committee be approached and details of an Emergency Communication network be placed before them. The Chairman, Mr R.A. Fiddle VK2RA was granted plenary powers to conduct negotiations. How well 2RA carried out his duties may be gathered from the fact that after several months permission was finally granted by the Department of the Navy on the 14th July 1942 for the formation of the network. 2RA's first efforts were directed towards convincing the S.W.E.C.C. of the value of the network and at first that body was only mildly sympathetic, but a chain of circumstances rapidly changed their views, and they supported the scheme wholeheartedly. Then the real job started, namely convincing the "Silent Service" that the Network would be of value in emergency. This was another long and heartbreaking job but at last this obstacle was surmounted and Australia, through the efforts of the New South Wales Division of the Wireless Institute of Australia backed by the S.W.E.C.C. was the first country in the world to have its Amateurs Transmitters recognised and given a place in the Civilian Defence of the Motherland. With the necessary permission granted a Technical Committee consisting of Messrs Bennet 2VA, Dickson 2AFB, McElrea ZUV, Fiddle 2RA, and Ryan 2TI was formed and it was through the efforts of these amateurs that the ECN is now in full swing.

Acting on the suggestion from Federal Headquarters, the possibility of amalgamating the Monthly Bulletin with Amateur Radio was the subject of some consideration during the year and it was eventually decided to combine the two publications. Although this amalgamation has resulted in a much improved official organ, it is felt that the passing of the Monthly Bulletin, although only for the duration of the war, has left a gap in the Institute

framework in 1941. With the amalgamation of the publications it was decided to reduce the grades of Membership to two namely, Full, with annual subscription of 10/6 per annum; and Service, subscription 7/6 per annum.

The Division wholeheartedly supported the Wireless Institute of Australia Prisoner's of War Fund and to-date a total of £16 has been realised. Through the courtesy of Messrs Bonnet and Hoad a Picture Night was held in lieu of the October meeting and the sum of £3 was realised. Unfortunately the elements were unkind on this night otherwise a much larger sum would have been realised.

With reference to the Custody of Experimenters Containers all Members were circularised and informed of several modifications agreed to by the Chief Radio Inspector, the principal being an opportunity to remark any container if desired. Although a number of amateurs resented this Regulation this Division supported the views expressed by the Federal Executive, namely, that if the equipment was out of the possession of the owner no inferences could be made that it was a potential danger to the country, as had been done by a certain type of newspaper in the past.

In an endeavour to make certain that Australia should keep abreast with overseas moves regarding the post war position of Experimental Radio steps were taken to ascertain what plans had been made by the R.S.G.B and the A.R.R.L. These Societies were to be informed of the steps taken in this country with particular reference to the Federal Census and the Emergency Communication Network.

The Federal Executive has been located in this State for over twelve months now and a report of their activities appeared in the December issue of 'Amateur Radio'. The personnel of the Executive is as follows:- President R. Fiddle 2RA; vice-president, H. Peterson 2HP; Secretary W.C. Ryan 2TI; Councillors W.J. McElrea 2UV and N. Gough 2NG. These are the original Members of the Executive who were elected in August 1941, with the exception of Mr N. Gough who filled the vacancy caused by Mr A. Joseclyne resigning upon joining the services. Although this body was elected in August of that year, it did not commence to function until October.

Due to the war situation no Council election was held in 1941, the Councillors then in office being instructed to carry on, but due to the increase in membership since the formation of the Emergency Communication Network, Councillors now feel that these newcomers should be given the opportunity of expressing their opinions as to who should govern the Institute, and accordingly nomination papers have been sent out to all Members.

Quite a number of amateurs on service have been present at General Meetings and upon one occasion all States were represented with the exception of VKS. In addition to VK's quite a number of "W" hams including W6PPT, W6TJ, W6PEZ, W6BEC and W6BRP have been entertained by various members.

Oldtimers will regret to hear of the death of C.P. Bartholomew one of the signatories to the Articles of Memorandum of Association of the Division and a Life Member of the Institute. Another Oldtimer to pass on during the year was G20D. G20D and A20J participated in the first two way contacts between England and Australia.

Membership has maintained a steady increase, no less than 73 new members being elected during the year whilst resignations were practically negligible. At the present time the total membership is in excess of the previous figures of peak years. This continued increase augurs well for the future and proves that the average amateur is alive to the fact that it is essential that an active organisation be maintained at all times.

This, Gentlemen, covers the major activities of the Division for 1942. Let us hope that 1943 will bring the day nearer to the time for the lifting of the ban on transmissions,

P.A. Middle... Chairman
W.C. Ben..... Secretary.

WIRELESS INSTITUTE OF AUSTRALIA, NEW SOUTH WALES DIVISION

Statement of Receipts and payments for the twelve months ended
31-12-42

To Balance 1-1-42	£4. 5. 5	By Printing & Stationery	£25.13.4
Subscriptions	79. 7. 7	Postage	15. 3. 9
Book sales	3.12. 0	Rent	5. 7. 6
Badges	6. 6	Exchange	13. 6
W.O.W. Fund	14.17. 0	Book purchases	31. 0. 4
Exchange	2. 6	General Expenses	6. 0. 0
Refund ECW Exp.	22.14. 8	Balance	41. 7. 2
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	£125. 5. 7		£125. 5. 7
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I hereby certify that I have audited the books and vouchers of the W.I.A. N.S.W. Division and have found them correct and the above Statement is in accordance therewith.

H. Brooks, F.C.A (Aust)

-----XXXXXXXX-----
EMERGENCY COMMUNICATION NETWORK
-->>-----

Phew ! Boy, what a day ! Sunday January 17th saw practically the whole of the network stations on the air. Commencing at 10.30 am and finishing at 5.45pm the band was reminiscent of 40 metres any Sunday afternoon in the good old days. In addition "A" Network Control Station was in communication with two mobile units.

On other test days there have been two or three stations on each afternoon and it was anticipated that the day would come when every station in the network would be crying out for a Test

at one and the same time. It arrived with a vengeance.

In order to bring country ECH reservists into the picture it was arranged that they should be listed for VL2JA on this day also, and to date numerous reports have been received reporting reception in various country centres. The information contained in these reports will be very helpful when the time comes for the extension of the Network to areas outside Sydney and Metropolitan districts.

VL2JH and the boys down there will soon have to look to their laurels. In last issue details were given of the splendid job carried out by Ern Hodgkins and Co; but the rest of the gang are close on your trail, Boys.

VL2JI has replaced his burnt out mike transformer, has obtained a new mike from a very close friend of his, and using only a temporary aerial is putting in a wallowing signal at Control. When that beam goes up its sure going to block up the receiver---and you should hear the quality. When one remembers the things ZHP had to say about fone hounds once upon a time---well---well, only goes to show what a great job a CW man can make of fone.

VL2JK is on the air at last and putting in quite an FB signal. 2OB who is in charge down there has associated with him 2ALH, 2IA, 2AIU and 2AHV. Many young squirts may not know much about 2AHV, but to oldtimers "Cal" is quite well known having held the presidential reins of the Division over ten years ago. You can't keep a good Ham down. Lionel 2OB is also interested in photography but so far has received the offer of 2TI to photograph the modulation envelope from 2JK. Never mind OM once you get the fur off the edges of that signal it'll be something to be proud of.

VL2JF is putting out a nice signal, but unfortunately there is more than one frequency at the present time. Neutralise that 807 boys and then you'll go to town. If you don't you'll probably go into every shortwave receiver around the place!

"Convict 99" Jeff Thompson has also bought a new mike and is putting out an FB signal. Jeff said that he never expected to operate a radio station from a police cell complete with iron bars, concrete floor large padlock and everything. Never mind OM wait until you get the red carpet down, VL2JF will certainly be a glamor station then.

At VL2JC the boys who include 2DI, of RK20 fame, Eric Pugh 2ADK and Phil Cox 2IE are having some difficulty in getting sufficient audio; but never mind it won't be long now and you'll have that transformer.

In answer to many inquiries regarding the "drink" given to one of the operators at Control the label on the bottle said "Tropical Tonic", but I don't believe that label---I think it

came from a chemical laboratory on the outskirts of the City area. Everything I spoke into the mike, the final tank condenser would flash over. Of course there's only half an inch spacing between the plates. Never mind it was a great day.

On the last Sunday in February a full scale exercise will be held, but details will be forwarded later.

-----XXXXX-----
CORRESPONDENCE

Some little time ago the N.S.W. Division wrote to the ARRL asking that they insert in QST an invitation to any Amateur who was on Service to attend Institute meetings or if his leave did not co-incide, to contact either the Divisional Chairman or Secretary. This request was complied with and the August Issue contained the invitation.

As a result the following letter was received recently and may be considered self explanatory and an appeal is made for as many VK hams as possible to reply to this lonely 'W'. Here is the letter:-

"Secretary Ryan 2TI
Wireless Institute of Australia,
Y.M.C.A. Buildings, Pitt St
Sydney, N.S.W. Australia. FX3305
VK2TI

Guadcanal Island
British Solomon Islands
28th October, 1942

Just received a copy of my QST magazine, August issue. I noticed the article to Amateurs of United Nations who may be in your area. I am not hardly close enough to drop in on one of your meetings, but never too far away to write to an amateur, especially a new contact.

I am a PFC in the Marine Corps and I think the heading will speak for itself for what I am doing. Back home I had a 500 watt CW transmitter on 40 metres and used a Hallcrafters Super Sky Rider receiver. I just now found out that our equipment had to be registered, so have taken steps to do so.

I belong to A.R.R.L. and keep in contact with them regularly. W8RTK and myself, W9UZW are located here together. I would be very much pleased to hear from your organisation and a few of the VK boys. Are there any W9's around Sydney now? Please write and QSL if possible.

73's
PFC Sprague W9UZW

All letters should be addressed as follows:-

P.F.C Zane Sprague W9UZW
U.S. Marine Corps Unit 900
C/- Postmaster, San Francisco
California.

Go to it Follahs.

-----eee-----

SLOUGH EARS AND FORAGE CAPS

By VK2YC

-----000000-----

Still the same title, as so far, we have not heard from the Navy as to what cap they prefer. But as the RAN doesn't spend much time lying around in port gathering barnacles, I guess it will be a month or so before most of them see "Amateur Radio", its one of these time lag circuits. So you chaps in the RAN don't forget that our column is a 'cap' short in its title, and we look to one of you to supply it.

ZYC has been trying to fit in a part time holiday (weekends mainly) with the family down at Cronulla so there hasn't been time to cope with the business, let alone nose out some done for the column...so I will have to be forgiven in advance. In any case running the place short handed and being away part time means that when I clean up arrears I will need a real holiday Hi !

By the way have any of our chaps been mentioned as POW by the Japs yet. I don't think there are any NSW names among them.

Can anybody dig me up some news of VK7HL, Loveless, who appears hamlike, to have been the right chap in the right place up in TIMOR, but who seems to have been singularly neglected when the praise was being handed out...not to mention the medals. Who, but a ham, would think of building a "Ham" transmitter from junk. Any news of him that you VK7's have will be appreciated here at ZYC.

Had a good surprise the other night when VK30F, blew in for a rush visit complete with Petty Officers rig out, with two years service stripes he seemed a far superior person than the "old" 30F. However, in spite of it all he had to get the tea as the YF was away. Yes, his wife has him trained lovely...it was a slap-up meal, far and away better than I got myself Hi. Frank was in the RAN reserve way back before the war, when he and 3JJ were ten metre fans. At the outbreak he was called up at once and, very much to his disgust has, ever since, been instructing at Flinders. He couldn't even get a trip on a convy. But persistence wins and here he was with a couple of hours to spare in between trains, on his way to join the Australia. I hope he did catch the train (he cut things pretty fine), but as he missed it altogether in VIM he was improving a little in VIS. Hi!

Wilf Harris 2AIF seems to have settled down on the same ship judging from a card I had from him. so Frank will have some company as he knows Wilf from the Depot.

My co-news collector 3RJ who, having moved the family over can now be considered as a New South Welshman (knows a good state) has had a letter from Basil Dale (P/O of course) and once 2XX, 9XX. Basil seems to have ended up this time way out in the W.A. Never Never, but even there one finds VK2VW. How are you

Bill, haven't heard of you since the war began, whats the news? Congrats on being "Father" these days, FB, OM. Besides that degree Bill is also F/O so he may have some news he can pass on. Thanks for the dops Basil, OM. One thing you can always be relied upon to tell us where you are...how many other Hams over your way? Dig a bit of news out of them...I'll fix it up for the Beer that will no doubt be necessary to get the news. Hi!

Fl Sargent H.R. Carter VK2HC rang up the other night on his way back to Wagga. I had been wondering just where he had wandered to, but 3RJ who was also wondering "Cleaned him up" on both our behalfs. Did you know that Mr Jones was now a Flying Officer...if he lives long enough I hope he will be higher in the ranks "in time" Hi! Johnny Traill down in VIM somewhere and still not having sent me some promised news is also a F/O these days. I nearly said "doesn't deserve it" but may be all of you wouldn't understand mu "animosity" was entirely due to those lost notes about his sojourn in Malaya.

Oh, do you remember my QRR to Cpt Carruthers V.2RF...well, alas, all wasted...as he doesn't get QST...please somebody lend him one.

From Clarry Castle LAC comes a letter that tells us, as I've said before that Amateur Radio does reach the troops. Clarry says he was visiting Cpl Ivor Stafford and mentioned A.R. Low and behold he was able to read both November and December issues and said the news of the Hams, and old ham radio, that now seems so long ago was an FB treat. Which all goes to prove that, as I said, and keep saying, "NEWS" of Hams is "BIG NEWS" to a chap stationed away where he doesn't have City and Suburban telephones to keep him in touch with the chaps. So, once again...don't hoard your news miserly to yourself...send it to Amateur Radio.. where all your fellow hams can get a kick out of reading it too.

Clarry 5KL mentions hitch hiking 50 miles just to have a yarn to Sgt Ray Deane 5RK but simply passes it off as "worth it to have a yarn to one of the boys". And some lazy so and so's won't even write a few lines or use a telephone...Ham Spirit of New Order??????????.

Up Darwin way and mentioned as having seen 5KL are also LAC W Leonard 3AB and VK2AII Sgt Cleburne. Any more news of these two, Clarry??.

Still further north we find that Bob Cunningham VK3ML, now Wing Commander, is OC Signals in that area. Nice going Bob, but what about a note from you occasionally, you must see quite a few of the boys from time to time.

Bill Gromow VK3WG has recently been promoted to Squadron Leader, and seems to spend much of his time running all over the place. VK3TE Stan Dixon Corporal please, after visiting quite a few of the states is now stationed somewhere in VK6.

(Continued on page 14)

VICTORIAN DIVISION

Somehow notes of the Victorian Division seem to grow smaller and smaller, as more and more of the boys go on service. Notes seem to consist of what happens among the Council Members and what happens at the Magazine printing. As regards what does actually happen at the latter, well I'm afraid that I just couldn't publish it sometimes. If I did publish what did happen at the last printing, well the issue which contained the report would be worth pounds and pounds. Now don't start guessing what did happen because you are likely to get a long way ahead of me.. TOO bad isn't it.

One thing which did happen was that Herb (Romco) Stevens 3JO usually brings Charlie (Screwdriver) Quin 3WQ along to the printing...well Herb dumped Charlie about five blocks from the place of printing and disappeared for about three-quarters of an hour. To make matters worse he has maintained a strict silence ever since, and endeavours to change the subject every time it's brought up... Now wouldn't you think just what we think???

Bob Anderson 3WY still manages to cram the writing of articles for the magazine into his little spare time. He has had several articles on various subjects promised to him, and he is hoping that it will not take too long for them to come to light.

Some members of the instructional staff of the Melbourne Technical College arrived along at the last VKZ meeting, and have promised a lecture or two, so chaps if you want to hear some good lectures the best thing you can do is to attend the next few meetings of the Division. The next meeting will be held at the rooms 191 Queen St Melbourne on the first Tuesday in February which will be the Second of February.

We wish to warn everyone never to ask 3PU for a light because its odds on that you will have to go through every match in the box. 'Tis reported that he always puts the dead match back in the box along with the live ones. Now I wonder just how he got that habit??

Alec Clynch 3VX is looking for someone who can supply him with the dope for a special type of UHF directional antenna. He saw it in some magazine, and its shaped somewhat like a speaker horn, but instead of having a speaker unit it has a radiator where the speaker should be. Can anyone help.

It's reported that Ivor Morgan 3DH is working eight days this week. Myself (3HX) would like to know what the formula is for stretching seven into eight, because I'd like to try it.

Bert Burdakin reports that the potatoes planted per lunar influences turned out real fine business (that's according to his own say so, we haven't seen them yet). Bert has been renamed "Spuds"...He doesn't know that until he reads this !!

Slouch Hats and Forage Caps

Corporal Ron Higgenbotham 3RN turned up at a recent VK3 meeting. He was then still associating with the "leones". It was noticed that at this particular meeting he went into conference with the RAAF, the subject seemed to be antennae. I guess that by this time Ron effected considerable improvements in the aerial system.

And that is that for this month... Remember contact 3RJ RAAF, Pt Piper or 2YC... Jim Corbin, 78 Maloney St, Eastlakes Phone MU 1092.. for news for YOUR column.

-----e-----

OUR PROBLEM----IS IT YOURS?

At the last meeting of the VK3 Division during a general discussion, one of the members asked a question. It was this:-

In standard text books the impedance at the centre of an half wave antenna is 72 ohms. To feed this using a 600 ohm line and a 'Q' section transformer the required surge impedance for the matching section is $Z_0 = \sqrt{Z_1 Z_2}$ which is 208 ohms.

It is claimed that this will give a perfect match.

Our query is this:- Why should 208 ohms give a match between the 600 ohm line and the 72 ohms of the antenna.?

If you can offer any solution send it along so that we can publish it in this magazine. If you have any other problem send that along and see what others have to say about it.

-----XXXXX-----

STOP PRESS. And then there is the story about the youngest member of the VK3 Council who, walking along the street, was hailed by a child of tender years As "Daddy". We wonder.

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H A M S !

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SIXPENCE

MARCH 1943

AMATEUR RADIO

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OF
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NOTES ON RECEIVER DESIGN

(From an article in 'Radio' by David Eby Jnr.)

.....

The prime requisite of a communications receiver are sensitivity, stability, high signal-to-noise ratio and ease of control. A few ideas with regard to improving these essential characteristics are incorporated in this article.

SENSITIVITY AND NOISE. The sensitivity of many receivers is far below the ideal and there are numerous factors that impair the ability of the RF stages to bring weak signals up to a useful level. The first tuned circuit is the most important, in-so-far as signal-to-noise ratio is concerned, and the first RF stage must operate at optimum efficiency for good weak signal sensitivity. The tube in this stage must have low inherent noise output and the tuned circuit should have high selectivity.

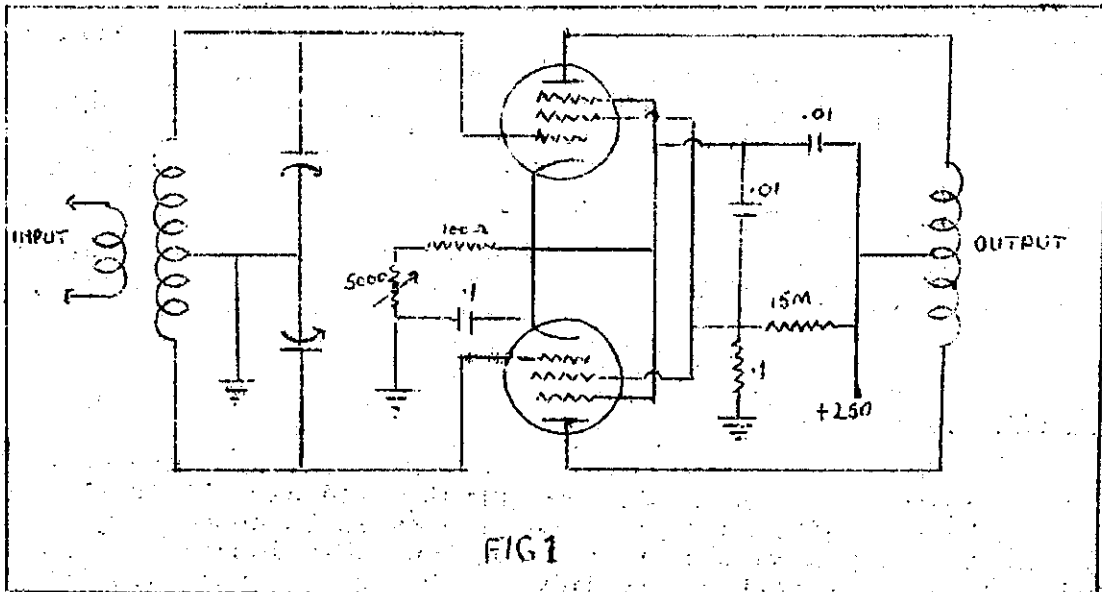
From the viewpoint of low noise output the tube 1851 is most suitable; but this tube has the unfortunate characteristic of loading the grid circuit, due to its low input resistance. Grid circuit loading may be reduced however, by the use of a push pull tuned RF stage (Fig 1) and by this means the excellent low-noise characteristics of the 1851 may be realised. In this circuit, the grid input resistance is increased, the Q is raised and the gain lifted above that of a single ended stage.

In a push-pull tuned RF amplifier of this sort symmetry is very important, lead lengths on either side of the circuit must be uniform and capacities kept equal. Grid leads particularly should be kept the same length and in the same relation to chassis and other components.

INTERMEDIATE AMPLIFIER. It is important that stability be built into the intermediate amplifier, for if the IF amplifier is off peak or drifts off peak, the weak signal gain will be less than a strong signal gain below a certain level.

If 1851's are used in the RF and mixer stages high gain should not be incorporated in the IF stages; it is preferable that lower voltages be used and the job of bringing a signal up to a useful level left to the AF amplifier. In a two stage IF amplifier the plate voltage should preferably not exceed 50 volts. The low voltage gives sufficient gain and much greater stability.

If higher plate voltage is required (up to 250 volts) it is preferable to use a band-pass amplifier; an immediate advantage is gained by the flat-top resonance curve for in this case drift, if not too extensive, has little effect on gain.



For CW reception, the flat-top portion of the curve should be kept narrow, but not necessarily peaked. If the circuits are peaked, then it will be found that the curve of the crystal filter is far too sharp to be practicable in conjunction with anything but a highly stable oscillator, and the chances of holding a signal may be slim. If the top of the IF amplifier curve has a width of about 1Kc there is sufficient selectivity for all practical purposes, and the band width provided will compensate for moderate drifts. With this arrangement it is possible to hold weak signals indefinitely except where the signal fades below the noise level.

An ideal system consists of six ordinary IF transformers rebuilt to provide twelve link-coupled circuits in a two stage amplifier. The circuit of a single stage is shown in Fig 2. The link windings are close coupled, and consist of about 25 turns of No. 36 solid copper wire. Litz wire is not recommended unless special care is taken to see that all strands are soldered and make good connection.

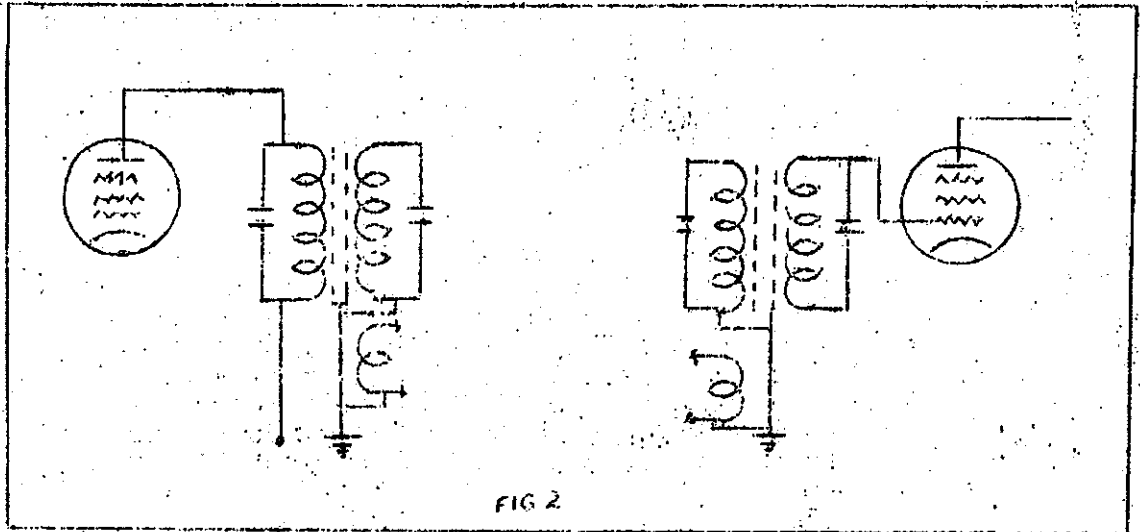


FIG 2

BEAT OSCILLATOR STABILITY... In the usual beat frequency oscillator a coil-condenser unit is used as the frequency controlling element and frequency drift is frequently experienced. If a crystal controlled beat-frequency oscillator is employed drift can be kept very low. The receiver can be shaken without altering the pitch of the beat note, provided of course, the high frequency oscillator is also stable.

The crystal used must be of the zero drift type, and the IF amplifier must be aligned to the desired beat frequency. The IF frequency must be kept to one side of the crystal frequency by a degree equal to the beat note desired. These adjustments are not difficult if a good signal generator is available.

In a receiver incorporating these features it is possible to use the dial calibrations to an accuracy better than 250 cycles one minute after the receiver is turned on. A large part of the stability is attributed to the low plate voltages employed.

.....XXXX.....

ITEM...The problem of an airtight seal between metal and glass in the manufacture of high-power transmitting tubes has heretofore been solved by the development of a special nickel-iron-cobalt alloy which has the same co-efficient of expansion with temperature as the glass. Drs. Hull and Navais of G.E. Laboratories have recently reversed the technique by inventing a type of glass with the same co-efficient as that of iron. Since nickel and cobalt are used in many ways for war equipment and their supply is extremely limited, the new invention is an important one.

.....XXXX.....

H U M

We may not be able to build new equipment these days, but time can be very usefully devoted to rewiring existing gear with an eye to getting a little more program and a little less noise.

Fifty cycles and associated harmonics may be acceptable enough from the audio oscillator when tuned for it, but otherwise they are unwelcome guests so a few points on hum banishment may be of interest.

Let us open the discussion by taking for example to case of amplifiers to supply 6 watts of audio from a dynamic microphone. (Six watts across 600 ohms = + 30 db on zero 6 mw) A good quality dynamic microphone can be taken as having an output of -35 db (ref. 6 mw), so that a total amplification of 115 db would be required. This can readily be calculated to represent 0.000107 volt to 60 volts in 600 ohms. Now a hum level of 30 db below program is quite audible and nasty, but let us take this level to work on!

It follows from ground already covered, that if an audio signal voltage of 1 millivolt is applied to the input of the amplifiers, it will cause a signal voltage of approx 60 to be developed across output, so that if a hum voltage of this magnitude is also applied at this point, 60 volts of hum can be expected at output. If hum is to be kept at least 30 db below program, the hum voltage picked up at input must be 30 db less than the 1 mv. already quoted. This works out at about 3.4 microvolts. That's all the maths; don't go away.

What can cause hum voltage pickup of up to 3.4 microvolts at the amplifier input or voltages of greater magnitude in later stages? Plenty.

Power transformer, AC wiring, turntable motor, pickup equalizer, filter reactor, condensers, heaters and heater wiring etc. The above can cause hum by either electro-magnetic coupling or electro-static induction into the high impedance input circuits.

At this stage it is best to be clear as to the difference between the above two types of hum. The names of course are self explanatory but are all of us really able to differentiate between the two when we hear them? Be honest. Alright, the hum set up by electro-static induction is more of a hard nasty sort of noise rich in harmonics, whereas the electro-magnetic induced hums usually take the form of pure 50 or 100 cycle stuff. The reason for this is that the capacitive coupling presents less impedance to the harmonics than to the fundamental hum frequencies.

Consider the power transformer first. Take for example a transformer having 3 turns per volt, that is 1/3rd volt per turn. Even allowing for its shielding it would not take much coupling to induce 3 microvolts in nearby wiring, and if this wiring should have anything to do with input circuits!!

The power transformer also induces voltages into the chassis according to the leakage flux lines cut by the chassis metal and these voltages can readily flow in wiring of the amplifier proper as the wiring usually has less reluctance than the metal of the chassis. Hum results if this wiring is part of input stages.

Filter Condensers. The first condenser of a condenser input filter, usually abt 8 mfd and having an AC ripple component of about 30 volts to 400 volts DC. Reactance of 8 mfd at 100 cycles is approx 200 ohms so current of approx. 150 ma would flow through it and its associated wiring. If the condenser is wired with 6 inches of 20 gauge stuff the voltage drop across the wiring would be approx 0.0005. If the condenser was slopped in haywire fashion with a lump of 30 gauge (who hasn't done it?) the voltage drop would increase to 0.0045. Pooey, what of it you say. OK, but remember, if this wiring should get near the input circuit induction of less than 1000th would overstep the hum maximum we have selected.

So much for that. Satisfied we are that hum can be put in, and now for the remedies.

Firstly, if high gain is required it is sould practice to provide it with amplifiers on separate chassis. In this way the power supply equipment can be mounted on same chassis as the power stage, and the low level stages can be effectively isolated. Electro-magnetic coupling to input stages is reduced and trouble due to induced chassis voltages minimised.

Careful placement of inductances in respect to each other is helpful in assisting to overcome hum difficulties. For best results the amplifier should be wired up with iron cored components not screwed down and with rectifier voltmeter or loud-speaker across output the inductances should be juggled around until position of minimum coupling is found. It may not look nice to have some component on the skew, but its far better than having a geometrical layout plus hum.

Induction from turntable motor, AC wiring etc. must be taken into account. If the pickup has an equalizer, it should be moved around in the cabinet until hum pickup disappears.

The heater wiring of low level stages should be twisted tightly and shielded. Remember that optimum conditions exist if the two wires of the heater circuit taking current in opposite directions were to occupy the same position in space. Under those conditions the fields would entirely cancel. Do the next best thing by tightly twisting the two wires. The shielding is useful in guarding against hum induction by capacitive coupling to input circuits.

Taking an ordinary pentode as input stage a little thought will convince that hum induced into any of the input wiring is similar to applying the same voltage directly across the input jacks so the following precautions should be taken; Do not rely on chassis for earth returns. Make direct connections and take all earth connections for each individual tube wiring as near as possible to one common point. Keep in mind that for ideal results the amplifier itself should touch the chassis at one point only.

Do not encourage coupling between grid and plate resistors by wiring them side by side. Shield grid leads. Avoid using spare pins on the valve sockets to anchor wiring unless no capacitive coupling is likely to result. Shield volume controls in low level stages.

Regarding volume controls, it is better to pad down the output of the low level amp to reduce volume than to cut down the signal input itself. If the signal input is attenuated the hum pickup remains the same whereas attenuation at output reduces hum and signal in same ratio.

There is no need to stress the importance of earthing. Every low level unit must be carefully earthed. That includes turntable and equalizer of course.

Talking of earths, quite a lot of mains interference is caused by pickup in the aerial coil of a receiver. This is caused by connecting earth end of input coil to chassis instead of directly to ground. A portion of any interfering signal travelling to chassis per modium of power wiring flows through the input coil and returns to ground via capacity of antenna and its lead-in. This interference can be cured by running separate earths for chassis and aerial coil.

-----oOo-----

ITEM...Air-cooled transmitting tubes are now being made in sizes up to 25KW. The heat dissipated by one of the large tubes is sufficient to heat a six-room house in winter... and we can well believe it.

.....oOo.....

OUR PROBLEM
=====

Last month we published a problem of one of our readers. In response to our request for a solution Cecil Waring VK3YW forwards his solution to the problem.

In "Amateur Radio" for February you have a problem as to why a 208 ohm quarter wave "Q" section is necessary to match a 600 ohm line to an antenna with an impedance of 72 ohms at its centre. To explain this it is necessary to delve into a little theory and do some maths both of which are fortunately brief,



In Fig. 1 "A" and "B" we have a quarter wave matching section of impedance Zo terminated in "A" by impedance Za, and in "B" by impedance Z1

Referring to "A" impedance Z1 looking into a quarter wave line of characteristic impedance Zo when terminated by an impedance Za is:-

$$Z_1 = \frac{Z_o^2}{Z_a} \dots\dots\dots 1$$

Similarly the impedance at the other end (as in Fig. 1 "B") when terminated by Z1 is:-

$$Z_a = \frac{Z_o^2}{Z_1} \dots\dots\dots 2$$

Thus to match to impedances Za and Z1 it is only necessary to insert a quarter wave section of characteristic impedance

$$Z_o = \sqrt{Z_a \cdot Z_1} \dots\dots\dots 3$$

Now the impedance Za can be the impedance of the antenna (72 ohms) and Z1 can be the impedance of the transmission line (600 ohms). Substituting for Za and Z1 in formula 3 we get Zo = 208ohms. If you go further and substitute for Zo in formulae 1 and 2 you will find both work out to 72 and 600 ohms.

Owing to the transformer action of the quarter wave "Q" section the 72 ohm impedance of the antenna is reflected as a 600 ohm load to the feeder and the 600 ohms of the feeder is reflected as an impedance of 72 ohms to the antenna; the action being the same as when we connect the loud speaker to the power tube, we insert a matching transformer and thus match the 2 or 3 ohms of the voice coil to the 5000 ohms or so of the output tube. The wrong transformer will work of course. The same applies to the matching "Q" section.

GRAPHITE SHIELDING

(From an article by B. H. Porter)

.....

Metal and rubber shortages affect everyone in time of war. The use of non-metal shields for research and necessary construction is but one of the many ways to conserve scarce materials.

The non-metal substance that makes this possible is an interesting one. It is Graphite--not the earth ingredient of certain pencil leads, but the artificial electric furnace variety--that is best suited to radio uses. Subdividing the flat particles to permit suspension in liquids facilitates the spraying and painting of non-conducting surfaces. The result is an even, electrical conducting film of grey-black color, polishing forces and graphite particles together reducing the electrical resistance of the coating.

When using this colloidal graphite, dilute the heavy black pas te with distilled water. This is done by slow addition of the paste while stirring thoroughly. Any masses that do not form a good suspension are removed by straining through silk or other closely woven cloth.

The prepared mixture is then ready for application to many grease proof surfaces. Glass for example should be clean with solvents for grease or with chromic acid (take care handling this stuff). Metals, wood and plastics are cleaned by abrasio n with sandpaper or scouring powder. Extra protection can be given by a coat of nitro-cellulose varnish. Metal eyelets are handy for making the necessary electrical connection to the shield.

When metal shields for tubes are unavolable, shield the tube by covering the glass with colloidal graphite. One part of the paste to three or four parts of water will serve the purpose. If the tubes are the type that generate considerable heat during operation apply the graphite film in a lattice or screen fashion. Both types of coatings may be grounded by continuing the covering down over the walls of the tube base to touch a lead mounted on top of the chassis.

Other applications involving the one abundant metal supplies may suggest themselves. In such instances the electrical com- ducting properties of colloidal graphite films are worth investigating.

....oOO....

Anyone got some ideas....Send them along for the information of other readersEditor.

::::::::::

SLOUCH HATS and FORAGE CAPS

... By 2Yc ...

February notes...a year after Singapore... a year since 2HZ and the fell into Jap hands...lets hope we soon hear some news of the m and in the meantime I'm sure you all join me in wishing them "best of of luck".

Seems to me that these sailors are faced with a bit of a problem. Even that coterie at Canberra are silent on the subject.. oh 4RF & 2EO. I suppose they are all working hard, but silently... like the Service. Hi!

2QL reports from one of those Townsville Post Offices that simply mean that they are NOT in Townsville. Frank says he used to wonder why they wanted so much equipment in our Northern Bastion but after seeing what the country was like and what has been achieved he marvels that they wanted so little. Hi!

Did you hear about the chap up there who was found wandering around searching for a pedal to put on a broken megacycle Hi! Keith Sherlock and VK3ML are mentioned in the next line, so whether one of these were the responsible person, one wonders.

Sign posts up there sometimes read "this marks the furthestmost advance of the Japs at such and such a date." They should have some other posts over the East coast by now Hi! So far the closest the Nips have dropped some bombs to 2QL is about a hundred yards, and as a slit trench is said to be effective up to a few yards I suppose Frank says this is "way off the target." Hi! All the best Frank...a third of those fifteen months are over already.

Ted, I beg pardon, Captain Peppercorn 2QJ has the same kind of address (apart from the same kind of call) as 2QL. But he even admits to being "somewhere in N.G." so we have "valuable information" as they so as to his whereabouts. 2QJ says his QRA is famous for the new "layer" as distinct from the Heaviside and Appleton layers. This is the Mosquito Layer which apart from the indirect QRM and QRM comes very very low at night and makes contact with the operators. Hi!

Having read of Roger Torrington and his speed. Ted nevertheless wants to be considered as a competitor with a big handicap against Roger and the other boys in dodging Zeros and Japanese Eggs. Hi! Having heard Roger, on his ability Ted, believe me you rate yourself pretty high. Tell you about how high when you get some leave....2YC.

From as far away as his QRA...24J is able to give me news of two other Hams. This proves once again the old story of the will finding nothing much in the way. Hi!

L/C Davies is in the Middle East still along with 2ES. These two have been in the same outfit since they left VK. Its a pity we didn't get any news of how 2ES won his Medal. Perhaps if you read this, eventually, 2ADS you might drop us a line about the happenings.

Sgt. Dodds 2LD is still up at Townsville with Morrie Myers who is quite high in the R.A.A.F. hierachy these days, but we hear no news of them in detail.

Seen in Sydney streets., so they say...early in February. VK3UM Bill Mitchell...looking well and sporting two pips. Congratulations and we hope you enjoy your two months stay with us. (Wish he would come out here to 2YC so I could pump him dry of news)

Also seen in Sydney but heading South to enjoy a couple of weeks well earned leave...Arthur Evans 3VQ. Arthur is a P/O in the R.A.A.F. and spends his time in a Northern State.

Another old face to pop up again recently is that belonging to Charlie Miller 4US /2ADE. Corporal Miller of the R.A.A.F. still keeps his hand in with the big transmitters. How come no more news of you Charlie?

One hears various things about the value of Hams in the Services. Talking to a Squadron Leader the following was his opinion. "The value on the Radio Amateur is most marked in my area, as roughly about one in five of the more highly qualified Radio men in this area have come from Amateur Radio ranks." This is pretty high praise and is a bit different from what I have heard some Hams say in earlier years of the War.

News comes that Norm Hannaford has at last got his Commission and is now with the Torres Force, so I hope to have more news of him by the next issue of notes.

Corp. Stevens 30J who is spending his time in a tropical heaven?? somewhere off the north of Australia reports that the sigs gang constantly monitor the outgoing traffic, whether they are on duty or not...reason...every time the key is pressed the camp lighting dims...must remind some of them of the good old days.

Major Lyle Andrews 5HY of the A.A.M.C. has now been officially reported a prisoner of war in Malaya.

And that is that...pretty short and sweet this month. As usual when you read these notes away on your R.A.A.F. or Army stations or on your battleship, sloop, cargo ship or land station just remember that you, too, are NEWS and drop a line for YOUR COLUMN to Jim Corbin. 2YC, 78 MALONEY ST. EASTLAKES, N.S.W...or if you know 3RJ send it to him at Pt. Piper.

73 and more for next month...2YC

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D I V I S I O N A L N O T E S

... Federal Headquarters ...

At the February Meeting of the Executive members learned with no little satisfaction that the VK6 Division had now received permission for the formation of an Emergency Communication Network in that State, and that several stations were in the course of completion. Like New South Wales, Western Australia was experiencing no little difficulty in obtaining equipment, particularly valves. VK6 intended holding their Annual General Meeting during February, and it is hoped that a report of proceedings will appear in the next issue of the magazine.

7PA, Peter Allan is busy delving into 7ML, Max Loveless's past, 7ML was the ham responsible with other members of his unit for assembling "Winnie the War Winner" and communicating with Australia from Timor. "Where there's a Ham There's a Way."

Reference was made some time ago regarding post war Experimental Radio and it was decided to contact both the A.R.R.L. and R.S.G.B. in an endeavor to ascertain what steps if any, had been taken or anticipated regarding the allocation of frequencies after the war. It has now been decided to extend the range of communication further by including all known active English bodies.

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EMERGENCY COMMUNICATION NETWORK

..... Stations Stand By During Sydney's Alert

On Friday night the 19th of February an unidentified aircraft was heard by Anti-Aircraft Defence units, flying in the direction of Sydney, and as all efforts to obtain recognition proved fruitless, Service Chiefs believed that it was of enemy origin and ordered that the Air Raid Warning system sound the "Alert", and at 10.50 p.m. the sirens wailed their warning. At 11.05 p.m. VI2 JM notified Control that the station was manned and other stations followed in rapid succession.

As no raid eventuated, the stations were not called upon to handle any traffic much to the disappointment of the operators standing by at their posts, and when the "All Clear" sounded, a sleepy band of hams wended their way homewards. The manner in which these hams manned their stations was very gratifying to the Officials in charge of the Network, and these men are to be heartily congratulated upon their sense of duty.

At the 33rd Annual General Meeting of the Institute, Mr. Warren Garlick, representing the Premier, Mr. W. J. McKell, congratulated Members of the E.C.N. and the Wireless Institute of Australia generally, upon the great work done in organising the Network, and further stated that the Government intended handing over the control of the scheme entirely to the Division, with Mr. W. G. Ryan VK2TI as Government Representative. In his remarks, Mr. Garlick traced the history of the Network since its inception, paying particular tribute to the work of Messrs. Bennett, Priddle and Ryan, and that with the re-organisation of the State War Effort Co-Ordination Committee that body had no qualms whatsoever in handing the Network over to the Division.

Well, its arrived! What, you don't know? Why the Aerial Changeover Relay for VL2JB, of course. Thanks to "Shorty" Higgins VL2LO and Gordon Wells, it is now possible to change from Transmit to Receive in a split second, due to a very fine piece of apparatus turned out by 2LO. This Relay would be an acquisition to any Commercial Station. Thanks a lot om.

Another arrival was VL2JL with a very fb signal. Although the last station in the Network to put a signal on the air apparently the boys over there who include George Littlefair VK2YV, Ivon Bailue VK2TN and George Paterson VK2AHJ who had been listening round a bit because VL2JL has well and truly snatched the Laurel Wreath from 2JH. We don't know whether there is any truth in the rumor that a certain well known lady announcer from the National Station 2FC will be handling traffic from 2JL. Would you know, 2AHJ?

VL2JJ is putting in quite a strong signal at Control, but speech needs a bit of cleaning up, gang. George Shaeley 2GF and his associates Arthur Springett 2OM, George Waldoek 2GU and Jack Keane 2JN have made quite a nice job of the antenna, but why those three longitudinal supports boys!

VL2JE gave the gang at Control quite a surprise with the strong signal that they put into VL2JB on a couple of Sunday afternoons. This station has quite an excellent radiating system. It uses a three element close spaced array perched at the top of a forty foot pole. It must have been worth while watching Don Reed 2DR climbing to the top, but it would have greater spectacle if the climber had been Jack McNamara 2EQ! Other hams associated with 2JE are Jim Georgeson 2-KU, Jack Dark 2ADQ, Ray Patterson 2AJW and Horry Laphorne 2HL. It is understood that 2EQ is arranging for Jim Gussey's Band to visit 2JE. Oh yeah!

Arrangements have been made for Section Leaders to visit Control, thus giving them an opportunity of looking over VL2JB and speaking to their stations from that location. A Roster has been drawn up so that every Member of the Network will make this

visit. Any member of the Institute who does not belong to the Network is at liberty to visit Control on the first Sunday in May, provided that early application is made.

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NEW SOUTH WALES DIVISION.

The Thirty Third Annual Meeting of the Division was held at Y.M.C.A. Buildings on Thursday 18th. February, 1943. Quite a large number of Members were present, and it is quite safe to say that it was one of the most representative meetings held since the outbreak of war, and to have heard the boys discussing the relative merits and demerits (if any) of their rigs was reminiscent of the "good old days".

The Annual Report published in February "Amateur Radio" was unanimously adopted, and the Council congratulated upon its fine record for the year.

With reference to the Election of Officers, only seven nominations were received, viz., R.A. Priddle, L. Mashman, E. Hodgkins, C. Fryar, H. Peterson, P. Dickson and R. Miller, thus making a ballott unnecessary, and these Members were duly declared Councillors. The Chairman pointed out that the Articles and Memorandum of Association stated that the Institute shall be governed by a Council consisting of seven Members, and as soon as possible after the Annual General Meeting that body - that is, the Council, would elect a Chairman and two Vice Chairmen from among its number, and also a Secretary and Treasurer from among the Members of the Institute. As the New Council will not meet until March, these appointments will be made known in the April issue of the magazine.

A presentation of a Gent's Toilet Set was made to Mr. Warren Garlick who is attached to the Premier's Department. Mr. Garlick has acted as liasion officer between the State War Effort Co-Ordination Committee and the Institute and anticipates being called up for Active duty with the Navy very soon. Whilst occupying the position of Liasion Officer, he has been very considerate towards the Institute, and no reasonable request was ever refused and it was decided that he should be the recipient of a small presentation as a token of the high esteem in which he is held by Members of the Division. In thanking the Members for the gift Mr. Garlick stated that his associations with the W.I.A. had always been happy ones, and trusted that the friendships he had made would be enduring.

Members were informed that the Prisoner's of War Fund now totalled £17/11/6 and that a further donation of £1/1/- had been received from Reg Fagan VK2RJ, making his total subscriptions to date, four guineas.

The Meeting was informed that during the month, Ed Remorenko W3GUF and Joe Peeley W1ADW had been entertained, and as the result of an appeal made for more Members to extend hospitality to visiting

Amateurs Messrs. Don Reed 2Dr. J. Thompson, 2XP, H. Caldecott 2DA and Iven Bailue 2TN volunteered to assist. Should any other member be willing to entertain a "Yank" or any other visiting ham, would they please let the Divisional Secretary have their name and address and particulars of when they would be available. The usual practice is for the VK ham to invite any of these overseas visitors home for dinner and collect as many as possible of the local lads afterwards. Most of the "W's are anxious to meet as many VK's as possible.

One minute's silence was observed in memory of G. P. Bartholomew who went to meet the Great Brass pounder on Christmas Day. G.P.B. was one of the signatories to the Articles and Memorandum of Association, and a Life Member of the Institute.

An interesting demonstration of a piece of very high frequency apparatus was given by Mr. Perce Dickson VK2AFB and this Lecture held the attention of members right throughout.

The next meeting of the Division will be held at Y.M.C.A. Buildings on Thursday 18th March, and all Amateurs are invited to be present.

-----oOo-----

V I C T O R I A N D I V I S I O N

The attendance at the Division's meetings seem to be improving, more being at the March meeting than is usual. During the evening, Alex Clyne 3VX gave a short explanation of his theory to the problem published last month.

The April meeting will be held on Tuesday, 6th April,.

For sometime Ivor Morgan has been working on plans so that a concrete working scheme can be put up to the authorities when the division presses its claim to establish an Emergency communication Network in this state. In order to obtain knowledge of Hams who still remain and would be available to man stations, should permission be granted, they are asked to forward their names and addresses to the Divisional Secretary, Box 2611 W G.P.O. Melbourne.

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The Problem:- Two further solutions to the problem have been received and these will be published in the April issue of the Magazine.

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**THE WIRELESS INSTITUTE
OF AUSTRALIA
VICTORIAN DIVISION**

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

**DO YOU WANT TO BE
BACK ON THE AIR?**



**THE WIRELESS INSTITUTE
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AUSTRALIAN AMATEUR

If you are not a member—

Join Now !

When the time comes that we can reasonably expect to go back on the air, we want to say that we represent—

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Strengthen our hand by writing to The Secretary of the Institute in your State to-day.

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VICTORIA:

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SIXPENCE

APRIL 1943

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A SHORT THEORY OF QUARTER WAVE MATCHING TRANSFORMERS

.. By Alec H. Clyne VK3VX ..

INTRODUCTION... A question was recently asked - "when a quarter wave matching transformer is used to match a transmission line to the centre of a half wave antenna, why is it that the characteristic impedance of the matching transformer must be the geometric mean of the impedances of the transmission line and of the antenna at its centre."

The author will endeavour to answer this question in the simplest manner, but to do this it is first necessary to have the right appreciation of the fundamentals leading up to this subject.

CHARACTERISTIC IMPEDANCE...The characteristic impedance of a transmission line is the impedance which the line presents to the passage of an alternating current and is equal to

$$\sqrt{\frac{L}{C}}$$

where L is the distributed inductance of the line and C the distributed capacity, BOTH PER UNIT LENGTH OF TIME. These quantities are of course dependent on the conductor sizes and spacing and the relation between all these quantities is too well known to be repeated here.

STANDING WAVE RATIO:.. When a transmission line is terminated in a resistance equal in value to the characteristic impedance, no standing waves will appear on the line, but if the resistance and the characteristic impedance differ, then standing waves will appear.

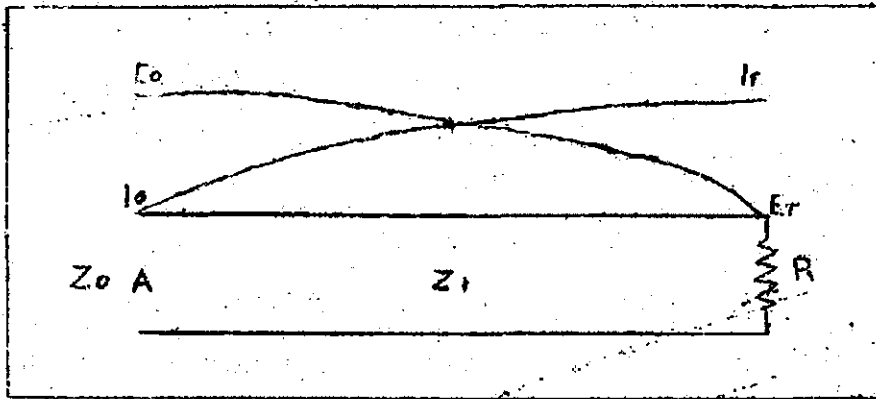
Furthermore the ratio between nodal and antinodal values of the standing wave current (or voltage) can be related to the characteristic impedance and the terminating resistance

thus:-

$$\text{Standing wave ratio} = \frac{Z_1}{R}$$

Where Z_1 = Characteristic impedance
 R .. terminating resistance.

QUARTER WAVE TRANSFORMER. Let us go on to consider now a transmission-line of characteristic impedance Z_1 a quarter wave long and terminated in a resistance R , as shown in the diagram.



If the line be fed by a generator at A standing waves will exist and the standing wave ratio will be:-

$$\frac{Z_1}{R}$$

Let the impedance looking into the end at A be Z_0 . Since at A the curve of voltage is at a point of inflexion, (i.e. its slope is zero, or horizontal) the voltage and current are in phase and the impedance Z_0 is resistive, therefore Z_0 may be evaluated as:-

$$\frac{E_0}{I_0}$$

Also $Z_r = R = \frac{E_r}{I_r}$

But $E_0 = E_r \times \frac{Z_1}{R}$ ($\frac{Z_1}{R}$ = standing wave ratio)

And $I_0 = I_r \times \frac{R}{Z_1}$

Therefore $Z_0 = \frac{E_0}{I_0} = \frac{E_r \frac{Z_1}{R}}{I_r \frac{R}{Z_1}} = \frac{E_r Z_1}{R} \times \frac{Z_1}{I_r R}$

$$= \frac{Z_1^2}{R} \times \frac{E_r}{I_r}$$

$$= \frac{Z_1^2}{R} \times R$$

$$= \frac{Z_1^2}{R}$$

From which $Z_1 = \sqrt{Z_0 R}$

So we see that if an impedance Z_0 is to be matched to a resistance R the match can be accomplished by interposing a quarter wave length of transmission line, the characteristic impedance of which must be

$$\sqrt{Z_0 R}$$

FOOTNOTES:

1. Note that the above relation applies to either end of the quarter wave line so that the match is theoretically perfect, and therefore standing waves cannot appear either on the transmission line (feeders) or on the quarter wave section.
2. The fact that the required impedance works out to the geometric mean of the impedances to be matched is apparently coincidental, it however provides a convenient means of memorising the equation, provided of course that one also remembers what constitutes a geometric mean.
3. The above system has come to be known as the "Q-bar matching transformer" and has achieved a certain popularity, due, the author suspects, to its little understood theory and its relatively spectacular appearance, for in practice it has no advantage over the delta match, indeed it is more difficult to adjust, and the mechanical problem alone, of supporting a heavy quarter wave for, say, the 7Mc band is sufficient to make most hams think twice.
4. And what of the cost? Since the impedance of the quarter wave is relatively low it must be solidly built to achieve stability, which means using copper tubing of say about half an inch diameter, which costs money.
5. Altogether it would seem that Q-bars are a doubtful proposition, unless the user is prepared to put considerable care and patience into their construction, suspension and adjustment, when they should be at least as good as any other matching device.

Mr. R. A. Priddle VK2RA has supplied another method of attack to the problem. Mr. Priddle writes:-

"the equation $Z_0 = \sqrt{Z_1 Z_2}$ is merely a re-statement of the equation for the input impedance of a quarter wave section (A.R.R.L. Handbook 1942 P168) i.e.

$$Z_1 = \frac{Z_0^2}{Z_2}$$

Otherwise it may be derived from consideration of standing wave ratios, which are of course equal to the ratio of the impedance mismatch.

Taking the example quoted, suppose the antenna current at centre is 1 ampere; then voltage at centre is $1 \times 72 = 72$ volts. Now impedance mismatch

$$= \frac{208}{72} = 2.88$$

Then current at far end of the quarter wave section is $1/2.88$ amp, and voltage at far end is 72×2.88 divided by $1/2.88 = 72 \times 2.88 = 600$ ohms, which matches the 600 ohm line.

The actual equation $Z_0 = \sqrt{Z_1 Z_2}$ can be developed by substituting $10, E_0, Z_0$ etc. in the above argument.

Note that Z_0 is the "mean proportional" between Z_1 and Z_2 or in other words that $Z_0 = \frac{72}{Z_1}$ because if:-

$$\begin{aligned} Z_0 &= \frac{72}{Z_1} \\ Z_0 &= \sqrt{Z_1 Z_2} \\ Z_0^2 &= Z_1 Z_2 \end{aligned}$$

Divide by $Z_0 Z_1$ $\frac{Z_0}{Z_1} = \frac{Z_2}{Z_0}$

In other words the mismatch at either end of the Q section are equal.

...ooo...

ANOTHER PROBLEM

No doubt every amateur has lying around his shack many old electrolytic condensers which have seen better days, due to excessive leakage and in consequence loss of capacitance.

In these days when wet type of electrolytic condensers are unprocureable we are hopeful that some of our readers may have ideas for the re-juvenation of these old condensers.

If you have any ideas or better still concrete methods of bringing to life these old condensers let us have it so that we can publish it for the information of other readers.

...ooo...

WOULD YOU BELIEVE IT... A neighboring BCL once wrote to W8VEW as follows:- "Please forgive the writing of this note, but I had to tell you how much I enjoy listening to your station even though it isn't polite to listen in. It comes in very plain on my small set. Hope you don't mind too much." After due consideration W8VEW decided to forgive him. "But don't let it happen again" he added.....QST.

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HOLE IN THE IONOSPHERE

-- Waves lost in Space --

A short note in a recent issue of the Wireless World gives some interesting suggestions as to the manner in which the above phenomenon takes place.

During magnetic storms the ionic density in the F layer is known to decrease very considerably, and failure of short wave communication to occur, because the ionic density becomes insufficient to ensure refraction of the waves. There is evidence that this effect is brought about by the action of streams of corpuscles which arrive in the ionosphere from the sun, but the precise nature of their action is not yet understood. The suggestion as to how this effect may occur is as follows.

Assuming that the corpuscular stream is in itself neutral, i.e. composed of equal numbers of positive and negative particles, it is suggested that on entering the atmosphere the electrons would be retarded much sooner than the positive ions, the former coming to a standstill in the higher atmosphere while the latter penetrate down as far as the E layer.

When this has occurred a large electric force exists between the E and F layers, and this, together with the force of the earth's magnetic field, causes a violent drift of the electrified particles in the F layer, which is in effect a west to east current in the layer. In the E layer there is a tendency for an opposite drift to occur, but owing to the large molecular density at this height the current is much smaller.

The ionosphere is the region of the earth where the electric force was set up, is thus swept fairly clear of electrons and positive ions and a big hole in the refracting layer is thus produced. Through this the radio waves can penetrate and so be lost in space.

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ITEM ... An electronic micrometer accurate to .000002 inch (two millionths of an inch) is being used to measure the stretch of a bolt which holds together two sections of the crank-shaft of an aircraft engine. The bolt is tightened under 1500 foot-pounds tension until it stretches exactly .002 inch.

.....

"SEAFARERS, FOOTSLAGGERS and SKYWAYMEN"

(Incorporating...Slouch Hats & Forage Caps) Hi!

... By 2YC ...

"Struth I dunno....." at least thats what the Sentimental Blucker of immortal fame said about names....but I dunno....I think the lads of the H.M.A.S. Lonsdale have taken "poetic Licence," in their suggestion for our title. Oh, but they are cunning...one puts them a task to provide me with a CAP for the Navy...tricks 'em bad and they switch the whole line...so I leave it to our 5000 ham readers to adjudicate on the matter. From Canberra being the Fed. Capital, I hope to have most learned comment. Hi! I am informed that the services are placed in the order of seniority as per "Nelson of Trafalgar." I had a vague idea of Alfred The Great, myself or some such laddie...but I'm a mere civilian so I am VERY neutral. The rest of the "Lonsdale" news being somewhat libellous I will place in inverted Commas. Hi!

"Harry 3IR has a great job at the moment...instructing WRANS in the gentle art of brasspounding. I understand he is a very popular instructor, by the way....but let's not let our imagination wander. (Possibly he gives them one of those Photos of himself as 1st Class Op...???? 2YC). Cap'n Bligh, 3UH is preparing for sea again...uke and all...just in case another one goes down. In the meantime so rumour has it he is QRL with the charming sister of 4CJ.

5SP seems to be busy, notwithstanding the "ham ban," as he recently sent over an order for gear. And I filled it! How!s that for influence. 5MV also ordered a pair of Test Prods. What is wrong with VK5? I notice a sad lack of notes from my old home town...and I would seem there's a sad lack of gear. (Wish there wasn't such a "complete" lack of notes. Hi! 2YC)

Noticed an error in January QST. They refer to their Colleagues in Australia and their official journal "Break-In."

And now 'tis Harry's turn to punch the keys. "Well, both of the Seafarers unfortunately were unable to attend last months Vic. Division meeting. 3MV was at sea acting on an unfounded idea that a few weeks sea air was good for ones system. Now he is back...says its the vilest form of propaganda issued by non-seafaring medicos. Anyway did at least keep 3MV away from the grog. 3IR too busy QSOing brand new girl friend (Nr.622) filling her with sweet words and lots of grog. Ultimate intentions doubtful...still waiting for 31st March to celebrate twin birthdays with a certain very attractive lucious blonde Dental Nurseand then I think the boat should have had "Little" in front

(Continued on page 9)

SUPERCONDUCTIVITY.

This phenomenon will probably for long save us from too smug a complacency about our understanding of the electrical behaviour of metals. There are a few laboratories, notably that in the University of Leyden, in which has been developed the peculiar and difficult technique of experimenting at temperatures more than 260 degrees centigrade below that of ice and within the last half dozen degrees above the absolute and unattainable zero of -273 degrees.

Here in balks of liquified helium gas, metallic conduction "runs wild." According to theory specific resistance ought to diminish steadily to zero at the absolute temperature zero. Actually it often tends to break away as if intending to finish as a very minute "residual" resistance. But many metals reverse this tendency by suddenly losing all their resistance several degrees above the zero. This is known as "super-conductivity" and though it has been said that we only have to induce this virtue at ordinary temperatures to solve many of the power engineers difficulties, he would face a new nightmare if we succeeded.

Actually the transition temperature at which this strange effect sets in has been raised by alloying, but only a degree or two.

Direct resistance measurement here becomes wierd and unmanageable, but one sidelight from familiar radio constants is of interest. We know that when a potential is applied or removed; the change in current is not completed quite instantaneously, but except for an inductance of large choke size takes about one thousandth to one millionth of a second.

On a famous occasion, the Leyden physicists induced a current in a metal ring immersed in liquid helium gas at a few degrees above absolute zero, then removed the source of potential and sent the whole apparatus to an English scientific gathering by aircraft; so complete had been the loss of resistance in superconductivity that the fall of current took hours instead of micro-seconds, and the English gathering found the current still running.

-----oOo-----

ITEM...Black crackle finish which has become filled with dust may be made to look like new by wiping with a clean rag soaked in any light oil. The oil should be allowed to remain on the surface for an hour and then thoroughly wiped off.

W3ERV..QST.

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TERMS OF INTEREST

A method of preventing jamming of radio messages while still maintaining secrecy has recently been patented by Francois C. Henroteau of Ottawa, Canada. This is accomplished by use of a key plate which varies the frequency of the transmitter in an irregular manner according to a pattern on the plate. A similar key plate at the receiving end removes the distortion. If the enemy should happen to find out the pattern the key plates can be changed.

China's Transmitters-- The Chinese have established at Chungking the headquarters of the broadcasting service which now operates a dozen transmitters. The chief station is the medium wave 75KW transmitter XGOA which has been transferred from Nanking to the present Chinese Capitol. Also situated at Chungking are two short wave transmitters each of 35KW. There is also a 10KW short wave transmitter in the province of Kweichow and a 60KW medium wave transmitter in the province of Yunnan. The Chungking transmitting apparatus has been installed in bomb-proof shelters within the hills on which the city is built.

QST for February publishes details of a new electronic device which signals and measures ice forming on airplanes in flight, and automatically operates the planes' de-icers. The ice indicator provides the pilot with information on the thickness and the rate of accumulation of ice on the exposed plane surfaces and permits the de-icing equipment to be turned on at the exact moment it becomes most efficient. The indicator which used electronic principles for its operation is composed of three separate units. A pick-up or sensing element is mounted on the wing or plane surface where ice accretion is to be measured. This element is very small and is set flush with the plane so as not to disturb the airflow. The element is connected to an amplifier inside the wing, which in turn is connected to a power supply unit. The latter does the actual work of turning on the de-icers and registering the accumulation of ice on an instrument on the dash. The entire equipment weighs less than five pounds.

Argentina has opened up the 5 metre ham band, and in order to create a good supply of radio operators has made the requirements for obtaining amateur licenses much simpler.

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air at their main transmitting station.

VK2ANF still remains a land-sailor and works lots of DX for the Navy. Roll on for the duration says Jack.

VK2ACG also just another land-lubber and looks after an 8KW rig and six or seven smaller outfits for the U.S. Navy.

VK4RF...Ahem! STILL leading a quiet life more or less (but still able to remember A.R. needs notes, thanks very much..2YC). Hair is gradually turning grey with worry teaching WRANS how to work DX for the silent service. Now quite Blase about handling HQ 120s and anything else the US like to give us...what say 2ANP? HI!

Thanks OMs for all the news...as I've said and must say again.. six other correspondents as keen as the Canberra...Little...oh I mean THE Lonsdale group and everything in this Column whatever name we publish it under would be fb. Lastly I wish to thank..ahem!... one of my friends of high rank who spent an evening here...told me lots of lovely news of lots of Hams you'd all like to hear about and on leaving remarked..."of course, Jim, that all for yourself-~~P~~ Don't forget that in Slouch Hats and Forage Caps...wouldn't it! It's like seeing "non-existent" Spitfires flying around the sky. HI!

Another lastly...I hear Johnny Traill is down in VK3 doing quite a bit of "posting"...I say Johnny how about getting a WAAF to post me those NOTES promised a year ago...HI!

All notes to Jim Corbin, 78 Maloney Street, Eastlakes N.S.W. or if you like to 3RJ? R.A.A.F. Pt. Piper.

D I V I S I O N A L N O T E S

.. Federal Headquarters ..

At the March General Meeting of the Federal Executive discussion centred around the operations of the Prisoner's of War Fund. Councillors were informed that the balance of the Fund was now £25/14/0 and that it was understood that the Victorian Division had also collected a considerable sum. The Chairman pointed out that the Red Cross Society was the only body permitted to send parcels of food but unfortunately that body could not guarantee delivery to any specified individual. Next of kin are the only persons permitted to forward clothing. Other persons may send books, games, playing cards etc.

It was decided that a cash donation be made to the Red Cross Prisoner's of War Fund realising that this would help any Amateur in a P.O.W. camp indirectly and that an endeavor to be made to arrange some form of Rostex with the next of kin regarding other types of parcels.

NEW SOUTH WALES DIVISION.

The usual monthly General Meeting of the Division was held at Y.M.C.A. Buildings on Thursday 18th. March. The attendance as at previous meetings was quite large and reminiscent of pre-war days. The Chairman extended a welcome to Flight Lieutenant Morry Meyers VK2VN and Bill Sievers VK3CB.

The Chairman informed the Meeting that Council, acting under the powers conferred upon it by the Articles and Memorandum of Association had elected the following Office Bearers for the ensuing year:-

President and Chairman	-	R. A. Priddle	VK2RA
Vice Presidents	-	H. Peterson	2HP and
		E. HODGKINS	VK2EH
Secretary	-	W. G. Ryan	VK2TI
Treasurer	-	W. J. McElrea	VK2UV
Councillors	-	P. Dickson	VK2AFB
		L. Mashman	VK2OB
		C. Fryar	VK2NP
		R. Miller	
Assistant Secretary	-	N. Gough	VK2NG
Assistant Treasurer	-	E. Treharne	VK2AFQ

Newcomers to the Council are Messrs. Hodgkins VK2EH, Mashman VK2OB, Fryar VK2NP and Treharne VK2AFQ. Although new to Office these Councillors are quite well known to Amateurs and their election should greatly benefit Experimental Radio in New South Wales. It is quite safe to say that the Council as now constituted is the strongest and most representative body to look after the affairs of the Institute since a few years before the outbreak of war.

The rest of the evening was devoted to a discussion on the position of the Network not forgetting the virtues of Fone. V. CW sponsored by Messrs. Jones and Meyers.

Morry Meyers VK2VN gave a short resume of his wanderings during the past two years, but unfortunately as time was getting on, what had promised to be a very interesting talk had to be cut short. For the same reason a Lecture on "Frequency Modulation" that was to have been given by the Chairman R. A. Priddle had to be postponed to the April General Meeting.

The April General Meeting of the Division will be held at Y.M.C.A. Buildings on Thursday 15th April commencing at 8 p.m. and as stated in the previous paragraph a Lecture "Frequency Modulation" will be delivered by the Chairman and all Amateurs are invited to be present.

.....

EMERGENCY COMMUNICATION NETWORK.

The first Network Traffic Exercise was held on Sunday afternoon 7th March with stations VL2JF, JI, JG, JL, JM and JN participating and the manner in which the operators attached to these stations handled the messages was very gratifying, so much so that the Radio Inspector was invited to another demonstration on the following Friday night and he, too, was more than surprised at the ability shown. On Sunday 14th March the balance of the Network stations participated, but unfortunately with one exception these stations did not exhibit the same degree of efficiency.

In an endeavor to bring all stations up to a high degree of efficiency it has been decided to grade the stations into two Divisions as follows:-

"A" Division

VL2JG
VL2JH
VL2JJ
VL2JL
VL2JM
VL2JN

"B" Division

VL2JC
VL2JD
VL2JE
VL2JF
VL2JI
VL2JK

These gradings have been made upon the performances of the stations during the message handling tests held over previous weekends. It must not be taken for granted that those stations that are at present graded in Division "A" will automatically retain that position.

It has been decided to hold exercises two nights weekly "B" Division to participate on Tuesday nights and "A" Division Fridays and a competitive spirit will be introduced. Points will be allotted under two headings - Station Operation subdivided under the following headings:- Percentage of operators present each month, Punctuality, Signal Strength, Quality of Transmission.

The Second Section will deal with Message Handling and points will be allotted for Procedure, Accuracy and Speed. At the end of each month all the points gained by each station will be added together and the six stations with the highest totals will go into "A" Division. In addition the station gaining the highest total each month will hold the W.I.A. Efficiency Pennant for the following month. In order to win this Pennant outright it will be necessary for a station to win it three times in succession or five times in all. So its up to you boys! At the present moment there are two if not three stations in "B" Division whose efforts just fall short of "A".

Opportunity is taken to thank those Country Members, particularly VK2ACT, VK2GI, VK2AMR, VK2ACP, VK2ALO, VK2AHM and VK2II for their co-operation during a recent test. Sorry boys, but we don't QSL!

What a great guy this fellow "Shorty" Higgins is. Upon a recent visit to control he noticed that the mike stand wasn't adjustable. It now is. Tax om. Any time you want a piece of 73 gauge fuse wire, just ask 2LO and he'll oblige.

VL2JJ hit the high spots on a recent Sunday afternoon, so much so that after a lot of heartburnings they made Division "A" of the Network and not satisfied with this, went ahead and topped the score for Division "A" at the end of the First Round for the Pennant. Congratulations fellows, and keep up the good work, but a word of warning. Forget that ham "slanguage" when handling traffic or else ---.

VL2JM put up a good performance in "A" Division during the First Round, but unfortunately seems to think that the operators at control write the messages down in shorthand. We don't em. It must be perfectly legible longhand so just drop into second gear occasionally.

VL2JL was hard on the heels of 2JM but anxiety to do well apparently was the reason for several errors.

VL2JH lost a considerable number of points through not being alert. Remember chaps, and this means every operator, you should keep your Receiver tuned in on Control all the time.

VL2JI has now managed to erect his beam and does he put a signal into Control. Quality is very nice too. Very keen on relaying messages. Topped "B" Division in the first round and just missed heading both Divisions. Congrats em. By the way chaps, Charlie is a very keen cyclist and is anxious to obtain a reliable trainer.

VL2JC also did well for the "B's" but watch your procedure and alertness boys. The same remarks apply to you as to 2JH. Both stations lost points through not being alert and ready for their call.

VL2JE are still battling alone and this station has received more rebuffs than any other, but nevertheless managed to raise a very respectable total under the circumstances. Keep going fellows, you never could keep a good ham down.

VL2JK, after 2JI's glowing reports on his beam has now decided that possibly the Technical Committee were right after all and Lionel and Co. are now busy measuring feeders etc.

Well chaps here are the points for the first round:-

VL2JJ	48	VL2JC	41	VL2JG	5
VL2JI	47	VL2JH	38	VL2JN	5
VL2JM	45	VL2JE	34	VL2JK	2
VL2JL	42	VL2JF	7	VL2JD	0

Points are allotted as follows:-

Signal Strength	10	Accuracy	10
Quality	10	Punctuality	5
Procedure	10	Alertness (Speed)	5

At the end of each month a bonus will be added to these points for attendance.

So much for the first round. A few disappointments were JF, JG, whilst JI and JC did exceptionally well.

.....

VICTORIAN DIVISION:

Since the outbreak of the war the Victorian Division has been conducting Morse Classes. Now that each branch of the Fighting Services has instituted its own training classes, the attendance at the Institute's Classes has fallen to such an extent that it was deemed advisable to discontinue with the classes.

The Institute Classes, with Mr. H. N. Stevens 3JO as Class Manager, together with a very willing band of instructors, all of whom offered their services voluntarily, filled at that time a gap which unfortunately was not realised by the Military Authorities, as the standard of instruction was very high, and anyone passing through the classes eventually became a first-class operator.

The council of the Victorian Division thanks most sincerely all those Instructors who so willingly gave their services.

The Divisional Council added the sum of £5 to the amount collected at the meetings, thus making a total of £15 in the Prisoner of War Fund. This amount has been forwarded to Federal Headquarters, and will be distributed at F.H.Q.'s discretion.

By this time all former licensed amateurs in the Metropolitan area, not already in the Services, will have received a circular in regard to a proposed ECN scheme. An early reply to this circular would be appreciated as it will help considerably the final details of the proposed scheme which Mr. Ivor Morgan 3DH is drawing up to present to the authorities in an endeavour to have such a network established in Victoria.

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**THE WIRELESS INSTITUTE
OF AUSTRALIA
VICTORIAN DIVISION**

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

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BACK ON THE AIR?**



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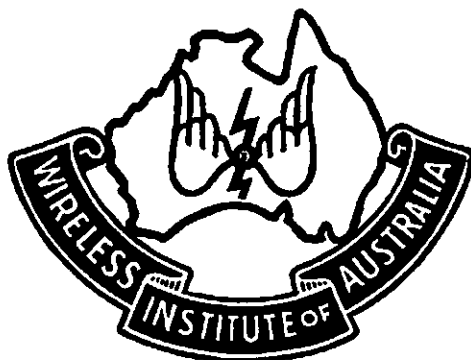
BOX 547E, G.P.O., HOBART.

SIXPENCE

MAY 1943

AMATEUR RADIO

THE
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WIRELESS INSTITUTE
OF
AUSTRALIA



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May, 1943

.. A LOW POWER MAGNETRON ..

By F. P. Dickson. VK2AFB

The Magnetron is never likely to be very suitable for amateur transmitters because of its poor frequency stability and the difficulty of modulation. Its principle of operation however, may yet be of great importance to us in UHF work since a recent development wherein the Magnetron is combined with a cavity resonator. This results in a valve capable of operating at extremely high frequencies with good efficiency and stability. This type of valve is called the "Turbatron" and will be referred to later.

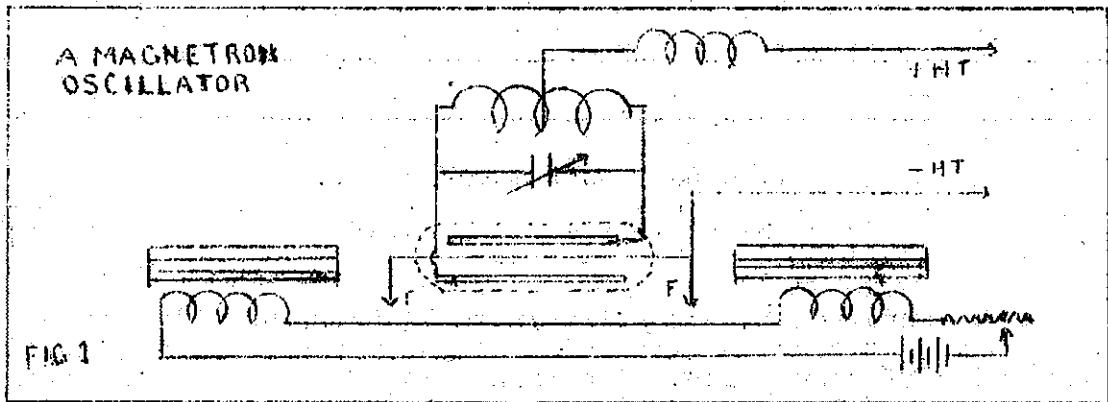
With a view of finding out something of how the Magnetron works in practice several experimental valves were constructed. One of these was particularly successful and was demonstrated at a recent N.S.W. Divisional Meeting. The valve was made quite small, and for the sake of simplicity a plain Tungsten filament was used, which gave quite sufficient emission for the purpose. The two half anodes, since it was a "split" anode magnetron, were 18 mm in length and 2.5 mm radius. These were mounted with a gap of 0.5 mm between their edges.

The filament was mounted along the centre line of the assembly, very nearly parallel to it. Some slight deviation from symmetry is necessary since with a perfectly symmetrical arrangement oscillation will not start. The whole assembly was sealed in a T9 bulb.

To provide the necessary magnetic field an electromagnet was set up with a pole gap sufficient to admit the bulb, the windings being on two bobbins and the magnetic circuit completed through a massive soft iron yoke. This magnet was energised from a 6 volt battery and drew 3 amps with the 15 ohm control rheostat all out.

For low frequencies a coil and condenser were used in the tuned circuit, connected between the half anodes, while for frequencies above 100MC, parallel rods were used. The lowest

and highest frequencies observed were 12MC and 250MC. At 250MC however, the output was poor because the pinch type of construction was unfavourable at these frequencies. Lecher wires were used for measurement in this range, loosely link coupled to the oscillator, see Fig 1.

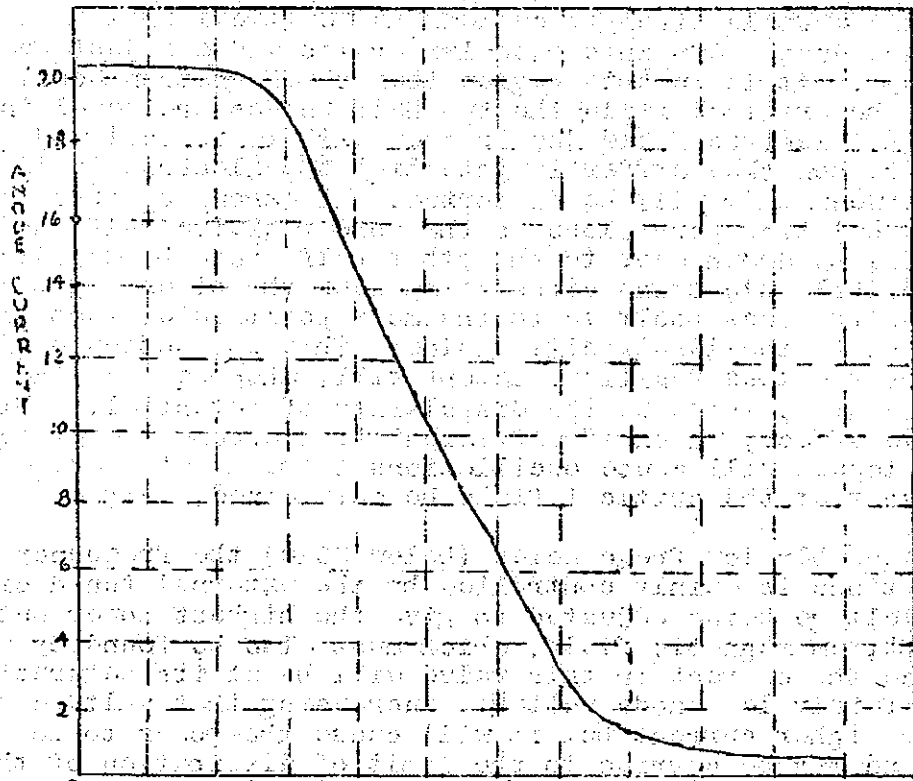


The electrical characteristics of the valve are few and simple:-

Fil Current ... 2.5 amps
Anode Voltage ... 300 volts.
Anode current
(no field-) ... 20 M/a
Anode current
(max field)... 0.8 M/a
Anode dissipation. 7 watts.

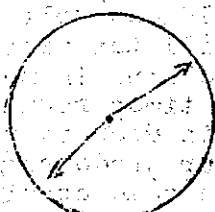
The valve is set up between the poles of the magnet so that the lines of the magnetic field are parallel to the axis of the assembly. If current be drawn from the two half anodes tied together and the magnet not energised, about 20 M/a will flow. This is all the emission available at the particular filament temperature and about 60 V would be enough to draw it over. The electrons proceed in straight radial lines to the anode with velocities depending on filament temperature and the gradient due to the anode voltage (300 volts).

If now the magnet is started it will be seen that at a certain field strength the anode current will begin fall and then drops very rapidly with increasing power till a low value is reached, beyond which the current cannot be much decreased. See Fig 2. This may be explained by the fact that an electron being a moving electric charge, will tend to alter its direction of motion in accordance with the Left Hand Rule. In this case the electrons change from their straight radial paths to paths of increasing curvature till they finally are travelling in circular orbits round the lines of magnetic force and so do not reach the anode. A further increase in field makes the circles smaller as in Fig 3.

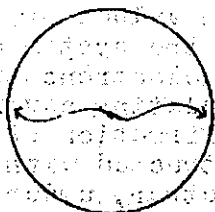


Control of anode current by field magnet

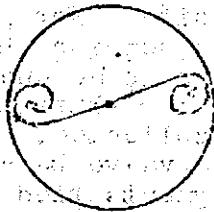
FIG. 2.



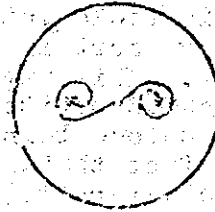
NO FIELD



WEAK FIELD



CRITICAL FIELD



STRONG FIELD

How the magnetic field causes the fall of anode current. Electrons behave according to Fleming's left hand Rule.

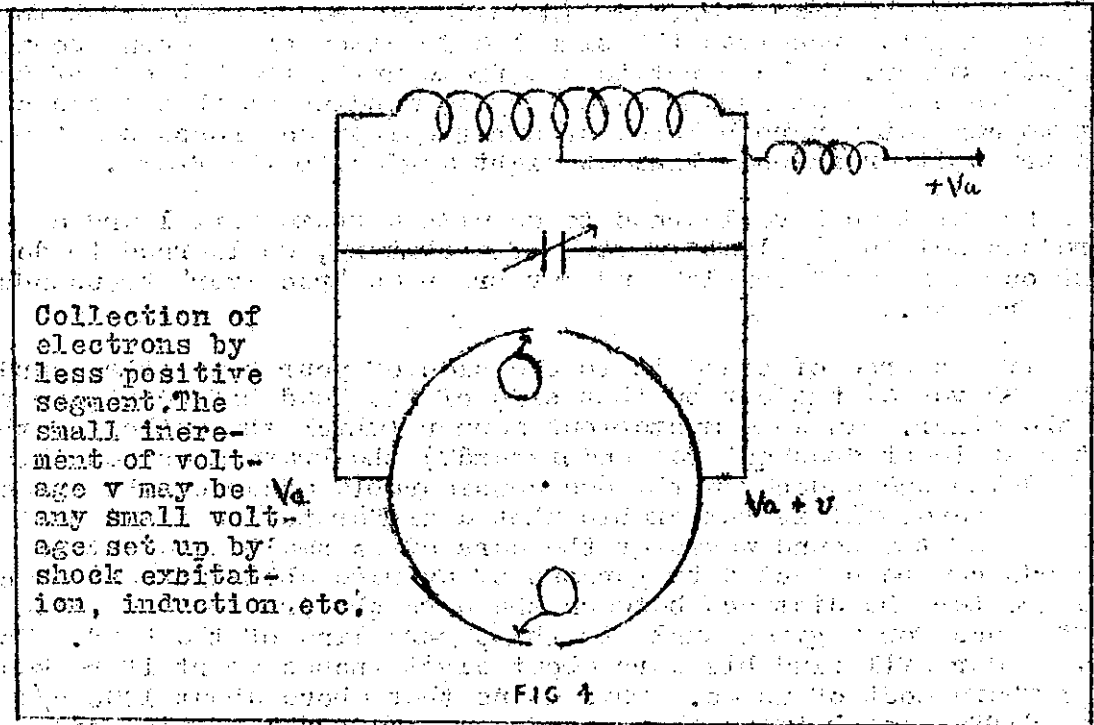
FIG. 3.

There is a field strength called the "Critical Field" where electrons are just drawn into circular orbits and are just grazing the anode. It is in this region that the Magnetron Oscillator works. If the critical field the two half anodes are equal in potential the electric field due to them will be radial and uniform, but when they differ in potential the electric field near the gaps between them will be distorted. Electrons under these conditions, circulating very close to the more positive half anode near the gap, will be drawn over to the other half anode by the distorted field. Similarly electrons circulating near the other gap and tending from the less positive to the more positive element will be drawn back to the less positive side. This collection of more electrons by the less positive element will, when we have the tuned circuit connected, increase the disparity of potential. This is a cumulative effect, which if sufficient to overcome the circuit resistance losses will cause oscillations to be maintained, provided always that the critical field be maintained. Fig 4.

At reasonably low frequencies (below 30MC) the frequency of the oscillations is mainly controlled by the external tuned circuit, the anode voltage being adjusted to give the highest power output with the optimum magnetic field, which must also be found by adjustment. Since the current in this valve will be at its saturation value with fairly low anode voltage, increasing that voltage will not produce higher current but it will cause the power to be increased and may be carried to the limit of dissipation of the anode. In this particular case the anode dissipation is severely limited by the risk of filament bombardment.

In the higher frequency range other factors become of greater importance and at very high frequencies the external tuned circuit is merely resonated to the frequency generated in the valve. This is controlled by the dimensions of the valve, the voltage and the magnetic field intensity. For given values of field and voltage there are certain frequencies where the system oscillates most readily. This appears to be due to electrons travelling in more complicated orbits and perhaps circulating several times round the system before being collected. Confirmation of this view is given by the fact that if a valve be constructed with four anode segments and the alternate segments tied together, under the same conditions the frequency will be twice that generated with two sections only.

It should always be remembered that in these valves the tuned circuit is connected between the anode segments and that the oscillatory currents are confined to this portion of the valve. The filament is purely a source of electrons and does not enter into the high frequency side at all. As a result, wiring can be made very short and there are no awkward by-passing or filament choking problems.



The "Turbatron" is an extreme type of Magnetron where the anode segments (as many as 6 or 8) are made part of the walls of a cavity resonator. Because of the high Q of the cavity resonator the frequency stability is good and the efficiency high, and since at very high frequencies the cavity resonators are physically small, they can be built into valves of reasonably size.

Modulation of these valves presents some difficulties. If the attempt be made at high frequencies to modulate either anode voltage or the magnetic field result in frequency shift or stoppage of oscillation. Success has been obtained by the use of grids, but this method was not tried in these low power valves, from lack of time.

Loop modulation, can of course be used, but in these days it could almost be described as unethical. An almost equally objectionable system was used here, that of modulating the filament current with the output of an audio amplifier super-imposed on DC heating current. Owing to the low thermal inertia of the filament the emitter would follow the audio frequency and some modulation was obtained. It is not however, recommended for use in transmitters. It may be that these magnetrons can be frequency modulated and if that is the case, there may be many interesting possibilities for them.

SOUND WAVE DIRECTION FINDING

An interesting analogy between radio and sound waves concerns the effect of the direction of the source.

If we want to find the direction from which a radio wave is coming we use a frame aerial. The side of the frame nearest to the transmitter receives the signal a fraction of a second sooner than the other. We can rotate the frame until the "phase" of the signal in each side is the same. By so winding it that these cancel out we can get a zero balance on our receiver and hence say that the transmitter is on a line at right angles to the frame.

Now what we have learned to do with a frame aerial and a wireless set in the last quarter of a century, we learned to do with our ears as "aerials" and our brain as "receiver" thousands of years ago.

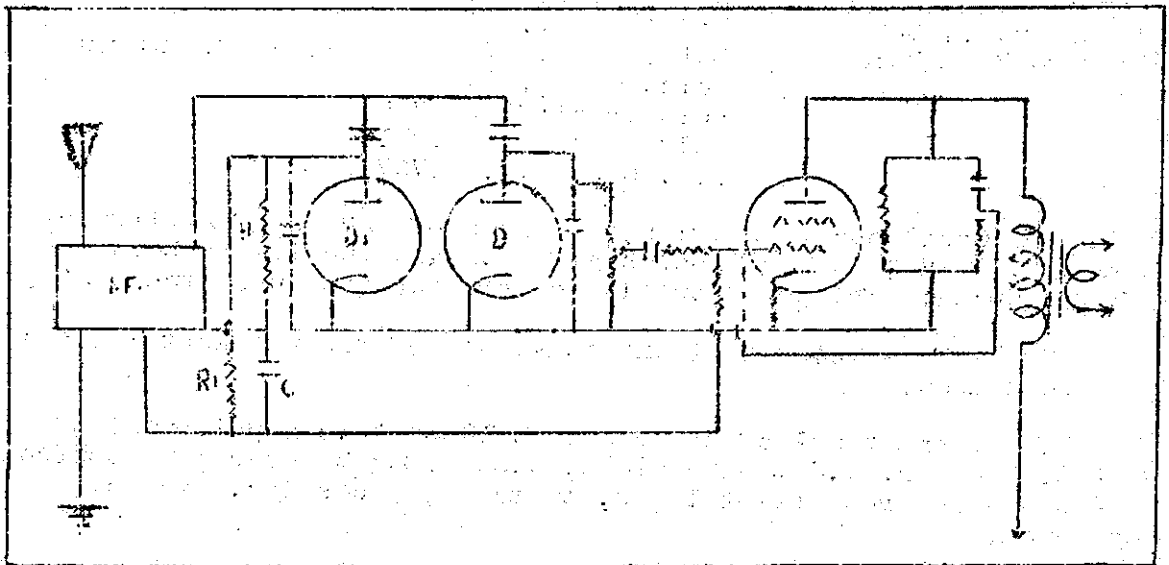
If a source of sound is to one side of your head, the sound wave arrives at the ear on that side of the head before it arrives at the other. In some mysterious manner (which the author of these notes at least does not yet understand?) the brain measures this time delay and deduces with some considerable accuracy the direction of the sound. It is remarkable that a difference in times of arrival of the sound waves at the ears of as small as about 50 micro seconds can be detected by persons of average ability! Now of course the greater the distance between the ears the greater the time difference for a given angle to the centre line of the head. Now the reader will find his ears about eight inches apart if he keeps them where most of us do. This means that above about 1000 c/s the time difference between the ears for a sound fully to one side of the head represents more than one cycle. This introduces certain complications and we have to judge direction at high frequencies from the fact that the head screens the ear than the other. This is not so reliable as the use of time differences for we become dependant upon equal sensitivity of the ears which may depend upon our not suffering from catarrh!

This sheds some light upon the fact that small animals can make more use of higher frequencies than we can. In such tiny creatures as, for example, the crickets, the head is so exceedingly small that ears in the normal position on either side of the head would be so close together that the time delay would be so small as to be useless for direction finding of sounds. As this may be his only way of ascertaining the whereabouts of his wife, the matter is of some importance to a cricket! Nature has therefore thoughtfully placed the cricket's ears in his knees at which point he is the widest! He can thus find his way to (or from) her with surprising accuracy. That this directional ability is really due to air borne

AUTOMATIC VOLUME CONTROL

When receiving weak signals, the effect of AVC is to accentuate the high-pitched background of inherent noise. Similarly, when receiving weak signals on short waves, the tendency to rapid fading produces a low pitched frequency of the order of 60 to 80 cycles, which is likewise emphasized by AVC action, unless steps are taken to suppress the effect.

In the circuit shown provision is made to cope automatically with both drawbacks. Signals from the IF amplifier are fed through a diode rectifier D to the AF amplifier and loudspeaker the ordinary way. A second diode D1 supplies AVC voltage to a resistance R which is smoothed by R1 and C, and supplied both to the IF stage and the control grid of the AF amplifier. The output circuit of the latter includes a resistance capacity shunt from which a tapping is taken back to the control grid. The shunt impedances are such that the negative feedback automatically suppresses the very high and very low frequencies. The suppression comes into action only when the AVC control is near its maximum, i.e. when receiving weak signals.



Continued from page 6 -

waves and not to any form of ground vibrations has been proved by some ingenious experiments in which crickets were suspended by miniature balloons. It was found that they could still find their mates until one ear was destroyed, after which they answered each other, but could not judge the correct direction.

- From the T & R Bulletin.

A RECEIVER DE-LUXE

It is not uncommon to read in American Magazines of receivers of 15-18 tubes, but to read of a set using no fewer than 35 tubes gives one a bit of a shock. Yes--believe it or not such a set was described in a recent issue of Radio News. We regret that the publication of the circuit is beyond the scope of Amateur Radio, but for the interest of readers the details and tube line up may give someone ideas.

The set comprises:- Frequency modulation tuner. All wave tuner with noise squelching. Oscilloscope modulation meter (using a 902 cathode ray tube) and high fidelity audio amplifier with recording section incorporating a decibel meter. Taking the set section by section the tube lineup is as follows:-

<u>F.M. Section</u>	<u>Allwave tuner</u>	<u>Audio amplifier</u>
R.F. 7A7	R.F.1 7A7	7B4 ... 1st Audio
Mix Osc 6K8GTX	R.F.2 7A7	1612 ... Vol Exp
1st IF 1B52	Mixer 7Q7	7A4 ... Vol Exp Amp
2nd IF 7A7	H.F.Osc 7C7	7A6.... Vol Exp Rect
Limiter 7C7	1st IF 1612	7A4 ... Tone Control
Det 7A6	2nd IF 7A7	7N7 ... Phase Invert
Magic eye .. 6U5	3rd IF 7A7	
Voltage Reg. VR105	Dot 7B6	6B4GP.P. output
	Noise amp .. 7C7	
	Noise rectifier..7A6	
	Voltage reg. ..VR105	
	B.F. Osc .....7C7	

The Oscilloscope Section comprises of 7A7 as IF Amplifier; 6F6 C.R. Driver; 902 cathode Ray Tube. The rectifiers being a 1V and an 84. The power supply for the receiver uses two 5Z3's.

It will be noted that extensive use of the new Loktal Tubes has been made.

The front panel of the set resembles the control panel of a B.C. Station...3 tuning dials, C.R. Tube; 2 meters; 25 control knobs and numerous pilot lamps, switches, jacks etc. are in evidence.

All in all quite a handy little gadget to have around the shack.

.....

"SEAFARERS, FOOTSLOGGERS and SKYWAYMEN"

(Incorporating ... Slouch Hats & Forage Caps) Hi!

.. By E YC ..

By the time we go to print next month I should have some news as to the popularity of our "pro-tem" heading - or have it superceded by a new effort.

By some oversight I left a rather important piece of news out of last month's column. News came over Tokio radio that F/O Bill Moore and our ex-Federal President and VK 3 Councillor is "alive and well." He did not broadcast personally and the message was very brief. It possibly points to Bill now being in Japan. Guess we all feel that's not so very good--but it is good to know he survived the taking of Batavia and is alive a year after so he should be Federal President in the future.

There is news of F/Lt. Douglas 3YK, who now seems to be stationed around Brisbane these days. He was luckier than Bill, getting out of Batavia - just in time.

Oec. Horne 2AIK - seems to have landed up Torres way along with Hannaford.

Rex Black 2YA - who did his sigs. rookie course with 3RJ, 9XX and 2WW way back in 1940, is now a F/O in Armament section--quite a change what! Rex has had plenty of changes. Went to Richmond sigs. office for a few months after finishing his training from dear old Ultimo, which in his day was "being only got ready" for use (hi). However two escort trips to Vancouver with Empire Air Scheme trainees, and the trip home with nobody to mind or to mind "them" should have made Rex look with favor on the R.A.A.F. But these trips came to an end and then Rex with Frank 2QL was interviewing the lads who wanted to be ops., remember them Ray, 2HC??? But the boys soon became replaced by girls and the day of the W.A.A.F's dawned. Next trip he had was a trip to Brisbane - where the place was crawling with "dit Happy" yls, hi! (I particularly like dit happy, Rex--2YC). I don't know whether Rex got the dit Happiness but he took an Armament Officer's course and now looks at sigs. "from the outside." But the ham blood is there and occasionally the sigs office in the early hours of the morn gets a little "outside" help...hi!

Now I've got to "demote" somebody. I made Ted Peppercorn--2QJ, a Captain and he was only a Corporal. (Please Freddie, it was only a little mistake). Anyhow they have made him a Sergeant now--so you see I was right - Commission will not be long coming now - Ted. They always read my column in the "right" places.

VK 3EF .. Bert Paull of Warracknabeal writes that he has now passed his Armourer's and fitter armourer's exam. and graduated from the school at Hamilton as L.A.C. His address now is - 58017, L.A.C. Paull A.E., Group 680 R.A.A.F. Bacchus Marsh.

AGI Day, C.J -- VK3GY and former 200 metre merchant has now completed his wireless mechanics course and is awaiting posting. Clem is well known amongst the Western District boys, as for some years he was located at Camperdown.

VK3LN...Sgt. Len Moncur turned up at a meeting recently. Former Distribution Manager of Amateur Radio, Len now spends his time as Radio Mechanic at Operational Station in Victoria.

VK3UC...Sgt. Doug. Norman R.A.A.F. figured in the list of Awards recently gaining a "mentioned in Despatches. The citation reads" Sgt. Norman was in charge of the Wireless Detachment at the time of the occupation by the Japanese Forces. He successfully evacuated his personell and equipment, and although ill, continued to maintain a watch on all enemy aircraft in the area" - Congratulations, om....The occupation was that of Salamaua and for several months Doug was dodging about the Territory and putting up what must have been "a good show".

Pilot Officer Len Burston VK3BV, formerly of Wangaratta is now at Mt. Gambier. Enlisting in 1939 as a W/T Op. Len went to Singapore in 1940 and arrived home last year after taking part in the trek from Khoto Bahru via Malaya, Sumatra and Java. Originally, he was on the same station as Roy Prowse VK3XS, but lost track of him during the last few days in Singapore. 3XS was one of the boys who was unable to get away and we hope to hear news of him, too, soon, even if it has to be over Tokio Radio.

Jack Coughlan VK3ST was last heard of instructing W.A.A.F's in VIM. It seems to be a Ham pastime, Hi!

Another ham who has just finished his R.A.A.F. Wireless Mechanics Course is VK3EM, Ted Minifold. And from the same Course Bill Wonder of the old Fitzroy Radio Club also graduated.

Graham Colley 3QZ should by this time be sporting the uniform of a Pilot Officer. When last heard of Graham was attending the RAAF School of Administration. Nice going om...keep up the good work and one of these days you'll be an Air Marshall.

After being posted at the one place for over two years the powers that be at last remembered there was a chap such as Dick Giddings 3DG. As a result Dick has at last reached the High Rank of Flight Sargeant. You'd better see 2LZ, Dick....they forgot and still forget him...2YC.

Another ham to be heard of at long last is Ken Rankin 3KR. We believe that Ken is now a Warrant Officer, but no other details are to hand...but here's hoping....2YC.

Unfortunately, Hamdom like all other avenues of like in Wartime, must Pay the Supreme Price. It is with regret we list that Jim Colthrup VK3PL lost his life as the result of air operations over Europe...no details are available. We extend our sympathy to his relatives and close friends and assure them that Jim as 3PL will be always remembered by Hams scattered far and wide.

Alf Moya 2EW says that any hams passing through Wagga, and many a

do these days, will be very welcome if they call in at Anderson's Pharmacy in Bayliss St. And don't forget Alf, when they do, pump 'em dry and send the news to THE column. HI! After all, beer is scarce and a few tablespoonfuls of SVR will get me tons of news Alf.

And lastly, and a tragedy for ZYC...4RF has been moved from Canberra and I lose easily my most consistent helper in this column. As I have said how he managed to get the news was beyond me, but shows what can be done by you all wherever you are or how few hams you meet. 4RF now sails the Seas in the Manoora, now with H.M.A.S. in front of the name. Oh, well, son she is cut above the old Jervis Bay...but more than that I couldn't say. HI! That should be nice cheerful news. And what I want to know is...WHO sends me Canberra news these days...how about your Chief Petty Officer????

And that is THAT. Many thanks VK3s for all the news from your end. One thing I want to avoid above all else is to have this a kind of VK2 affair. To put in the chorus...THIS is YOUR column..ALL of you, no matter where you are and I'll fill it as long as YOU send the dope. Thanks oms...

P.S. Did you see OUR ADVERT on the Back Page...??? (at least some one reads the adverts.....Ed "AR") ZYC.

.....

D I V I S I O N A L N O T E S

.. Federal Headquarters ..

At the April Meeting of the Federal Executive members were informed that a very fine donation amounting to £15/13/6 had been received from the VK3 Division towards the Prisoner's of War Fund. This sum represented an amount of £10/13/6 that had been collected from among the Members and five pounds had been added from Divisional Funds. This generous gift raised the total to £21/7/6.

It was decided that the sum of £5/5/- be donated by Federal Headquarters to the Australian Red Cross Prisoner's of War Fund and that each Prisoner of War whose address was known should receive a parcel of comforts. These parcels have now been despatched and if YOU know of a ham who is a P.O.W. please forward his name, rank and address on to your Divisional Secretary or the Federal Secretary, Wireless Institute of Australia, 21 Tunstall Avenue, Kingsford, N.S.W.

....oOo....

NEW SOUTH WALES DIVISION.

The April General Meeting of the Division was held at Y.M.C.A. Buildings, Sydney on Thursday 15th April.

It had been intended to demonstrate the auxiliary power supply for the E.C.N. but due to a late delivery of the universal transformer it had been found impossible to complete the unit in time for the Meeting. This pilot model is being built up of Charles Fryar VK2NP and as he is quite a tradesman, members should not lose by the delay. This unit will be completed prior to the May General Meeting, and it is hoped that transformers will be available for distribution among Section Leaders.

An interesting letter from Morrie Lusby VK2WN who was attached to the Australian Legation at Washington, was read, and two colored prints illustrating a new color process in photography were passed round for inspection by members. Any old friend of SWM's who would care to write him, my address correspondence as follows:- M. Lusby, Scientific Liaison, Australia House, London, England.

At the conclusion of general business an interesting talk was delivered by Arthur Springett VK2OM on his experiences at a certain local Police Station!

...oo...

EMERGENCY COMMUNICATION NETWORK

Well, the first series of message handling exercises have been completed, and what a ding dong fight it was between VL2JI and VL2JJ and 2JI the eventual winner, the margin being 7 points. Right up to the last round only one point separated these stations, but during the last exercise 2JJ lost points through falling off in both quality and signal strength, scoring 43 points out of a possible 50 whereas 2JI totalled 49. Congratulations to Charlie Fryar VK2NP and his co-workers Alec Little and John Rotherbury.

When stations were graded at the beginning of the month 2JI was in the "B" but this did not discourage these lads. They turned to with a will and in no time the beam was erected and right throughout the series their signal was one of the best.

The lads at VL2JJ, George Shelley VK2QK, Arthur Springett, VK2OM, John Keane VK2JN and George Waldo should not be discouraged. Their's was also a fine performance and right up to the last minute they had a chance. Better luck next time fellows. This station is particularly well organised, each man quite capable of both operating the station and handling traffic. This is the way every installation should operate. Look out for VL2JJ next round!

Another Station to do well was VL2JL and in the last round scored 48 out of a possible 50 points, only one less than 2JI. George Littlefair VK2VY, George Patterson VK2AH and Ivan Bailue VK2TN are keen and enthusiastic chaps all anxious for the station to do well. As an example of enthusiasm Ivan, 2TN, is constantly on night work, but nevertheless manages to get a long at least one night each month to handle traffic. Well done chaps.

Well here are the final points.

VL2JI	191	VL2JH	162
VL2JJ	184	VL2JE	155
VL2JL	182	VL2JF	136
VL2JM	178	VL2JG	123
VL2JC	166	VL2JN	96

VL2JM operated only twice out of the four periods whilst 2JF and 2JG missed one period.

Gradings are as follows:-

"A" DIVISION

VL2JI
VL2JJ
VL2JL
VL2JM
VL2JC

"B" DIVISION

VL2JH
VL2JE
VL2JF
VL2JG
VL2JN

VL2 JF was one of the disappoints, not altogether due to Section Leader Harold Peterson VK2HP. Harold had arranged a roster of operators so that the burdens would be equally shared, but nevertheless a couple of chaps attached to the station failed to turn up when due for duty. This shows a very poor spirit and throws the work on the "Always faithful Few." Better luck next time, om.

VL2JH lost a considerable number of points through inability to sign on punctually, and had to be called up several times during different exercises. All this wastes time chaps, and brings down the average rate for each message. It is essential that the receiver be kept tuned into control at all times.

VL2JM did quite well, but has a Message Handling Procedure all of his own. Lost a few points through inability to be present at his station during a full message handling period. Dislikes the background noises at Control. Reckons that it sounds like a rats nest sometimes. Boy if you had to listen to some of the sounds that pass for an intelligible speech at times you'd realise quite a few things.

In the last issue of the magazine members were informed that the exercises would be held on Tuesday and Friday nights. Subsequent to this announcement several section leaders stated that it would be difficult for their operators to be present at night

during an exercise although they would be available during an emergency. It was decided to hold a ballot with the result that half the leaders were in favor of night operation and the other half in favor of daytime. It was then decided that Exercises would be held on Friday nights and Sunday mornings.

It is again stressed just how important it is that your station should be constantly tuned to Control. During the last round of exercises it was necessary to call VL2JH and VL2JC constantly over the air and eventually they had to be raised by landline. The same is true in a smaller degree of 2JG. You chaps should realise just how much time can be wasted when you miss your call and how dangerous this could be in an actual raid. So fellows "keep em listening."

.....

VICTORIAN DIVISION

Those who were present at the last meeting were treated to a feast...of apples...all home grown. These apples were brought along to the meeting by 3IG who has an orchard out at Mitcham. Thanks George, we'll be very pleased to see you any time...and your apples too.

Ivor Morgan 3DH who is drawing up a scheme for an ECM put some ideas before the last meeting, inviting discussion and ideas from those present. Since the last meeting circulars have been sent out to all Hams in Victoria, asking if they would be available to operate stations. The response has been gratifying and is helping considerably in finalising any scheme put up to the authorities.

At the next meeting which will be held on Tuesday, 4th May, it is hoped that some finality will be come to in regard to the scheme. Everyone interested is advised to attend the meeting, as there will be a discussion on the matter...so come along and help.

It will be noticed in the Federal Headquarters Notes that the combined effort in regard to the P.O.W. Fund stands at £41/7/6. It seems to us that there is no reason why we should not continue to increase that amount. So if you've got a donation to send along...send it to your Divisional Treasurer.

Our Treasurer and his Good Wife are again spending a working holiday in the country. After spending 10 days or so in the northern area of Victoria, they arrived home for a week only to be sent down into Gippsland for a while...What are the mushrooms like, Elva and Jim???

**THE WIRELESS INSTITUTE
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VICTORIAN DIVISION**

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Meeting Night—First Tuesday in each month.

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

**DO YOU WANT TO BE
BACK ON THE AIR?**



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in the Commonwealth.

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VICTORIA:

BOX 2611W, G.P.O., MELBOURNE.

QUEENSLAND:

BOX 1524V, G.P.O., BRISBANE

SOUTH AUSTRALIA:

BOX 284D, G.P.O., ADELAIDE.

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BOX N.1002, G.P.O., PERTH.

TASMANIA:

BOX 547E, G.P.O., HOBART.

SIXPENCE

JUNE 1943

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FREQUENCY MODULATION

Part 1

... By R. A. Priddle, VK2RA ...

Few VK Hams have had the opportunity of experimenting with frequency modulation, but a perusal of available literature indicates that it should become popular when we are again on the air. As everyone is talking of post war reconstruction, why shouldn't we?

The normal amplitude modulated (a.m.) signal consists of a carrier of constant frequency, the amplitude being varied at voice frequency. With 100% modulation the carrier amplitude varies between zero and twice the unmodulated value. For this condition the modulator must supply power equal to half the unmodulated input to power amplifier. For voice communication it is desirable to limit the audio channel to 4000 cps, so that the total bandwidth is 8Kcs.

The F.M. signal on the other hand has a carrier of constant amplitude, so that the power does not vary, and a power modulator is unnecessary. The FREQUENCY of the carrier is varied either side of the mean frequency by the modulator. The frequency variations occur in step with the applied voice frequency, but the AMOUNT of the variation may be anything from a small value to several times the voice frequency.

The maximum amount by which the carrier shifts to one side (and the other) of the mean frequency is known as the FREQUENCY DEVIATION, and the ratio which this deviation bears to the maximum voice frequency is the DEVIATION RATIO. Modulation is LINEAR when the deviation is proportional to the AMPLITUDE of the modulating signal (the louder the signal the greater the deviation). Over modulation cannot occur.

For example, assume a 1000 Kcs carrier frequency, modulated by a 4000 cycle tone with a deviation ratio of 4. Then the carrier

frequency will vary 4000 times per second between 984 and 1016 Kcs at maximum gain. If the gain of the speech amplifier is halved the frequency will vary 4000 times per second between 992 and 1008 Kcs.

The same transmitter, with a 1000 cycle tone and full gain will vary 1000 times per second between 984 and 1016 Kcs.

For high fidelity broadcasting deviation ratios of about 5 are used in order to improve the signal-noise ratio. As explained in Ref. 2 the higher the deviation ratio, the less effect the variable amplitude noise pulses have on the receiver.

This only applies, however for land signals, audit has been found that the wider deviations are less readable than narrow-band F.M. signals when the signal strength is low (Ref. 4, 5, and 7). This is due mainly to the extra I.F. band width of the wide band receiver picking up more noise than with a limited I.F. Band width.

A deviation ratio of 1 has been found to give the best signal-noise ratio for weak signals, and this appears likely to become standard for Ham use...Reference 7 shows a comparison between F.M. with deviation ratio of 1 and A.M., and indicates that a 1.7 microvolt signal on F.M. is as readable as a 4.1 microvolt signal on A.M. This is equivalent to a power increase of nearly six times at the transmitter...Now are you getting interested?

A deviation ratio of 1 has other advantages, because the band-width required is only the same as for A.M. and also quite good reception is possible on an ordinary superhet detuned to one side of the carrier frequency. Of course, such an arrangement does not discriminate against noise as a proper F.M. receiver will.

Transmitter and receiver design will be discussed next month, but we will first summarize the advantages of F.M. from the Ham viewpoint.

ADVANTAGES.

- 1...Improvement in Signal-noise ratio (if F.M. receiver used).
- 2...No modulation POWER required, so two stage speech amplifier and receiving type modulator tube sufficient.
- 3...Transmitter adjustments, grid drive, L/G ratios etc. as for CW, provided neutralization correct.
- 4... The voltage and power ratings of tubes, tank condensers etc. are the same as for CW since the signal amplitude does not vary.

5...Overmodulation cannot occur. If the receiver band-width is too narrow, reducing the gain at the transmitter will rectify any distortion in the receiver.

6...Amplitude fading has no effect on the signal.

DISADVANTAGES:

1...An F.M. signal is very susceptible to phase distortion arising from multiple wavepaths, and is therefore not suitable for DX; It may possibly be of use for DX on 28MC, but not on 14MC.

2...A special receiver or adapter is necessary. As mentioned above, narrow-band F.M. can be copied on an ordinary superhet, so that the second disadvantage can be overcome.

The way in which this works can be understood if the selectivity curve of the receiver is drawn. With a good selective receiver this curve has a sharp peak, falling off rapidly on either side of resonance. The sloping sides of the curve are practically straight lines for several Kcs.

If the receiver is tuned to one side of the F.M. carrier, as the modulator varies the frequency towards the resonant frequency of the receiver, the receiver output will increase. Since the sloping side of the curve is practically straight the output of the receiver is proportional to the frequency deviation of the signal. This is the condition required for linear F.M. reception (see definition of linear modulation).

Next month we shall include some notes on F.M. detection and F.M. transmitters.

REFERENCE:

- 1..Radio Amateurs Handbook 1942 or 1943.
- 2.."Noise rejection in Frequency Modulation"..Hierath, QST Dec '40.
- 3.."F.M. Noise Characteristics"..Crosby Proc. I.R.E. April '37.
- 4.."F.M. Propagation Characteristics" ..Crosby RCA Review Jan '40.
- 5.."The Service Range of F.M."..Crosby RCA Review Jan '40.
- 6.."Some thoughts on Amateur F.M. Reception".Grammer, QST Mar '41.
- 7.."Band width and Readability in F.M."..Crosby QST March '41.
- 8.."A Crystal controlled F.M. Exciter"..Bollinger QST Oct '42.

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ITEM...Few of us stop to realize the value of ordinary things which we now take for granted because of modern production methods. Joseph Henry, who made some of the most important discoveries in connection with induction, was forced to insulate bare wire by hand with silk from his wife's dress to obtain the large inductances with which he worked....Ohmito News.

NOTES ON RECEIVER DESIGN

By Bruce Mann, VK3BM

.....

A short time ago we published an article dealing with different aspects of receiver design. We have heard quite a fair amount of discussion regarding some of the points raised in the article and one of our readers--Mr. Bruce Mann of Quambatook, Vic. has discussed some of these points in the course of a long and interesting letter to us. He deals with the subject in the same order as was used by Mr. Eby in the original article and as we have no doubt you will find his discussion as interesting as we did, we decided to publish part of Mr. Mann's letter in the form of the following article. Here it is:-

SENSITIVITY AND NOISE...In a receiver functioning properly, all noise comes from the first stage. There are two sources (1) THERMAL NOISE due to erratic movement of free electrons in the aerial coil circuit. (2) VALVE NOISE due to irregular movements in electron stream to the plate of the first tube. The greater the gain and the lower the plate current the less noise. So it is up to the tube manufacturer to produce the suitable tube---and so he has lots of 'em.

Assuming you are designing the most sensitive receiver you possibly can, you would naturally be using an RF stage, as in a converter valve, valve noise is double that of an RF valve.

It can be shown by mathematics that if you can get a gain of 10 in your RF valve, then only 15% of the noise voltage is due to valve noise and 85% to thermal noise in the aerial coil. Reduced to terms of audibility this 15% is entirely negligible---so why use fancy tubes and push-pull RF stages on any frequency except extreme highs?. You can easily get 10 or more gain on 20 meters and up, so for these bands you may use a 6K7G, etc. and rest assured that no change of valve type will make any appreciable improvement in valve noise. On 10 metres, even with care I believe it may be possible to get enough gain out of one of those tubes to prevent tube noise, but I purchased a 956 acorn to be on the safe side.

Reverting to noise in the aerial coil, you cannot stop the thermal agitation, but you can do a lot to build the signal up above it. This can be done by:-

- (a) Use highly efficient tuned aerial. Use your transmitting antenna for reception. Couple with a link which may be switched over from one to the other. If the antenna is highly directional you will also lose a lot of noise due to QRM and QRN.

(b) Get the best possible transfer from antenna to grid coil of the RF tube. Use an adjustable link and couple for maximum gain on a weak signal. This is extremely tight coupling and will so damp the tuning of the grid coil that selectivity will be insufficient to prevent image interference on 20 and 40 metres. To overcome this a second RF stage designed for selectivity is required.

(c) Use as high Q coil as is possible. This builds up the signal by its flywheel effect, and is affected by its size, shape factor, L/C ratio, dielectric losses etc.

It is also reduced if damped by low input impedance of the following tube. Of all the likely tubes the 1851 is about the worst in this respect and the 956 one of the best.

For the ultra frequencies neither great sensitivity nor selectivity are needed therefore the 1851 is ideal, and 1851's in PP not necessary.

INTERMEDIATE AMPLIFIER..A very narrow band pass effect is also a great advantage in reducing noise as well as obtaining selectivity. Three popular methods: -

- (a) Crystal Filter
- (b) Audio Filter
- (c) Special I.F. Amplifier.

(a) The crystal filter is not altogether satisfactory--like Pat's horse--it's hard to get going and it is not much good when it does go. It's Q is so great that signals are distorted, yet the skirts of its resonance curves are so broad that strong impulses of QRM etc. come through as a ringing noise. These can be cut out by a complicated IF noise silencer.

(b) A highly selective tuned audio filter has similar distortion and ringing effects as the crystal. (a) and (b) are of little use for fone.

(c) I have experimented along the lines suggested by David Eby, but you really need two IF amplifiers, one for fone just broad enough for good intelligibility, and a very sharp one for CW. When a very selective IF amplifier is used for fone, it is advisable to use an audio tone control of a type that progressively cuts out the bass. Thus with the IF amplifier cutting the highs and the tone control cutting the bass you have just the band of audio frequencies left necessary for intelligible speech, and the resultant tone is like the landline telephone.

BEAT OSCILLATOR STABILITY.. Why put in a crystal here when the HF oscillator is 50 times as liable

to drift, yet drift is just as serious--cycle for cycle. The HFO should be designed with low L/C ratio to track with RF and Aerial coils of high L/ C ratio, and the voltage may be stabilized with VR150-30 neon tubes.

TO SUMMARIZE... The ideal ham DX receiver consists of:-

Front end...for 80, 160 metres and BC switched with 1..6U7G or similar RF stage.

Tuner for 40 and 20 metres 2...6U7G's RF stages.

Tuner for 10 metres 1..956 RF stage.

The above is interchangeable into 2 I.F.'s for CW and fone, or a third if you must listen to high fidelity broadcasts.

A separate receiver altogether for ultra highs.

Not an AUSTERITY outfit! Hi!

I might add that an accoustical labyrinth large enough to damp the speaker throughout its whole range is a great improvement in DX reception as it reduces speaker "rumble" on QRN etc.

....OO....

OUR PROBLEMS

Readers will remember that recently we asked for ideas for the rejuvenation of old electrolytic condensers. In a recent issue of QST the following information was published:-

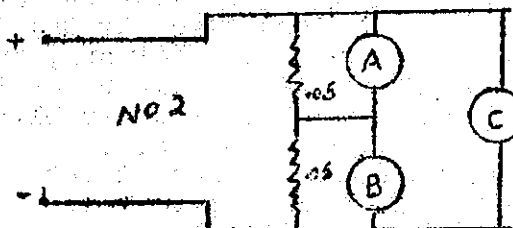
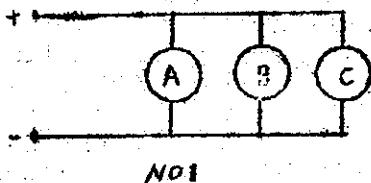
"I have been experimenting with both wet and dry types of electrolytic condensers, and found that about half the time the dry electrolytics are in good condition after failure, except for corroded terminal strips or a small burned spot on the positive plate.

Several of the wet electrolytics that I have opened were found to be empty, while others were full of a white substance. Careful washing and filling with a less-than-saturated borax solution restored the usefulness of these units. The use of a film of oil on the top of the solution would seem to be desirable to cut down evaporation. From some experiments it seems that there is a tendency for the leads entering the solution to fail right at the point where the air and solution meets. Some sort of solution proof paint on the lead ought to stop such failures."

.....

This month a very interesting problem has been unearthed by a member of the Victorian Division. We publish it herewith for readers perusal, and of course comments would be appreciated. The meters used were:- Meter A...Western Model 301..0-500 Volt

DC..1000 ohms P/v Meter B. Beede 0-500 volt DC...0-1 M/a with ext multiplier. Meter C. Western 301...0)1500 VDC. 0-1 M/a with ext. multiplier.



The following readings were Noted:-

Circuit No. 1

A	B	C
110	103	100
150	148	145
200	200	200
250	250	250
300	300	300
350	343	350
405	405	410
460	460	470
500	500	515

Circuit No. 2.

A	B	C	A & B
250	250	525	500
280	290	615	560
340	340	730	680
425	425	825	850
500	500	1100	1000

The dial of meter C has an 0-1500 volt scale which is divided into

15 divisions of 100 volts with sub-divisions of 20 volts. Readings can be taken to the nearest 5 volts. Meter A has been checked against other similar instruments and can be regarded as sufficiently accurate for normal usage.

What is the actual supply voltage of circuit No. 2? It is the sum of the readings of meters A & B. Why is it that Meter C. gives a higher reading? If it is that read on Meter C, why does the sum of the readings of meters A & B differ from this? If the error is due to the multiplier resistor of meter C, would its adjustment for accuracy at 1000 volts result in a true reading at 1500 volts?

.....

WIRELESS INSTITUTE OF AUSTRALIA (W.A. DIVISION) INC.

VICE-PRESIDENT'S ANNUAL REPORT.

Owing to the continuance of war conditions over the past year, amateur radio in the accepted sense of the term has remained at a standstill, and the entry of still more of our members into the various branches of the armed forces has further depleted our already small numbers.

F.H.Q. has been very active during the year and has kept us fully informed on matters of importance. They have regularly forwarded to us copies of the minutes of their meetings, and your Secretary has, in turn, kept F.H.Q. informed of affairs in VK6.

The most important activity of the past year in this State has been the inauguration by the Civil Defence Council of an Emergency Communication Network, in the operation of which the services of qualified members of this Division are to be utilized. This network calls for the establishment of radio transmitters and receivers at the various A.R.P. centres as a secondary means of communication, to be brought into service in the event of breakdown or over-loading of the normal telephone facilities. A committee comprising 6CF, 6CZ and 6GM was appointed some time ago to formulate and place before the Civil Defence Authorities a scheme suitable for the Council's requirements. The principal points of the proposed scheme were the installation of a fixed transmitter and receiver at the A.R.P. Central Control, and the provision of transportable battery powered transmitter-receiver units which could be taken to and set up at any suburban centre with which telephonic communication had been lost.

The plan was submitted by the Council to the PMG. Dept. for approval which was eventually granted together with the necessary licence. The Council then requested that two units be constructed so that initial tests could be carried out, and, largely due to the co-operation and efforts of CIEV these units were built. They were given their first official test during last Sunday's A.R.P. exercise, when they were in use with entirely satisfactory results to all concerned. Arrangements are now in hand for the permanent installation of the central station.

A civil defence radio communication network is in partial operation in VK2, and is designed on an ambitious scale, using a 200 watt, central transmitter with a 140 foot vertical radiator. A network scheme is also mooted in VK5.

It is proposed to recruit the operating personnel of these various schemes including our own from the amateur ranks, and this in itself represents an important advance, as it is the first occasion on which government authorities in this country have recognised the amateur fraternity in the field of national service. It remains to us to justify that recognition by acquitting ourselves faithfully and well in whatever work may be entrusted to us.

Your Council takes this opportunity of conveying to all members wherever they may be, their best wishes for the coming year, and trust that in the not too distant future, circumstances will again permit them to pursue their chosen hobby.

SLOUCH HATS and FORAGE CAPS. - By 2 Yc.

Not receiving any comments, so far, as regards the change of my heading I will try the idea of changing it back again just to see what it brings. You know, the ham idea of reversing the leads now applied elsewhere.

The Mail this month was very light and I thought of the hard lot of 4RF tossing around on the billows, most likely too seasick to be of use to the Navy, whereas in Canberra he could have chased me up some notes, and on the side, done some work for the Navy.

Which reminds me...I wonder how Frank, 30F, is feeling at the time of writing this...or, more correctly, one week ago. His ship after a very short sojourn here went to sea in the middle of one of our worst gales. Wilf 2AIF has had plenty of experience on the Atlantic, but Frank sailed the last couple of years on land...or "Lake Albert" Frank. Hi! Anyway cares of a Petty Officer notwithstanding 30F looks pretty fit and well. Blow into 2Yc's late one night...we talked till after 1 a.m. and at five, I woke him so that he would at least catch the only ferry going back to the ship. There are now three hams on the Australia...2AIF, 30F, and, I think, 6IG. I hope the latter can give us some news of other "VK6s" as we hear very little about what is happening over there these days.

Another visitor to unexpectedly arrive here was VE4BB...of all precontests and an oldtimer on 28mc...P/o Beatson these days he is quite a bit fatter than when he was down at the last WIA Convention in VK2. I was able to let him read all about what an expert he was on 28mc way back in '28 when VK6SA was our DX par excellence, and he wasn't easy to work either. You had to be pretty patient on "ton" those days. 4BB had to work pretty hard to get into the Services, starting right from the bottom, i.e. trainees Morse Instructor. However, he seems to be very satisfied with the branch he is in now.

Bob Chilton 2RC another of the "Hoary Old Men" of ten and eighty is, I hear, now an instructor up at Richmond in the most advanced department of the RAAF. I wish Bob, you can be my "demonstrator" before this War is finished. Hi!

Somebody said 20R who was instructing at Richmond has landed a trip to G to get the latest dope, while the number of Hams who just casually, hop over to US and back seems to increase every time one hears the news of the day.

Heard a few stories of Bill Moore the other day. Bill did some pretty good work apparently. At one place where they sent him to install some gear the spot chosen was on top of a cliff and Bill, first of all had to build a light railway to get the gear up there.

so it was just as well he was a Waterboard Engineer besides a Ham. All VK2s will be pleased to know that our Board, at long last, has some water "to engineer". We got a damfull into the shop they could have had with pleasure.

Frank Hine 2QL is still going strong up in VK9, and life up there seems to have been a lot livelier lately. I wonder if he is still, as he described it, "fairly comfortable." Many of you will be able to interpret what that meant more accurately than I can. Hi! He seems to have quite a collection of hams up there near him as he mentions 2TQ, 2AIS, 3VU, 3VD and 4HZ. Incidentally, 3VD is adjutant to 3VU, which should be a good combination, free from all QRM. Hi!

VKZYK has spent a short leave down in VIM but by now is back up north again. Bill Lewis 6YB/2YB has also had some leave. After about two years up Darwin way, Lt. Joe Ackerman 2ALG is now down on a well earned rest and I hope he likes our "climate."

Had a letter from Sid Clark who has changed to Flinders Naval Base after a nice exciting couple of years in which he just about went everywhere there was to go. Any VK3 hams can get in touch with him per L/tel S. T. Clark, Transmitting Station, Flinders Naval Depot. If the VK3 Div. hasn't heard Sid give one of his yarns at a Meeting you have missed something, oms. At the time of writing Sid was after a rx p.t. and choke. 6.3 V heaters and 60 mils and up...pretty scarce in VK2, how about VK3??? (They're scarcer'n than in VK2..Ed "AR")

It seems a long long time since we heard of 3MV and 3IR. It may be that the brand new XL mentioned in these notes of a few months ago has got Harry on his back. 3MV seems to have gone 'bush' or maybe its just "alcoholic invasion"..We'll tell you what it means if you don't know Jack..Anyway you SONS of the SEA, let's hear from you.

3XZ who was overseas with the AIF returned some time ago and Mac spends his time playing around with transmitters etc..Of course the exact whereabouts is a military secret, but Mac put in an appearance at the last VK3 meeting.

Among the members of the VKC we find 3TL..from information received Treb is a Lt. Colonel on full time duty and is in charge of activities for scores of miles around Kerang. We would like to hear from you Treb.

3ZK was seen recently in VK3 when he was travelling through to his home on leave. He has been spending his time up in the north of Australia at a Catalina base where he attends to the electrical works of the kites.

And thats all for the month...see you again...don't forgot all news to Jim Corbin VK2YC, 78 Maloney St., Mascot. Phone MU1092.

D I V I S I O N A L N O T E S

.. New South Wales ..

May General Meeting of the Division was held at Y.M.C.A. Buildings, and the attendance was quite large. A welcome was extended to an interstate visitor namely 3XJ.

Members were informed that one of the Divisional Life Members Mr. Harry Stowe ex-VK2CX had made a donation of Three guineas towards the funds of the Institute. Council's recommendation that £2/12/- be set aside to "adopt" a soldier under the Australian Comforts Fund scheme, and the balance be credited to the P.O.W. Fund was endorsed. A very hearty vote of thanks was accorded Mr. Stowe for his generous gift.

During the month 1st Class Radioman Jack Pitts W600K was entertained by Members of the Division. Jack is a globe-trotter in the real sense of the word. Last part of call prior to Australia was Iceland. More volunteers are wanted for the Hospitality List. If some of you chaps could only realise just how grateful those Yanks are for the entertainment given them, that List would be full.

Congratulations to Councillor Neil Gough VK2NG upon the arrival of a bonny daughter. Well, well, well ! After all these years. What a silent worker too. Never mind, we'll certainly have "Fore on Forty" now.

Another Councillor in line for congratulations is Elgar Treharne VK2AFQ. 2AFQ recently joined the ranks of the happy (?) band of Benedicts. Make sure that you bring her up the right way om. See that she keeps the log nicely and that the Qsl's are always up to date.

On Friday 21st May a farewell Dinner was tendered Radio Inspector J. M. Brown affectionately known to all and sundry as "Jimmy", by members of the staff of the R.I.'s Office. The function was representative of every section of Radio and the Division was represented by Messrs. Priddle and Ryan. An interesting document passed round for inspection was J.M.B.'s discharge from S.S. "Mare-tania" with the rating of Wireless Operator, dated 1905!

A demonstration of the Auxiliary Power Supply to be used in connection with the E.C.N. was given by Mr. C. Pryor VK2NP. This was voted an excellent piece of work. A description of this unit together with circuit diagram will appear in an early issue of the magazine.

The next Meeting of the Division will be held at Y.M.C.A. Buildings on Thursday 17th June, and it is hoped that ERA will have the opportunity of delivering his long awaited Lecture on Frequency Modulation.

EMERGENCY COMMUNICATION NETWORK.

The second series of message handling exercises have just concluded, and a marked improvement in operating ability has been shown by all the operators attached to the various stations. At the end of the first week-end JI and JN were level, closely followed by JL and JM. Only two points separated them. Next week JL had displaced JN and shared the lead with JI closely followed by JG, JN and JM. The third weekend JI, JL and JN were level at the head of the table closely followed by JM. The last weekend showed the positions unaltered. Here are the complete scores:-

VL2JI	193	VL2JF	171
VL2JL	193	VL2JC	171
VL2JN	193	VL2JE	162
VL2JM	188	VL2JH	159
VL2JJ	180	VL2JG	147

A comparison with the previous months point will exemplify in the improvement in operating ability. Last month 25 points separated the first and fifth competitors, i.e. "A" Division stations whilst this month only 13 points. In "B" Division 24 points separated sixth and tenth positions, last month 36. A striking example of how keen the boys are is shown by VL2JC. Last month these boys scored 166 points and made Division "A". This month although they scored five more points they could only make the "B's".

At the May General Meeting of the Division Charles Fryar VK2NP demonstrated the Auxiliary Power Supply for Network Station. This consists of a universal transformer capable of operation from 240 volts A.C. or 6 volts D.C. and delivers 350 volts at 100 mills. A non synchronous type of vibrator is and 6X5GT's are used as rectifiers. A Full description of this unit will appear at an early date. Incidentally all components for this power supply have been made available free of charge by State Co-ordination.

Congratulations to VL2JL and the operators attached thereto George Littlefair VK2YV, George Patterson VK2AHJ and Ivon Bailue VK2TN. These lads decided that they would improve on their first round showing and set to with a will to rectify slight defects in operating procedure and quality. Although content to share first place with JI and JN they reckon daylight will be second next month. Keep at it boys. That's the spirit. By the way 2VV that daughter of yours in the W.A.A.F.S. Is she a signaller?

VL2JL, Alec Little and Charlie Fryar, had to share first place this round. Look out next time follahs. These two lads show a splendid spirit. Having their own station operating excellently they spend their time going around helping those not so fortunate. That's ham spirit at its best. You should hear 2JI and 2JG battling it out at 30 wpm.

VL2JN, Ross Treharno and Len Blackott by a very special effort managed to be on all four sessions with very good results. Keep it up boys.

VL2JM, Perce Dickson and Felix, again did very well. Not enough attention to procedure probably cost this station first place. By the way Perce built and operates this station all on his lonesome. Some moaners please note.

VL2JC, Gordon Cole 2DI, Eric Fugh 2ADK, Phil Cox 2IE, Will Dukes 2WD and Les Tamer 2ABL set to with a will and effected considerable improvements over the last two week-ends, but left their run a little late. By the way Gordon, can you fold a "V" Beam yet?

VL2JG. Jeff Thompson only operated three week-ends, but nevertheless scored 147 points. Another one that would have been near the top. You had better look out Fryar, there's all after you. By the way chaps, Jeff's loss of points was occasioned by one of his operators not being fully conversant with the operation of the station. This point has been stressed all along. It might have been a blitz!

VL2JE. Ray Fatterson, 2AJW Jack Dark 2ADQ and Don "Floggo" Reed 2DE, showed considerable improvement but there's room for a lot more yet. Keep at it boys. One thing about these lads, they refuse to be beaten and keep plugging away.

VL2JJ, VL2JF, and VL2JH are disappointing. These stations were amongst the first to get going, but unfortunately have failed to live up to early expectations. VL2JJ, George Sheelley, John Keane, Arthur Springott and (sometimes?) George Waldoock did well scoring 180 points. This is not good enough chaps, you can do better than that. How about putting the original mike tranny back. Any person desirous of course in fingerprinting should apply to VL2JJ.

VL2JF. Alec Moss, Harold Peterson, Percy Roney, Will Nelson and Peter Mulligan. For some unknown reason signal strength has dropped off considerably. Coupled with very poor procedure occasionally points are not as high as they could be.

VL2JH. Ern Hodgkins, Tom Barnes and their assistants are capable of doing very much better. A breakdown one session and poor quality other times brought a very low point score. This isn't like you Ern. Whatsa.

URGENT. Wanted to purchase two type 809's for use at Contro. Must be in good condition. Will obtain release if under seal. Particulars to VK2TI, 21 Tunstall Avenue, Kingsford.

V I C T O R I A N D I V I S I O N

The May meeting of the Division saw over fifty members and non-members present; the largest gathering for some considerable time.

The object of the meeting was to discuss an emergency Communication Network which has been under consideration by Council for some time.

The meeting freely discussed all matters appertaining to the formation of such a network, and it was the opinion of practically all present that any equipment should be powered from a primary source, completely independent of any outside power supplies.

It was finally decided on motion that the Victorian Division endeavour to obtain an interview with the Chief Air Raid Warden so that the Institute's plan could be discussed with him in an endeavour to obtain his approval for the formation of the Network.

The day following the meeting the Secretary wrote as instructed, and it was not until the 28th of May that a reply was received, asking the Secretary to ring and make an appointment suitable to both parties. This was done and an appointment was made for 2 p.m. on the 2nd of June.

The delegation from the Institute consisted of Messrs. H. N. Stevens VK3JG; R. Marriott VK3SI; J. K. Ridgeway; I. Morgan VK3DH, and Chas Guin VK3WQ who were very well received by the authorities. After explaining the proposed scheme the authorities were of the opinion that the scheme proposed by the Institute could not be applied to the metropolitan area as their own system of radio communications were foolproof as had been proved after exhaustive tests under many different conditions. The members of the delegation after being shown the workings of this system were also of the opinion that it was foolproof. The authorities, however suggested some alternative ideas which are being followed up by the Council, who will report the proceedings more fully at the next meeting of the Division. The meeting will be held at 191 Queen Street, Melbourne on Tues day 6th July at 8 p.m.

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**THE WIRELESS INSTITUTE
OF AUSTRALIA
VICTORIAN DIVISION**

191 QUEEN ST., MELBOURNE

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Meeting Night—First Tuesday in each month.

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N.S.W. DIVISION

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

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BACK ON THE AIR?**



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OF AUSTRALIA**

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EVERY ACTIVE HAM

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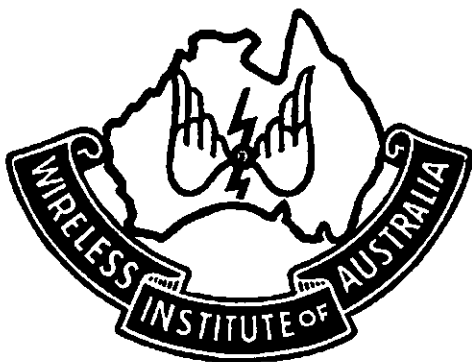
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SIXPENCE

JULY 1943

AMATEUR RADIO

THE
OFFICIAL ORGAN
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WIRELESS INSTITUTE
OF
AUSTRALIA



Published by the Victorian Division

AMATEUR-RADIO

INCORPORATING THE N.S.W. DIVISIONAL BULLETIN

Vol 11. No. 7

July, 1943.

FREQUENCY MODULATION

.. Part 2 ..

By R. A. Priddle, VK2RA

.....

RECEIVERS

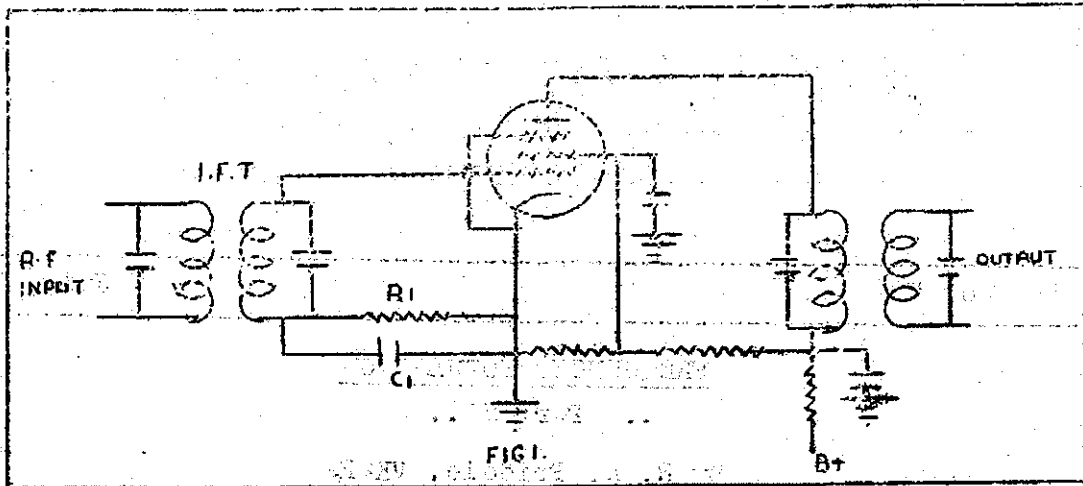
The frequency modulation receiver should respond only to frequency variations, and if full advantage is to be taken of the noise discrimination characteristics of frequency modulation there should be no response to amplitude variations. The detection of the frequency variations is performed in a "discriminator" stage which takes the place of the second detector in an ordinary superhetrodyne. Any variations in amplitude of the incoming signal or noise are ironed out by incorporating a "limiter" immediately before the discriminator.

For effective operation weak signals should be amplified sufficiently to saturate the limiter, so that high RF and IF gain are necessary. For this reason an IF of about 5Mc/s is commonly used. This frequency also gives the greater bandwidth necessary for wide-band frequency modulation.

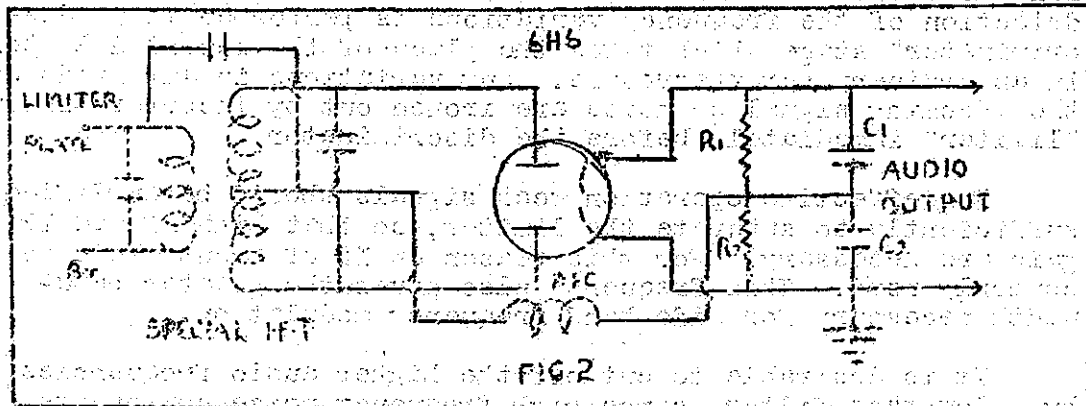
It is desirable to cut off the higher audio frequencies by a low-pass filter, since high-frequency noise components have the greater amplitude.

LIMITERS .. The usual limiter circuits use a pentode with low plate and screen voltages, so that the plate current flow is limited. This is shown in a single stage limiter in Fig. 1.

The time constant of R1 C1 determines the speed of operation of the limiter. Fast operation is necessary for noise impulses, but a large time constant is better for amplitude variations of the signal. This is usually overcome by using a "cascade limiter", an example of which is shown in the frequency modulation adaptor to be described.



DISCRIMINATORS .. A typical discriminator circuit is shown in Fig 2. The secondary of the special IFT is centre tapped and the centre is connected back to the plate side of the primary through the condenser C3. Both primary and secondary are aligned on the intermediate frequency.

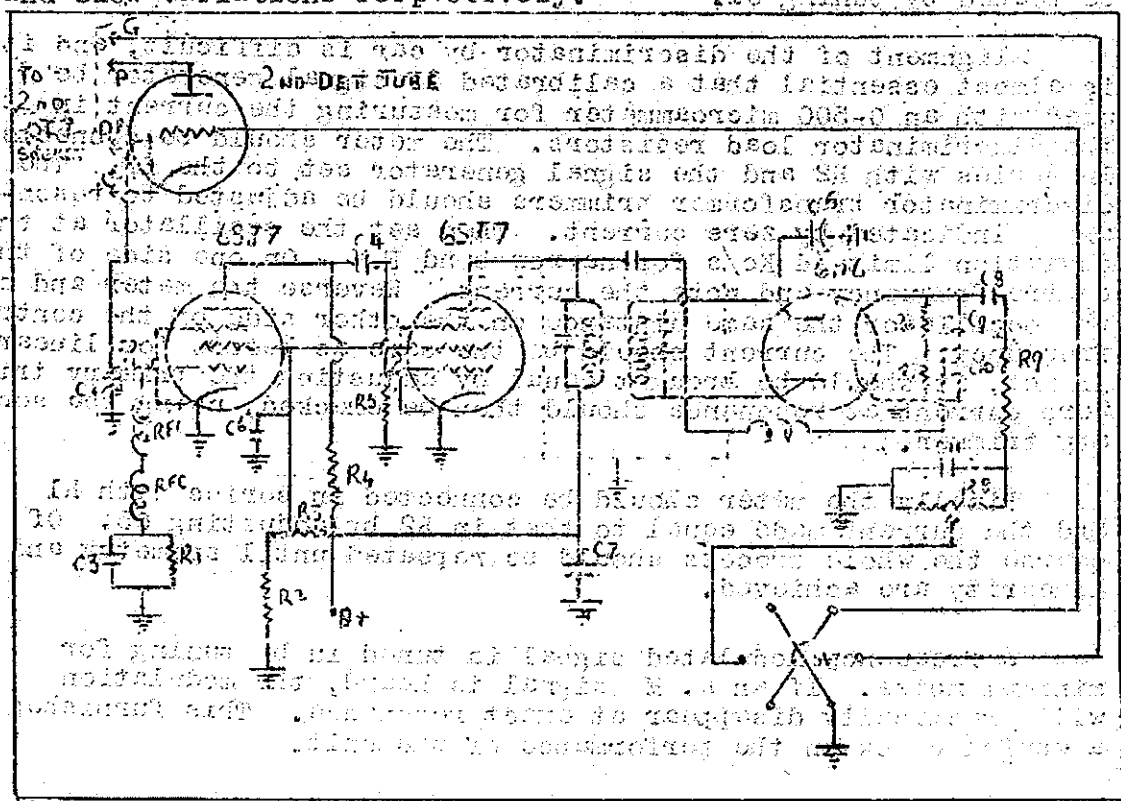


The voltage applied to the diodes has inductive and capacitive components through the IFT and C3 respectively. The phase relationships of these components are such that at resonance the rectified currents are equal but flow in opposite directions through the diode loads R1 and R2, so that the total output voltage is zero.

When the frequency deviates either side of resonance, one diode gets more voltage than the other, so that a voltage appears across the output terminals. This voltage is proportional to the frequency deviation, so that "linear" detection results.

A narrow-band frequency modulation adapter described in QST for March 1941 should be of interest to those thinking of

trying out frequency modulation. The adaptor can be permanently attached to an existing superhetrodyne, and provides for switching from A.M. to F.M. at will. The second detector tube of the receiver is moved from the receiver to the adaptor, which is plugged into the second detector socket. The FM limiter is connected across the AM detector, so that both are in operation all the time and it is necessary only to switch the audio outputs. The circuit is shown in Fig 3, and is seen to incorporate a two-stage cascade limiter, the time constants of R1 C3 and R5 C4 being suitable for impulse noise and slow variations respectively.



C1	50mmfd	C11	50 mmfd mica
C2	.0005 mica	R1, R9	50,000 ohm 1/2 watt
C3	.0001 mica	R2	3000 ohm 1 watt
C4	.00025 mica	R3	70,000 ohm 1 watt
C5	3-50 mmfd	R4	4000 ohm 1/2 watt
C6, C7	0.1 mfd paper	R5	0.2 meg 1/2 watt
C8	0.01 mfd paper	R6, R7	0.1 meg 1/2 watt
C9, C10	.0001 mfd mica	R8	0.5 meg

The input lead marked DP should have low capacity shielding. This can be made by running hookup wire through some 1/4 inch spaghetti and covering the latter with braid. The audio grid lead marked G should also be shielded.

The series RF chokes and the condenser C1 at the input of the limiter enable the last IF circuit to be re-aligned without having to adjust the IF trimmer. C5 is used to balance the extra plate-to-ground capacity of the lower diode of the 6H6. Correct adjustment will improve the signal-noise response.

As high gain is necessary before the limited stage, it is advisable to realign the receiver to make sure that everything is "on the nose." After plugging in the adaptor, the last IFT can be peaked by tuning C1.

Alignment of the discriminator by ear is difficult, and it is almost essential that a calibrated IF signal generator be used with an 0-500 microammeter for measuring the current in the discriminator load resistors. The meter should be connected in series with R2 and the signal generator set to the IF. The discriminator transformer trimmers should be adjusted to resonance, indicated by zero current. Then set the oscillator at the deviation limit (4 Kc/s for narrow band F.M - On one side of the centre frequency and note the current. Reverse the meter and set the oscillator the same distance on the other side of the centre frequency. The current should be the same as before for linearity. If not, it should be brought equal by adjusting the primary trimmer. Zero current at resonance should then be checked, using the secondary trimmer.

Finally the meter should be connected in series with R1 and the current made equal to that in R2 by adjusting O5. Of course the whole process should be repeated until symmetry and linearity are achieved.

A frequency modulated signal is tuned in by tuning for minimum noise. If an A. M. signal is heard, the modulation will practically disappear at exact resonance. This furnishes a useful check on the performance of the unit.

Part 3 of this interesting article on Frequency Modulation will appear in next month's magazine and will be entitled - "Transmitters."

REJUVENATING OLD METERS

(From an article by W. R. Triplett in QST)

.....

We all know how difficult it is to obtain new meters at the present time, and it is perhaps harder still to have old meters repaired. In consequence we must use what meters we are lucky enough to have, and also do our own repairs. Some meter repairs are beyond the ability of the average amateur, but in cases where there is nothing seriously wrong, it should not be too difficult to put many of them back in operating condition. The object of this article is to tell you how to go about it.

METER TERMS .. For those not familiar with the terminology, some of the terms used will be explained.

Sticky Meter - One in which the pointer tends to stick somewhere along the scale, when the applied current is gradually changed. The usual cause is lint, dirt or metal chips interfering with the movement.

Friction - A meter is said to have friction when gently tapping the meter while in use causes the reading to increase. It is caused by dirty points and jewels, dull pivots, cracked jewels or lint.

Balance - Whatever the position of the meter the pointer should remain on zero when no current is flowing. If not the meter is said to be off balance. Balance of the movement is restored by adjustment of small weights or by bending a flexible tail weight.

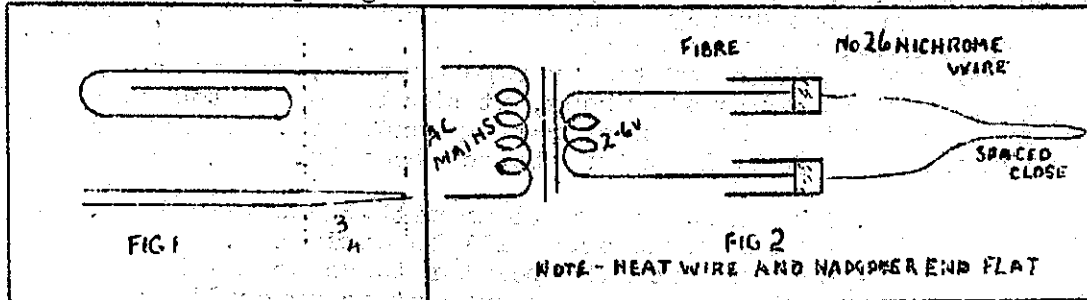
Overthrow - This term applies to the distance the pointer can move beyond full scale or below zero. It should be at least 3% of the total scale.

Accuracy - Commercial tolerances permit variations from the true reading of plus or minus 2%.

REPAIRING D.C. METERS .. Carry out the job on a sheet of glazed white paper, spread out on a well lighted table. Using a small brush, dust off the tools you intend to use. Do not use a cloth or this will spread small pieces of lint and so cause trouble.

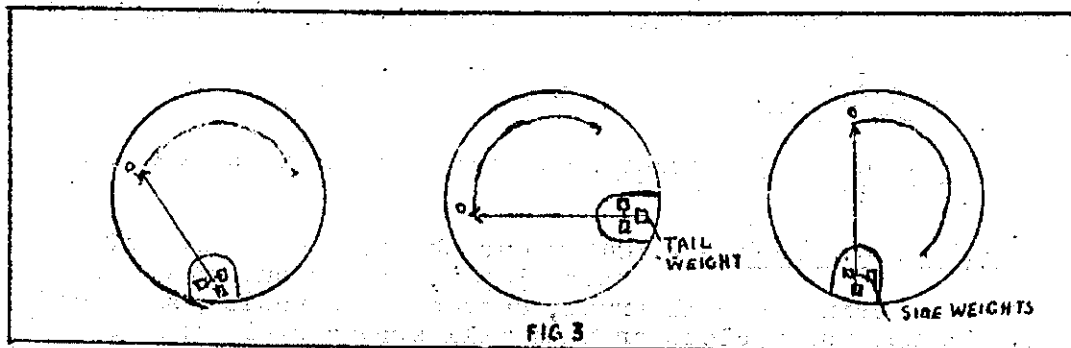
Carefully uncase the meter, but do not unsolder shunts or springs. No attempt should be made to remove the coil and movement from the magnet. If the coil or springs are burned, the job will usually be beyond the amateur, but if they are in good condition use a power supply with potentiometer to run the pointer slowly up and down the scale. Then check for stickiness and friction. Stickiness is usually caused by metal chips inside the polepieces. A tool for removing chips can be made from a metal paper clip (see Fig. 1.)

Carefully insert the straightened end between the pole piece and the coil, being careful not to touch the springs or the coil. The chip will be attracted to the steel clip and may usually be pulled out. Lint touching coil or pointer can also cause stickiness. A magnifying glass should be used to examine thoroughly all possible places where lint may interfere with a moving part. If the lint cannot be removed with tweezers, it may usually be burned out with a heater unit constructed as in Fig. 2. Be careful not to burn springs or coil.



EXCESSIVE FRICTION in a meter may be caused by fuzz or lint. If not, probably the pivots are dull or the jewel cracked. Neither is a home job. Bearings which are too tight may be fixed by loosening the jewel screw a half revolution or so.

BALANCE - Make sure the pointer is perfectly straight and that any repainting of the pointer is completed. The balancing procedure is indicated in Fig 3.



The three steps are (A) set the pointer on zero by means of zero adjustment screw while holding the meter with plane of dial in horizontal position. (B) Adjust tail weight until pointer is on zero while holding meter with plane of dial in vertical position (C) adjust side weight until pointer is on zero while holding meter with plane of dial in vertical position.

OVERTHROW - Adjust pointer stops to get an overthrew of a few divisions above full scale and below zero. Make sure the pointer hits the stop before the moving element hits.

CLEANING - Clean dial with a rubber eraser and inside the case with a brush. When replacing meter in case, be careful not to damage tip of zero adjusting screw.

CALIBRATION - Using the potentiometer set-up mentioned previously, check the calibration against another instrument of known accuracy. If the calibration is not satisfactory, remove the cover and make pencil marks for the points, or paste on a new paper dial and mark off a complete scale.

It is as well to remember that the reading of a D.C. meter will decrease when the meter is mounted on a steel panel, so that meters to be used in such a position should be calibrated while on the panel.

REPAIRING A.C. METERS - Generally the procedure is the same as for DC meters. Usually however, there will be no metal chips due to the absence of a magnet. Most A.C. meters employ a fan swinging in a closely fitted chamber to obtain damping. Dirt or fuzz in this chamber will cause stickiness. Care should be taken not to bend the soft iron vanes as the accuracy of the meter is dependent on the proper placing of these vanes.

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THE INTERNATIONAL AMATEUR RADIO UNION

Mr. W. C. Ryan, Honorary Fed. Sec., 10th March, 1943.
Wireless Institute of Australia,
P.O. Box No. 1734 JJ
G.P.O. SYDNEY. Australia.

Dear Mr. Ryan,

This will acknowledge receipt of your communication of January 13th, transmitting report of activities of the Federal Executive Wireless Institute of Australia, for the year ending November 30th 1942.

May we, in return, convey our greetings and congratulations on an excellent report. Although the activities of the I.A.R.U. are dormant for the time being, it is heartening to receive a report from a member society and to know that amateur activity and spirit is still very much alive in other parts of the world.

We all join in the hope that the time will not be far distant when amateurs throughout the world will be permitted to resume their normal peace time activity and international amity may be furthered in some measure by the existence and functioning of a reborn I.A.R.U.

Your report will be held for the future resumption of I.A.R.U. activities, and in the meantime our heartiest regards to the Wireless Institute of Australia.

OUR PROBLEM

Last month readers will remember we published a problem in connection with the inaccuracy of an 0-1500 volt meter.

Our suspicions at the time were that the meter was out of balance, and a subsequent examination of the meter proved this to be the case. Readers will probably be interested in the article printed earlier in this issue in regard to rejuvenating meters:

Mr. Bruce Mann VK3BM sent along his theory on the trouble which reads as follows:-

"It appears that meters A and B are accurate while C is only accurate in the region of 250-350 volts, and reads low at low voltages and high at higher voltages. This meter movement must have been knocked 'cockeye' since calibration to within plus or minus 1% at full scale by the maker, as the non linear deflection could only be caused by mechanical derangement. Possibly the soft iron core has moved. An error in the multiplier resistor would cause a constant percentage error at all points throughout the scale.

Without expert attention to the meter movement, recalibration of the whole scale would be the only means of obtaining accuracy.

The usefulness of the meter could be improved however, by simply adjusting the magnetic shunt to make it read accurately on the voltage usually checked, say 1000 volts.

As it can safely be assumed that the Weston wire wound multipliers are accurate, the meter movement minus the multipliers can be set up in series with two suitable wire wound variable resistors (one for fine, the other for coarse adjustments) and a single dry cell, and the incorrect meter adjusted against the correct one, at whatever point on the scale accuracy is desired.

The magnetic shunt is a small slotted iron plate which can be moved to bypass more or less of the magnetic flux across the magnet's poles. It will be found right at the bottom of the meter movement and is fastened by a tiny little hexagon nut.

Alternatively by adding to the multiplier resistor, the same result will be achieved e.g. to correct the reading at 1000 volts. add approximately 150,000 ohms to the multiplier resistor."

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The Victorian Division has 4 A.C. operated morse code oscillators for sale. These are complete with key and phones. For further particulars contact the Divisional Secretary.

....xx....

SLOUCH HATS and FORAGE CAPS.

By ZYC

Publishing and collecting dope for "Amateur Radio" in peacetime is a pretty arduous task. In wartime it becomes to all intents and purposes another of those seemingly useless tasks which fall to the lot of those of us out of uniform. Yet all hams know that the continuance of a Ham Magazine, no matter how restricted in size is truly keeping the banner of VK Ham Radio flying, and so it seems to me that those VK3 enthusiasts who do overtime (unpaid) every month to produce this Mag., should not be "just taken for granted". They, like you, are doing their particular war jobs for Australia at War, but they are also, still keeping Ham Radio alive till the Service chappies come home...are you doing that too, om??? I mention this, now, as this month we have received four letters letting us know that "Amateur Radio" does serve its purpose to Hams on far battle stations who like to know what is happening to all their old-time friends.

Its marvellous how a laddie interested in getting news can do so. 4RF has already sent in news of 2AMZ and 2HA. Fred, by the way, when last heard of was on his way northward to buy his little daughter the ice cream he had been promising her. He was out here one night and made ones mouth water with tales of the gear we would all like to have. I think I will come up to Canberra, Dave, when its a bit warmer, Hi! Fred is all Walkie-Talkie these days, Dave. By this means he has contacted Harry Young 2AMZ and also F/Lt. White 2HA. The latter has been for a long time in the Middle East and "our Correspondent" has hopes of more news for the column soon. Over in Africa almost the entire network that 2HAWas in charge of was composed of hams and he speaks highly of their efficiency.

4HK Bob Stack came across a copy of "Amateur Radio" and at once became a ham again. Hi! If possible he would like news of ZYL...4HA...4GC and 4SA. The address is LAC Stack. 2...75270 RAAP P.O. 71 Townsville...and that PO doesn't, remember, mean a thing, usually. Bob is still brass-pounding and liking it. How about some more news of things, om?

Jack Howes 2ABS has now been granted his Commission as P/O after the long journey from AC2. He celebrated by getting married so is in the "Walkietalkie" class from now on. Hi! Here is a story about Jack when doing a Rookie Course at the beginning of the War...in the Army. Each lad had to give a lecture on a subject as a finale. Jack's fairly left the brasshats astounded. Those of the VK2 Division who have heard Jack's fluent lectures on many diverse aspects of Radio...could have told them beforehand, Hi!

Eric Colyer now a "Loot" in the Army was at a WIA meeting recently. He has spent a good deal of time up North, but thats about all the news available for publication. Hi.

(Continued on Page 14)

DIVISIONAL NOTES

... New South Wales Division ...

....

The June General Meeting of the Division was held at Y.M.C.A. Buildings on Thursday 17th. Attendance was not as large as at previous meetings.

The Chairman, in declaring the Meeting open welcomed Lieutenant E. Colyer VK2EL. The "Red Terror" was his usual quiet self and very little in the way of news could be obtained from him. It is understood that he could have said quite a lot. Another visitor was Lieutenant Norm Hannaford, back from the Northern Paradise.

A very interesting Lecture on Frequency Modulation was given by the Chairman, Mr. Ray Priddle VK2RA. Members were rather intrigued by the very small amount of Audio required, but rather disappointed when it was pointed out that this system of modulation to a very large degree precluded DX transmissions.

The next Meeting of the Division will be held on Thursday, 15th July, and an invitation is extended to all Amateurs to be present.

...xXx...

EMERGENCY COMMUNICATION NETWORK

Since the last E.C.N. notes were published, considerable changes have taken place with the organisation function and Control of the Network. The S.W.E.C.C. original sponsors of the scheme have handed over to the National Emergency Services the whole of their A.R.P. equipment including the Radio Network. As Radio communication was to a very large degree something new to the N.E.S. organisation several demonstrations have been staged - the first unknown to Operators - for this organisation. These Tests have been outstanding successes, and Colonel Lorenzo, Director of Technical Services has expressed his satisfaction and admiration of the manner in which the Network operated, in no uncertain terms. An Advisory Radio Committee has been set up by N.E.S. and this consists of Messrs. Wetherall, Brislan, Raynor, Priddle and Ryan. Messrs. Wetherill and Brislan should be well-known to you as members of the R.I.'s staff whilst Sergeant Raynor VK2LJ is attached to Police Radio. Messrs. Priddle and Ryan should need no introduction. The control of the Network will of course remain with the Institute.

This changeover from S.W.E.C.C. to N.E.S. has of a necessity caused some alterations in station sites, the stations effected at the present time being VI2JL, VI2JH and VI2JI. VI2JF may be affected at a later date, but for the present will remain in their

present location. VL2JG will occupy an important place in the Network, relaying traffic from a more distant station. Incidentally, this changeover has been in the air some time, and with its completion, the balance of equipment - including chassis - to complete the Auxiliary Power supply, should be forthcoming very shortly.

With the temporary dislocation of Network activities, the Technical Committee had no option other than to conclude the Message Handling Contest after only two rounds had been completed in the third series:- Points were as follows:-

VL2JL	98	VL2JJ	95
VL2JI	98	VL2JC	93
VL2JG	98	VL2JF	87
VL2JM	97	VL2JB	5
VL2JH	95	VL2JN	0

The Trophy has been won by VL2JI ably operated by Charlie Fryar VK2NP, Alec Little and Jack Rothenbury. This station has been the acme of consistency, having won the first round and sharing first place in both the second and third rounds. VL2JL was runner up with two equal firsts and a third and these lads are to be congratulated. These lads 2YV, 2AHV and 2TN are striking examples of beam work, and when they are installed at their new location, reckon that daylight will be second. VL2JM operated wholly and solely by Perce Dickson, 2AFB occupied third place. Perce lost quite a few points upon one occasion due to his inability to be present during a full period of traffic handling and also had rather a unique procedure in the early days, but now conforms to standard practice. Wait until you put that beam up Perce.

Here are the total points scored:-

VL2JI	482	VL2JH	418
VL2JL	473	VL2JF	394
VL2JM	463	VL2JG	368
VL2JJ	459	VL2JE	322
VL2JC	430	VL2JN	279

VL2JJ in fourth place was possibly a disappointment. This station made Division "A" in a test prior to the commencement of the exercises, but due I think, to eagerness to do well, several alterations were made that were detrimental to the transmission, particularly quality. Listen fellows! Last Saturday, when the daylight test was held, your quality was the best on the band. PLEASE don't try for further improvements.

VL2JC did well to reach fifth place. These boys keep plodding away and despite disappointments, always turn up Quality more than anything else, and occasionally signal strength cost them points.

VL2JH in sixth place made a last minute dash and in the last round was only three points behind the leaders. This was a big improvement. Ern Hodgkins 2EH took his dinner along one Sunday and spent the whole day working on the rig. His efforts were rewarded by the splendid showing made by scoring 48 and 47 in the last two exercises. Hope you do as well from your new location Ern.

VL2JF have made quite a few alterations in the transmitter, and although not as high in the scale as other stations, also showed very great improvement, and it is confidently expected that this station will be placed closer to the top when exercises commence again.

VL2JC eight on the list could not operate one week-end in each series, and this accounts for a very low score. Jeff Thompson has done very well. By the way, Jeff might be sending you up an assistant who is very keen on the code.

VL2JE could not put a consistent signal into Control at any time, but strange to relate they are very strong at the proposed new site. That must be good news for you chaps. I'll bet you hope Control changes location!

VL2JN was equal first in one series was only on twice in another, and in the last didn't operate at all. 2IQ suffers from the disadvantage of being rather a busy man and his other operator was on vacation during the last series. Brother Elgar 2AFQ is now taking a hand and a much better effort is anticipated from now on.

When exercises commence again, each traffic handling period will be divided into three sections. First period telephony, second period I.C.W. and the third telephony with each station having an urgent message to transmit.

Summing up in brief, it can be now said that the E.C.N. is a reliable means of communication, and this is due entirely to the tenacity and courage of the operators concerned.

As members of the Network know, the first report submitted by the R.I. was not altogether a very good one. This did not daunt these chaps, it only placed them upon their mettle. They bucked in with a will, and in a very short time the R.I. was very pleased indeed to submit a further report recommending that the Net be retained.

Every operator in the Network is engaged in a Reserved Occupation, which means that he is carrying out about six other jobs besides his normal one and the fact that the Network is now working efficiently is a credit to them and a splendid example of the will to win, that when the full story is told, will be honored throughout the world of Experimental Radio.

VICTORIAN DIVISION

There have not been any further developments in the proposed ECN in this state except that which was reported last month. Council, at its last meeting, discussed the suggestions put forward by the Authorities, and by this time all country Hams will have received a circular in regard to a country link. Replies to this circular would be appreciated by Council.

The possibilities of "flea-power" local district work was also discussed by Council, and the matter will be referred to the general Meeting, which will be held on Tuesday night 6th July, when it is hoped that there will be a large attendance of Hams.

Members are reminded that the Annual General Meeting will be held at the Rooms 191 Queen St., Melbourne on the first Tuesday in August, the date being 3rd August, so show your interest in the Institute affairs and come along to this meeting.

We have been informed by 3LL who is now located in Hobart, that they are endeavouring, and have received some encouragement, to establish an ECN on the ultra-highs. This of course only covers Hobart. We hope to publish further information at a later date.

3YL..is desirous of selling her two masts, so she informs me. Like the rest of us Austine has ideas of the future and has in mind something a little better. She also tells me that I must be very careful just what I write about her in these notes.

3DX..spends his time these days keeping 3SH on the air, apart from that I don't know what other activities he has.

3TW..is another connected with radio down at 3HA, but George puts in his time in front of the mike. What else are you doing George. I'd like to hear from you.

3JO..was hoping that his case was satisfactory to the authorities when he appeared before the AWC. I guess I'll hear all about it in due course.

3YW..attended the last meeting. He had been spending a few days in the city so called on us.

3HF..also dropped in at the last meeting as he was down on holidays. Harry is another keeping the wheels of Radio turning. This time at 3YB.

.....

Norm Hamnaford after a nice trip up to Torres Str is now back in Sydney to do some instructing..oh, yes Norm is still a Lieut.

F/O Alfie Potts stationed at Mt Gambier is anxious to hear from ZAKI so I hope this note will produce the required effect. One of our VK2 ECF lads..Bob Mondel who got his call just too late to ever use it is now up north with an A/A Searchlight Co. He has yet to strike VK4 but has hopes. So far ZCB is the only Ham he has come across. Peter Vesper ZTV a chemist before the war, after a term in New Guinea has had leave and is now back in a better climate up in Queensland. How about a bit of news next time you are in VIS, Peter OM.?

VK4FJ is reported up north in the Milne Bay area working with the silent service. VK4EL is said to be up that way too. How about some news of you OM.?

Jack Lumsdaine now on leave in VK2 sports a nice square rig and looks very fit indeed. Cec Light, ZQM (Sgt Pilot) last heard in G-on leave- having a "bum time" in hospital with a carbuncle in a very awkward place--hi! Perhaps it's the English nurses that are the attraction to our VK Hams.

Friends of Ray Carter VK2HC will be pleased to hear that he is at Trinity College, Melbourne, doing his course for a Commission. Ray also did the RAAF the 'long way'..i.e. training trainees, AC2 etc. FB Ray OM--hope you manage this part O.K.

Johnnie Traill is now F/O Traill--and my notes are also trailling still John OM..hi! Morrie Myers has now all the glory of a Squadron Leader..however much that is. How about the 127's Morrie?.

Frank O'Dwyer reckons he wasn't sick..but how do I know, I ask you?. He mentions Crawford Young 6CY and Geo Benwell of 3KQ busy at a northern operational station, while his aid is 6IG. It's nice to hear of the VK6's these days. I wish we could get some notes each month from over there. Frank also mentions hearing of Reg Jenkinson, a VK6 whom the war robbed of his call. Reg is well known to all the Sandygroper Hams.

I received a letter from VK3YF over in the west. Unfortunately the arrival of ZYC's 4th Jr Op upset the happy home somewhat and page one is missing pro tem. However from page two I gather he reckons he is just like Dick Giddings ZDC..2+ years at Melbourne W/T and now seeing Australia in large lumps.

Thanks for the letters, chaps, keep them coming as others want the news even if you are lucky enough to be so situated that you know everything that happens. Call or write to Jim Corbin, VK2YC.78 Maloney St Mascot. (MU 1092)

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

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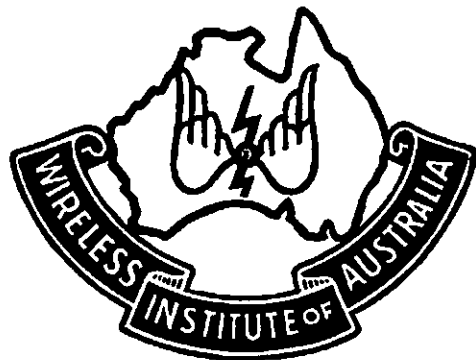
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SIXPENCE

AUGUST 1943

AMATEUR RADIO

THE
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OF
AUSTRALIA



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FREQUENCY MODULATION

Part II - Continued.

By R. A. Priddle - VK2RA

....

T.R.F. REGENERATIVE F.M. RECEIVERS... In QST for May 1943 a FM receiver is described which can be built without any special components. The circuit is shown in Fig 4, the coil values given being for the U.S. 45 Mc FM Broadcast Band.

The audio amplifier should have high gain and high fidelity if the advantages of FM are to be fully realised.

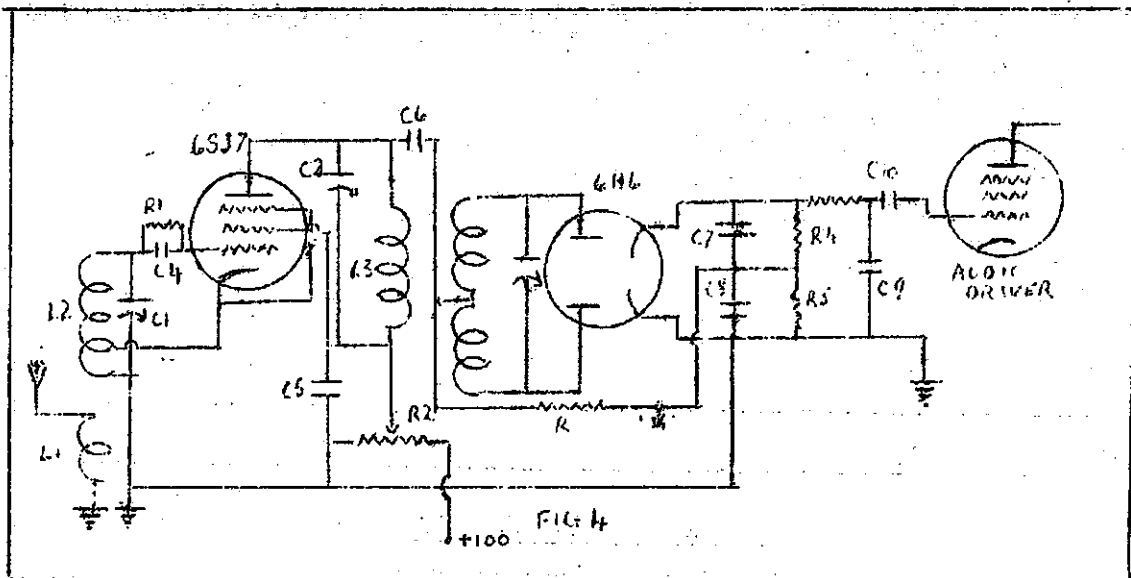
The 6SJ7 RF amplifier-limiter is regenerative and behaves like an unstable ECO whose low-Q circuit allows it to lock-in with the incoming signal and follow its frequency variations. The discriminator is normal.

Values of components are not critical except that R4, R5 and C7, C8 should be equal for discriminator balance.

If the tuning condensers C1, C2, C3 are gauged, the circuits can be aligned by spreading or squeezing the coils. The two halves of L4 must be kept symmetrical - about L3. Resonance of C2, L3 with C1, L2 is indicated by the 6SJ7 going into oscillation at a low setting of the regeneration control R2. Resonance of C3, L4 is indicated by maximum voltage developed across R4 or R5.

The discriminator is checked for balance by connecting the voltmeter across R4 and R5 (both) and tuning C1 to either side of resonance, when the voltage should be zero at resonance and should rise to equal and opposite values on either side.

Operation of the receiver is similar to that of an ordinary T.R.F. receiver.



C1, C2, C3	...	25mmfd	R1	...	.25 meg	1/2 watt
C4, C6	...	10mmfd mica	R2	...	.1 meg	
C5, C9	...	100mmfd mica	R3, R4, R5	...	.1 meg	1/2 watt
C7, C8	...	25mmfd mica	R6	...	.05 "	1/2 watt
L1	2 turns	No 14 5" dia				close spaced
L2	5 turns	No 14 5" dia				close spaced
L3	5 turns	No 14 5" dia				close spaced
L4	6 turns	No 14 5" dia				spaced at centre to admit L3.

-----XX-----
PART 3 - TRANSMITTERS

An FM transmitter is similar to a CW transmitter except that the oscillator is frequency modulated, by either mechanical or electrical means. For instance, an E.C.O. could be frequency modulated by attaching one plate of a condenser to a loud-speaker voice coil which would vary the condenser spacing in accordance with the voice frequencies.

The most usual modulator however, varies the oscillator frequency by electrical means and is known as a reactance modulator, of which Fig. 5 is typical.

R1 is 50,000 to 100,000 ohms which is large compared to the reactance of C1 (capacity 5-10mmfd) so that the current through R1, C1 is nearly in phase with the RF voltage in the oscillator tank LC. The voltage across C1 lags 90 degrees behind the current, and this is the grid voltage of the 6L7.

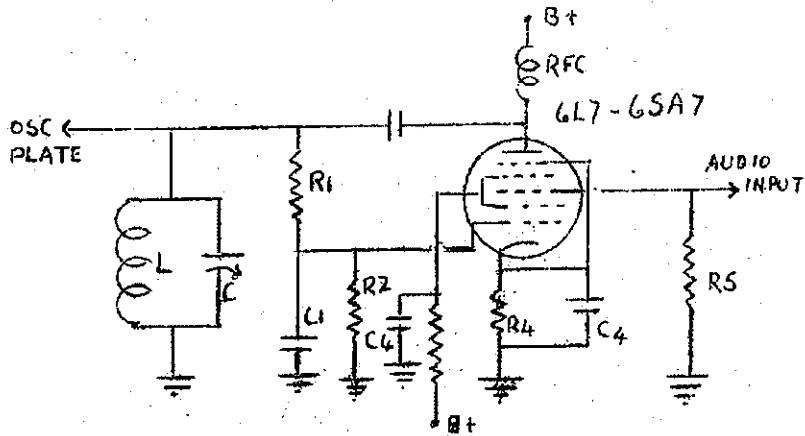


FIG 5

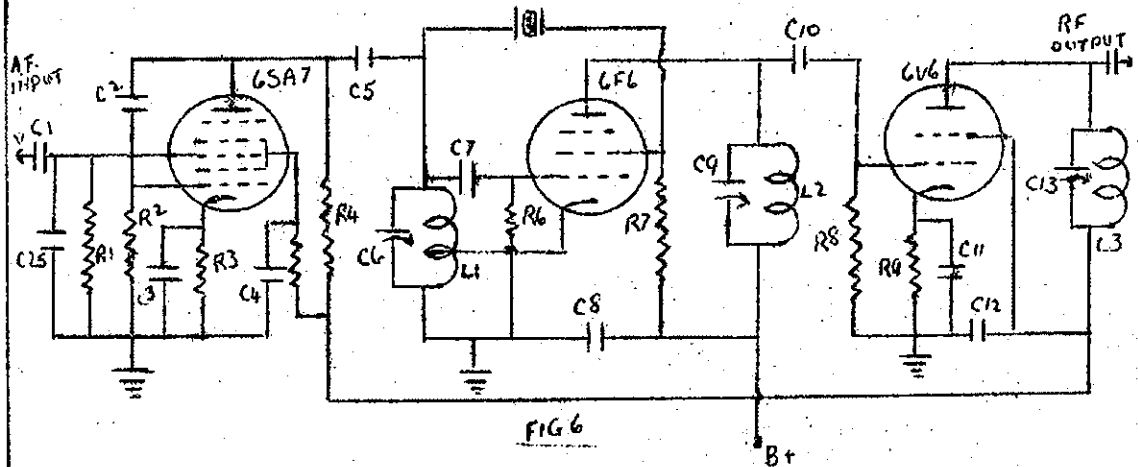


FIG 6

C1.....0.05
 C2.....10mfd
 C3,4,5,8
 C10,11,12.0.0015
 C6,9.....50mfd
 C7.....0.0001
 C13.....25mfd
 C25.....100mfd

R1,4,7.....0.2 meg
 R2.....100 ohms
 R3.....1500 ohms
 R5,8.....0.1 meg
 R6.....60.000 ohms
 R9.....250 ohms
 All 1/2 watt

All coils No 22 close wound on $\frac{5}{8}$ form
 L1.....34 turns tapped at 10 turns
 L2.....15 turns
 L3.....6 turns

The plate current of the 6L7 is in phase with the grid voltage, so that the RF plate current of the 6L7 lags 90 degrees behind the RF voltage in the oscillator tank. Hence the 6L7 behaves as if it were an inductance coupled across the tank, the value of the inductance depending upon the plate current of the 6L7. This plate current varies with the audio voltage applied to No. 3 grid and so the speech variations alter the oscillator frequency.

Voltage regulation is more important than with an ordinary E.C.O., so that the use of a regulator tube is almost essential.

With an oscillator frequency of 7 M/cs and tank condenser of 200 mmfd, 2 volts audio will produce a deviation of about 2 K/cs. If the final is operating on 28 M/cs, the deviation at this frequency will be 4×2 equals 8K/cs. For narrow-band FM (deviation 4 K/cs) the audio input may be reduced, or the crystal controlled exciter of Fig 6 may be used.

A CRYSTAL CONTROLLED FM EXCITER... This unit consists of a
(QST October 1942) 6F6 E.C.O. with crystal
connected between screen
and control grid so as to provide crystal locking.

Over a considerable portion of the range of C6 the frequency is controlled by the crystal, but for best operation C6 should be operated near the capacity where control is lost. The plate circuit of the 6F6 is tuned to twice the crystal frequency and further doubling is effected in the 6V6 stage.

The 6SA7 reactance modulator is connected across L1, C6 and requires about 3 volts audio to vary the 7M/cs oscillator 750 cycles either side of the crystal frequency. This will give a deviation of 3 K/cs at 28 M/ cs.

Adjustment of the oscillator can be made by using a plate Milliammeter and listening to the 7Mc beat in a receiver. A point will be found in tuning C6 where the plate current "kicks" and the frequency changes rapidly. The oscillator should be operated as near as possible to this setting, although both C6 and C9 may need de-tuning slightly for stable operation.

CONCLUSION ... It is hoped that these articles may be of some benefit to those who have not had access to over-seas literature on FM. The general principles have been discussed, and the adaptor and exciter described should be useful to Hams who wish to try out narrow-band Frequency Modulation.

A VACUUM TUBE OPERATED TIME DELAY RELAY

By

... A. S. Moyo, VK2FW ...

Here is the circuit of a relay actuated by any old power tube with which it is possible to accurately time the exposure of an enlarger or printer to a predetermined time by setting a calibrated variable resistor and pressing a push button. At the end of the desired interval the relay is automatically opened.

The unit makes use of gear generally relegated to the junk box.

As shown the circuit values give a time delay from about 1/50 second to 3 1/2 seconds. This time may be increased to minutes by increasing the variable resistor or grid condenser or both. However after some tens of thousands of exposures with the relay, it was found that the most useful range was from 1/4 to 2 seconds. The illumination of both the enlarger and printer was adjusted till 1/2 second exposure through the thinnest printable negative was just right on 4B1 and VF4 Kodak papers respectively. It was then found that all other exposures came within the above range with the exception of a few dark negatives or a big enlargement, when an increase may be had by closing switch S and counting the relay clicks.

Tube types 46 (triode), 45, 47 (triode), 2A3 have all been tried and found satisfactory and I dare say the indirectly heated type should work just as well.

The power supply need not be filtered and may consist of any old power transformer giving the required filament voltages and a high voltage secondary from 200 to 400 volts.

The 2 mfd condenser across the relay prevents chatter and is the lowest value that can be used here. When the relay is in the open position the bottom set of contacts are closed and are in series with the push-button. This gives a uniform discharge to the grid condenser each time the button is pressed. The 4000 ohm resistor is included to stop sparking across the button and may be varied down to 1000 ohms without any trouble.

The grid condenser was obtained by wiring in parallel 1, 2 and 4 mfd units which can be rated to work as low as 100 volts but must be in good condition. Any leakage causes the idle current of the tube to be too high and the relay will not open easily. This rules out the use of Electrolytic condensers.

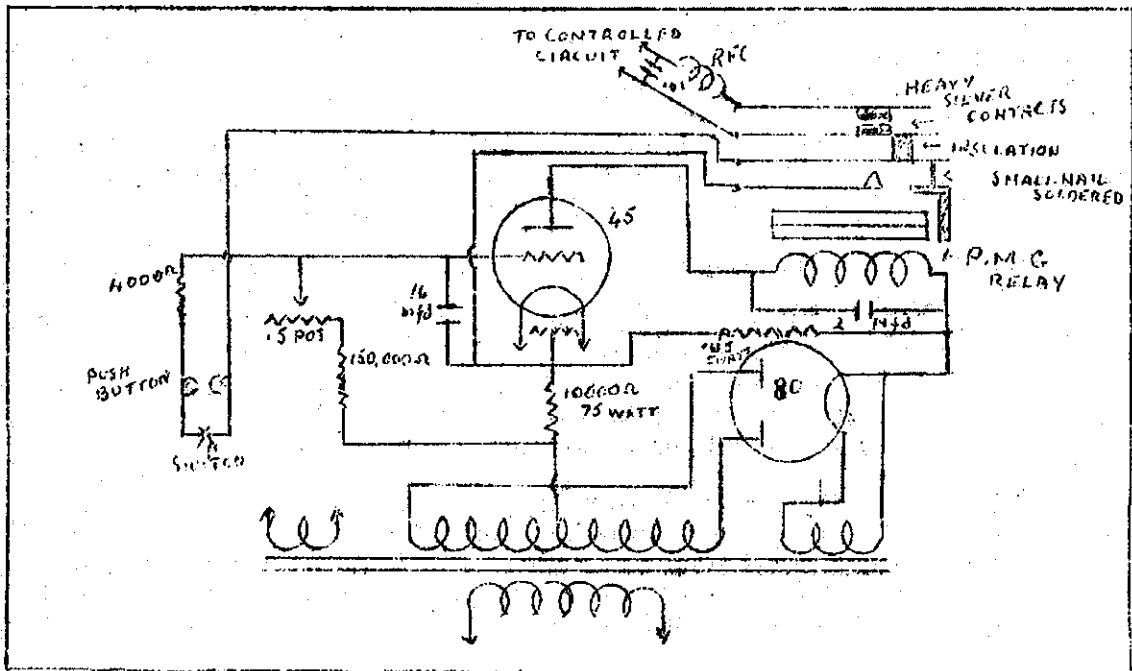
The 50,000 and the 10,000 ohm resistors as shown are rated quite high for wattage but this prevents heating and consequently any change in the calibrated time. Smaller wattage resistors may be used in any setup not requiring very accurate timing.

The relay was made from an old P.M.G. type rewound with about 40 S.W.G. enamelled wire till the bobbin was full. On top, in place of the regular contacts were mounted the contacts from a two circuit phone jack. The main contact points were made of silver and were it not an offence to deface the coin of the realm, I would suggest a coin would be just right! The smaller contacts in series with the button were the original ones of the phone jack.

Adjust the points so that the top ones are just opened when the lower ones are making contact. So when the button is held closed or the switch S closed the relay clicks but doesn't break the main contacts. The original relay closed at 12 mas. and opened at 8 mas.

It may be necessary to include a choke in series and a condenser across the main points if B.C.L. trouble is encountered. An old R F choke and a 0.01 mfd condenser got rid of all clicks in my case.

To calibrate the variable resistor, in this case an ordinary tapered potentiometer, the number of clicks per minute was counted and a paper scale marked accordingly. This calibration still stands O.K. after nearly 12 months continuous use.



WIRELESS INSTITUTE OF AUSTRALIA

.. Victorian Division ..

President's Annual Report for Year ending 30th June, 1943.

I have the pleasure in presenting herewith the report on the activities of the Victorian Division for the year ended 30th June 1943, and as finance is, perhaps the most important item of any organisation, I will deal with this matter first.

As the balance sheet (a copy will be forwarded to each member) discloses, over the past year receipts amounted to £139-7-6 whilst expenses of management, including rent £93-4-6 amounted to £170-9-4. After providing £35-12-6 for depreciation and allowing for £11-12-7 loss on the publication of Amateur Radio a deficit of £78-12-11 results, which figure compares favourably with other years. Rent may be considered excessive in comparison with our receipts but the Council of this Division has always maintained that our reserve should be used in time of emergency to ensure permanency of our rooms.

The only change in our assets during the year was the sale of our holding of £600 in Grain Elevators Board Debentures and the re-investment of £500 in Commonwealth Government Inscribed stock. At the time of the sale it was thought that our cash balance would be insufficient to meet expenses until the end of the year. This did not prove to be the case and the amount of £100 will probably be re-invested in the next Commonwealth Loan.

MEMBERSHIP ... For the first time since 1939 the number of financial members in this Division has shown a marked increase...from 104 at the end of last year to 148 at present. Amongst the additional 44 are many new members, while some could almost be classed as such, as it is some years since they had taken any interest in Institute affairs. However, the fact that they have joined, or re-joined as the case may be is proof of their newly found interest in current and future Institute activities and I have much pleasure in welcoming them to our ranks. I hope that they will be fit to take an active interest in all Institute affairs and thus help to preserve and extend this Institute as a virile organisation for the advancement of all radio Hams in this State, and indeed the whole of Australia. Later in the evening Membership Certificates will be handed to all those present who are entitled to receive them.

EMERGENCY COMMUNICATION NETWORK...Probably the most important activity during the year and one which has certainly aroused the most interest amongst Hams both within the outside the Institute, has been the negotiations in respect of an Emergency Communication Network.

Since the outbreak of war Council has been watching for opportunities to prove the Amateurs' value to the community and following upon the entry of Japan into the war and the consequent acceleration of ARP activities in this state, steps were taken to investigate the possibilities of some scheme of radio communication. The Secretary unofficially obtained the view of ARP officials whose opinion was that existing facilities were adequate for any emergency.

With the granting of permission to other Divisions to establish networks. Council deputised Ivor Morgan VK3Dh to draw up a scheme to cover the metropolitan area. 300 circulars were sent to metropolitan Hams to ascertain the number interested and available to operate stations in any scheme. A very satisfactory response was received and the proposed scheme was then submitted to the Chief Air Raid Warden.

Our delegation was very well received but after due consideration we were advised that the scheme would be superfluous as a radio network already operates in the metropolitan area in conjunction with the police Department. Alternative schemes were discussed and a second circular was forwarded to 105 country amateurs. Once again a most satisfactory response was received and it is now proposed to discuss further ECM suggestions concerning both metropolitan and country hams with the Senior Radio Inspector of this State.

OFFICIAL CUSTODY OF TRANSMITTING GEAR...When this order came along immediate representations were made to the Radio Inspector to allow the containers to be opened, enabling the gear to be re-packed in a manner suitable for transportation. This was agreed to and many Hams availed themselves of the opportunity to ensure that their gear would suffer no damage.

PRISONER OF WAR FUND...Members responded well to appeals for donations to a P.O.W. Fund, sponsored by Federal Headquarters, and an amount of £15.13.6 which includes £5 from Divisional funds has already been forwarded to FHQ and a further sum of £1.16.0 is being held. The despatch of parcels to hams known to be Prisoners of war is being attended to by FHQ and whilst too early for us to have received any acknowledgement of receipt of parcels we can well imagine how pleased those hams who are P.O.W. would be to receive them. Further donations may be forwarded to the Treasurer.

LICENCING OF RADIO SERVICEMEN...When this was first mooted some months ago it appeared that the sale of radio parts would be restricted to servicemen. A letter was forwarded to the Department for War Organisation of Industry pointing out our special qualifications and requesting that parts be made available to amateurs for the maintenance of their own

equipment. A reply was received to the effect that our claims would receive consideration when regulations were formulated. Since then, it has been announced that radio servicemen were to be licenced and a further letter has been forwarded asking for clarification of our position.

MORSE CLASS. After running continually for two years and nine months the closure of this class was forced upon us in March of this year owing to lack of pupils, due no doubt to the fact that the Services are now training their own operators. We are indebted to the instructors who acted in an honorary capacity, and I would take this opportunity of thanking Messrs. Quin, Marriott, Ridgeway and Mrs. Henry together with Messrs. Campbell, Callaghan and Riddell who offered their services; for their valued assistance to me in the conduct of the classes.

THE MAGAZINE. Following a suggestion from Federal Headquarters negotiations were entered into with the New South Wales Division which resulted in the incorporation of the N.S.W. Divisional Bulletin with Amateur Radio. Through the action of the N.S.W. Division contributing towards the cost of the extra pages and also through N.S.W. supplying a larger quantity of notes and technical articles, it was possible with the August 1942 issue to increase to fourteen pages whereas previously we had been turning out an 8 - 10 page magazine. This meant that more time had to be devoted to the actual work of printing, assembling, wrapping and addressing the magazine as circulation increased rapidly until now 170 copies go to New South Wales each month, and the total circulation has reached 375, copies also being sent to Amateur Organisations throughout the world.

As a result the Magazine Committee has been forced to spread the work over two consecutive Saturday afternoons which ensures the regular appearance of the magazine early each month. The Institute is indebted to the members of the Magazine Committee who devote so much of their spare time to the preparation of the magazine, and thanks are also due to the New South Wales Division for the way in which technical articles and notes have been supplied promptly on time each month.

The inclusion of the feature "Slouch Hats and Forage Caps" has proved a popular item and we are indebted to Jim Corbin VK2YC for his work on these pages.

Visiting American Hams, whose addresses are known to us have been placed on the mailing list and we would be pleased to extend this courtesy to any international Hams who may be in Australian Territory.

Before leaving the subject of the Magazine, I would like to mention that September of this year will see the completion of ten years of publication. Yes, the first issue of Amateur Radio

appeared in October 1933, and its regular appearance over the succeeding ten years is an achievement of which we can be justly proud.

In conclusion it is apparent that despite war time restrictions the Institute in this State is in a healthy position. The increasing membership, the continued publication of the Magazine and the possibilities of an Emergency Communication Network show that the Institute in this State is a live body which augurs well for the future of Ham Radio in this Division.

....OOO....

NOTES FROM FEDERAL HEADQUARTERS

The most important happening in Amateur Radio circles recently has been the announcement by the Minister for War Organisation of Industry, the Right Honorable J. J. Dodman, that Radio Servicemen were to be licensed. Institute members will recollect that certain proposals for the organisation of Radio Servicing as an industry were mooted sometime ago. These original proposals, if agreed to by W.O.I. would have meant that Radio Servicing would have been placed in the hands of a few members of the community and one of the greatest monopolies of all time created. One particular proposal was that only Licensed Servicemen would be permitted to purchase spare parts. Federal Headquarters fully realised the injustice that would be done to hundreds of Amateurs throughout Australia if Regulations were gazetted along these lines and a strong protest was made to the Minister and various anomalies pointed out to him.

As a result of this protest, regulations were recently gazetted wherein the part time Serviceman was recognised and given the right to apply for a Licence and Licences would be issued to any person provided that his qualifications were satisfactory, irrespective of membership of any trade organisation. These concessions again prove the value of the Wireless Institute of Australia to the Amateur both in peace and war.

Federal Headquarters has received a copy of the VK6 Division's Annual Report (published in the June issue of "A.R."). The Executive Officers of this Division are to be congratulated upon the splendid work that they are doing to keep the flag flying in the West. It is indeed a feather in their cap to obtain official recognition from the Civilian Defence Authorities and receive permission for the installation of an Emergency Communication Network. The co-operation that has been received by F.H.Q. from VK6 is very much appreciated and sets an example to other States. Well done VK6 and many thanks!

The total of the P.O.W. Fund is still growing and recently a donation of £5-5-0 was made to the Red Cross P.O.W. Fund. Parcels have been sent to Jim Edwards VK2AKE and Snow Campbell 3MR. These are the only P.O.W.'s whose addresses are known to F.H.Q. Do you know a ham who is a P.O.W. in any country other than Eastern areas?

If so send the information on to your Divisional Secretary or the Federal Secretary, 21 Tunstall Avenue, Kingsford.

2AKE and 3MR are both in Italy and the way things are shaping in the Mediterranean both lads should have a sporting chance of coming home very soon and then F.H.Q. won't have any P.O.W's to assist and about £40 in hand so let's have those names, fellows.

.....

NEW SOUTH WALES DIVISION.

The July General Meeting was held as usual at Y.M.C.A. Buildings, Sydney, and an interstate visitor in the person of Jack Coulter VK3MV was present.

Discussion centred around the various changes in the Network and admiration was expressed at the spirit in which some changes was taken.

3MV who belongs to the "Silent Service" gave a short talk on his wanderings since joining up. The speaker had a manner all of his own in describing various experiences and his talk was very much appreciated.

Subscriptions still continue to come in for the P.O.W. Fund. The total of this Fund Federally is now rather high and the total number of P.O.W's in this State whose addresses are known is only one. Council suggests that for the time being that when forwarding donations that it be given the right to use its discretion as to allocation between the P.O.W. Fund and the A.C.F. Recently a donation of £3-3-0 was made to the Institute by Life Member Harry Stowe and it was decided with Harry's permission that £2-12-0 be given to the A.C.F. "Adopt a Soldier Scheme". This means that one soldier will receive comforts for a period of twelve months. Whatsa fellows? How about making it possible for the Division to adopt another nine soldiers making a total of ten? This would cost £27-8-0. When forwarding your subscription why not add a few extra shillings to go to the A.C.F. and help provide a few comforts for hams serving in the "Northern Paradise".

Members will join with Council in expressing sympathy to Ross Wedon VK2PW upon his recent sad bereavement occasioned by the loss of his brother whilst serving with the R.A.A.F. in Scotland.

.....

EMERGENCY COMMUNICATION NETWORK.

The past month has been rather a quiet one for the E.C.N. In the last issue of the magazine you were informed that, in future, the Network would be part of the National Emergency Services. This changeover necessitated new locations for two stations, the installation of an entirely new station and the elimination of one.

Those changes have now been completed and by the time you read this every location will have been tested and the Message Handling Exercises in full swing again.

Stations whose locations have been changed are VL2JH and VL2JL. VL2JH's change was quite a big one. N.E.S. required a station in the Illawarra district and as the amateurs attached to VL2JK under the S.W.E.C.C. scheme had fallen down on the job, so much so that this station had to be eliminated, the Technical Committee were placed in rather a dilemma. Communication had to be provided from that district or the Controller of Technical Services informed that the Institute couldn't do the job it had embarked upon. This would have been a very bad advertisement for ham radio. The closest station to the new site was VL2JH seven miles away. Ern Hodgkins VK2EH, Section Leader at VL2JH, was informed of the position and he immediately volunteered to fill the breach by moving his station to the new site. This action is highly commendable and is a striking example of the real ham spirit. Now associated with 2EH are Tom Barnes VK2ABI - who also is making a considerable sacrifice in travelling to the new site "Jerry" Junk 2EY and Ken Davidson. VL2JH was on the air last Sunday and put in quite a good signal. Well done chaps and thanks a lot.

VL2JL's move was only a small one and the boys are quite happy about it and reckon they'll make good their boast about "day-light being second" when the Traffic skeds are in operation again.

At last "Shorty" Higgins has realised his ambition. He's going to have a station at last! One of these days I'll get the magazine to print Chas' original application for enrolment in the E.C.N. plus his comments regarding the suitability of his home location for U.H. F. Well om here's your opportunity to make good those words and knowing you I haven't any doubts that you will. VL2JP is the call and it is further away from Control than any other station, but despite this fact it is already putting in an excellent signal. Ron Richardson is associated with 2LO and VL2JP will be among the leaders very soon. That is of course provided that nobody does anything silly like getting married or something.

Valc VL2JI. Unfortunately no place could be found in the new scheme of things for this great station whose transmissions and operating procedure were a splendid example to the remainder of the Network. When informed of this decision Section Leader Chas. Fryar VK2NP whilst expressing regret at the change stated that he was quite willing to go "where his services could be best utilised for the benefit of the Network as a whole" 2NP is now with Jeff Thompson at VL2JG. Listen you "glass-arms" we don't want any I.C.W. at 50 w.p.m. just break it down to 49. Alec Little goes to VL2JN and this should help relieve the burden (?) on 2IQ. The transmitter from VL2JI is to be used as a stand by for VL2JB at the subsidiary Control.

SLOUCH HATS and FORAGE CAPS

By 2YC.

Our notes, like the butter, are on the rationed side this month, but I think there is enough to go through and there is always next month to get another batch - so chaps write those few lines NOW.

The most welcome thing about this month's notes, is, that there is a batch from VK 6 - real DX - fb 6FL OM - please keep them coming-- there's nothing more depressing than two pages of notes almost all about one State.

Have just heard that VK6AF Alan Foxcroft has received his commission. Now Pilot Officer, and he must be one of the youngest Officers in the Service. A teacher in private life Alan is now instructing Instructors - Hi! Congrats Alan.

VK6MW - Flight Lieut. "Bill" Weston over this way last year, now somewhere in Queensland. How about another visit, Bill?

VK6JR Glad Clinch now Warrant Officer. Has spent some time up North. Ask Glad what it is like looking for Diamonds - hi!

Bill Morris back again in the West. Bill was VK6WM and is now Staff Sergeant. Want some news from you Bill! How about it?

C. G. Morrison another VK6 over East somewhere. I am told that he is in Queensland. Sorry Cyril I forgot that Pilot Officer on the front end. Congrats and lets have some news.

In conclusion "fellers" - 2 YC wants some dope for this column and we want to see that he gets it, so you VK6 boys wherever you may be, send it along.

Hold it! Have just realised that VK6RH is in New Guinea. Ray must be with the Fuzzie Wuzzies. I'll bet he will tell a grand tale when he returns on leave. That shouldn't be long.

And one more for good measure - VK6FH - brother to Ray GRH - is now Pilot Officer somewhere in Queensland. That's all - 73's - 6FL.

Have you heard that story about one of our Hams off one of His Majesty's Australian Auxiliary Cruisers about to go on fourteen days leave, who went to have a last "look" at the rig. But there were apparently other hams on that ship, as even the key was tied down with steel hawsers and anchor chain. Hi!

VK3XZ - after spending two years overseas returned some months ago to work as we've found out, on hush-hush gear - someone says he transmits in his sleep - from what we gather from the note his modulation on all bands is pluperfect, with distortion.

3RD - Jack Dunc recently went somewhere up North.

6LA one Jack James has just about set a record for a trip from Perth to Melbourne - he only travelled 4500 miles detouring around good old Aussie. Other than that he has no news but hopes to be returning to the west soon.

3AF - is up in Alice Springs.

Captain Bennett a VK3 Ham was married on his last leave after being to three continents and N.G. in four years of service.

3DA and 3MQ are still up in VK4.

3RD os over in Perth...some of the boys want to know how the "Swan" is .. don't know if they mean the River or something else. Major Whyte is doing fine up in N.G. he likes to be alone.

Morry Quick 3RQ who joined the R.A.A.F. prior to the outbreak of war on the engineering side has climbed up through the ranks to the rank of W.O. Has spent considerable time in Darwin and up in N.G. When seen he was about to take off for all points north.

Neil Templeton 3HG, another of the boys to join up right at the outbreak of war has been in the sigs office at Air Board ever since - has also reached the rank of W.O.

The other night a laddie wandered into the shop with a prescription and while I was making it up he asked who was 2YC around here. (QSL card on display for such fish. Hi!) He turned out to be 4KM just about to depart with the R.A.A.F. for far places. Of course, as luck would have it he was in a hurry being a visitor at some relations out here and I was busy. Not having heard from him as arranged I guess he is another who has "gone places."

He was able to tell me that 4XO in the Merchant navy has been torpedoed twice "already". Saw plenty of service in the Med., having been among other places at the evacuations of Greece and Crete. VK6ZO and VK2GT are both now on the "Westralia" having first served on the "Kanimbla". Both Telegraphists and both when you read this headed into the War Zone. I believe 4RF is taking his rig and ship along with them.

I heard of a VK4 Ham (in the Service) who is on leave and was found searching VIB for Wireless Gear, and ever since I've been wondering if he knows what I don't, and its time to get the dust off things. Hi!

VK3TC/3DU - D. Bowie recently joined the ranks of the Benedicts. Up till now he has been most familiar with telephone trunk line services and country trains, and in between times works on or dreams of Xmitters, after the War.

Graham McGowan 3GO is a hush hush worker on unknown gear and if words were worth sovereigns he wouldn't give you a farthing. Hi! (Oh, well, if its the same 3GO whom I used to hear on 28mc way back in 1929, he is still in the front of HF DX. Hi! 2YC) VK4 KZ after a long spell in NT has just come down from Darwin, and came by plane too. At the moment he is on leave, and making the most of it.

VK9RC was located in Madang when the gun went off and stayed long enough to see the Japs blow his house and hospital up, so I guess you can say he has been in the thick of it. When seen by 3YW he was waiting to be discharged and afterwards his QRA is to be VIM.

VK3YF is the "fortunate" nephew of an "unfortunate" uncle 3XW. I think the Adjectives come thus. Ken is being carted all over the place per plane to fix up W/T gear and even catches lots of fish, while all Uncle can find to do is "say his prayers every night that Stawell will get an ECN station of some sort allotted to it" Hi! I reckon those adjectives aren't descriptive enough, om...2YC.

Thanks everybody...your column is beginning to "crawl" & lots hope you get it past the walking to the running stage pretty quickly. Remember notes to Div. Secretaries or direct to Jim Corbin VK2YC, 78 Maloney St. Mascot..if you are in Sydney, 'phone MU1092.

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H A M S !

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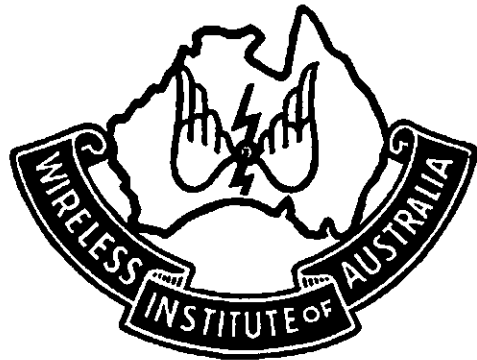
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SEPTEMBER 1943

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VOL. II No. 9

September, 1943.

AUXILIARY POWER SUPPLY

Used By The

EMERGENCY COMMUNICATION NETWORK

BY

C. F. Fryar VK2NF

Although the Emergency Communication Network has been in operation in New South Wales for some time now, using the A.C. Mains as the source of power, it was fully realised that, to live up to its name, the Network should be capable of functioning independently of the mains. With this thought in mind the writer set to work to design a universal power supply to operate from 240 volts A.C. or 6 Volts D.C. supplied by storage batteries.

Since the outbreak of hostilities, which was to curtail the activities of thousands of amateurs the world over, the very little used - as far as Amateurs were concerned - vibrator unit came into its own and due to the progress made with its manufacture, it is used by the Defence Forces of every nation as a means of supplying H.T. to countless Transmitters, Receivers and pieces of Equipment requiring a constant source of voltage independent of the A.C. Mains. With care and proper attention to the manufacturer's ratings their operation is practically trouble free.

The power transformer was the first problem and although a standard receiver type was revamped for AC-DC operation, losses were too great and having the resources of a well equipped laboratory at my disposal specifications were drawn up and submitted to a local manufacturer. This transformer has the following windings. Primary 240 volts A.C., 6 Volts D.C. for Vibrator and Secondary 350 volts each side of Centre tap at 150 mills and a 6.3 volt 8 amp. for lighting all filaments when working on A.C.

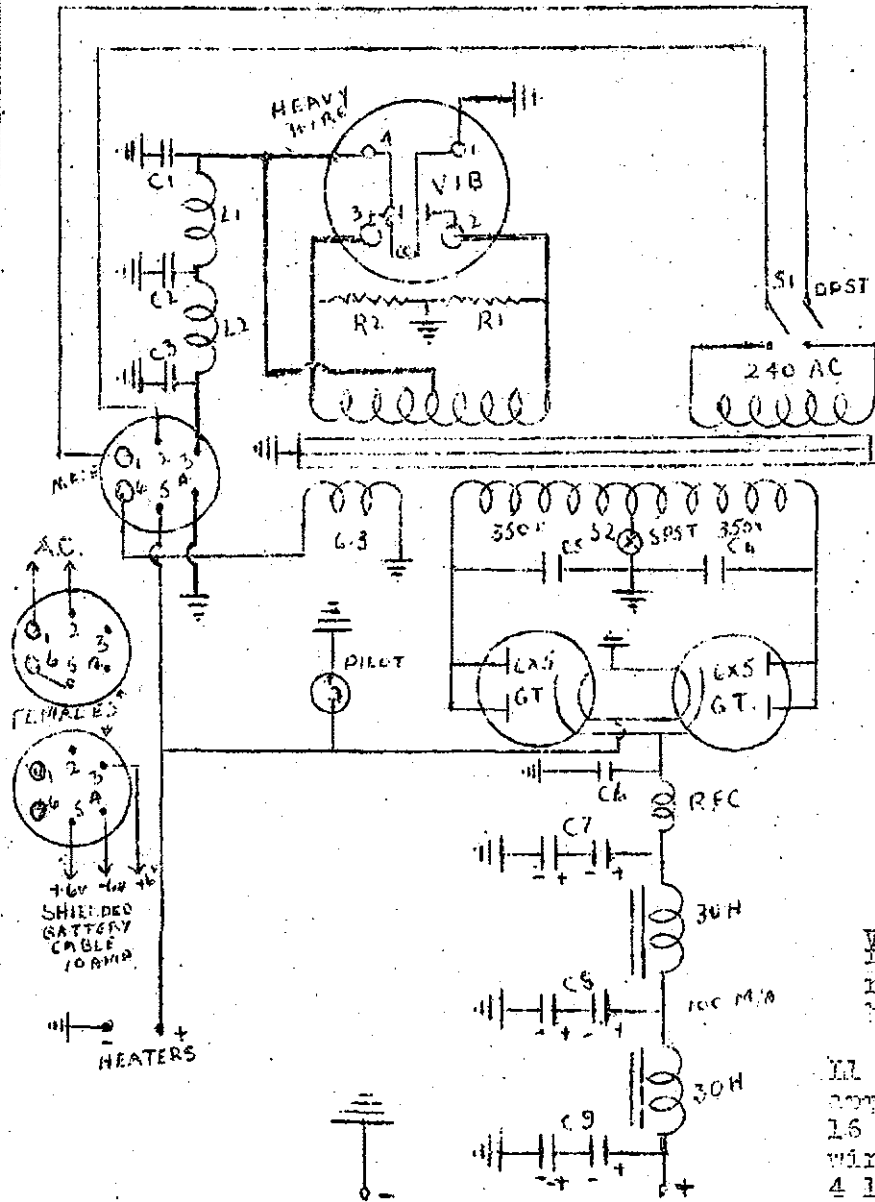
The Vibrator Unit is a 6 volt non-synchronous type rated at 100 milliamps maximum output using a full wave tube rectification system for minimum voltage drop and under test this unit withstood a 200 mill drain without noticeable signs of wear and tear on the contacts. It is suggested that operators do not carry out this overload test! At this severe overload the battery drain was in the region of 12 to 14 amps. However, under normal operating conditions viz., 100 mills the battery current dropped to 9 amps which is not an unreasonable drain. This current drain does not include the filament drain of the transmitter and receiver. A separate accumulator automatically connected by a plug and socket arrangement as shown in the circuit diagram takes care of these filaments.

The INPUT HASH FILTER is quite conventional and consists of a pair of L.T. Chokes wound with 70 turns of 16 gauge enamel wire on a $\frac{1}{4}$ inch former and by passed to earth by means of .5 mfd tubular condensers. These chokes must be wound with heavy wire to ensure no voltage drop at the vibrator terminals. For the same reason all connections between battery, transformer and vibrator should be wired with the same gauge. The 100 ohm resistors across the vibrator are to suppress sparking at the contacts.

The BUFFER CONDENSERS. This is probably the most important component in a vibrator power supply. If it were omitted from the circuit or should the capacity be incorrect, excessive sparking at the contacts would occur and the life of the vibrator considerably shortened and in addition battery drain would be high with a corresponding loss in output. Therefore the constructor would be well advised to experiment with different values. The ideal test of course would be with a 'scope, but we cannot all avail ourselves of the use of one of these very handy pieces of equipment. Proper values are usually between .005 mfd and .01 mfd, the condensers being rated at 1500 volts working.

RECTIFIERS. This section consists of two 6X5GT valves with their plates connected in parallel, used as full wave rectifiers. The centre tap of the transformer is earthed through an On-Off Switch. By removing one of these tubes the voltage drop is only about 40 volts, and this means that the installation is capable of operation should one fail at any time, although inefficiently.

H.T. OUTPUT FILTER. This section is quite conventional although somewhat elaborate, and consists of an R.F. choke and by pass condenser immediately following the rectifier. The filter condensers C7, C8 and C9 are 14 mfd. 600 volt working electrolytic connected totalries to give a total capacity of 7 mfd. and a working voltage of 1200 volts. When the unit was first constructed only one electrolytic was used with disastrous results, so it was decided to play safe and use two in series. The filter chokes are



Vibrator trans-
former and
rectifiers to
be shielded.

L1 & L2 It chokes
approx 70 turns
16 SWG enamelled
wire on 1/2" former
4 layers

- C1, 2, 3.....0.5 400v
- C4, 5.....0.01 2000v
- C6.....0.004 600v
- R1, 2.....100 ohm carbon
- S1.....DP switch to
break both legs of AC

- C7, 8, 9...2x14 mfd 600v
electrolytics in
series to make
7mfd 1200v working
- S2...On-off TR switch.

of standard design and should be capable of carrying at least 100 mills and for preference 150 mills. A Bleeder resistor of 25000 to 50,000 ohms was used in the original unit although not shown in the circuit diagram. Actually its incorporation is of doubtful value as some part of the installation either the Receiver or Transmitter will be running at all times and in addition it uses some of the scarce milliamps when operating on D.C. A Pilot Light of 6 volt is added as a safety measure.

CHASSIS. Here is a description of the chassis which was used and it is hoped that other stations may be in a position to duplicate same. It is constructed of 18 gauge steel 12" x 8" x 2 $\frac{1}{2}$ " for a twofold purpose viz., rigidity and shielding. The transformer, vibrator and rectifiers are enclosed in a steel box with tightly fitting lid and the builder should make certain that these pieces make good contact with each other as a further aid to suppressing harshness and other noises when on D.C. A Steel bottom is also fitted to the chassis for shielding purposes and as a precaution against acid fumes from the batteries located directly underneath. This bottom shield is cadmium plate to provide positive contact to frame as a common negative is used throughout the installation.

The changeover from A.C. to D.C. is accomplished in a matter of seconds by means of a plug and socket arrangement credit for which is given to 2R. for a very handy and ingenious method. The original idea was to use several switches ganged together but that meant a lot of wiring and working out a complicated circuit. The D.C.S.T. in the A.C. Primary of the transformer is used for safety purposes to break both legs of the mains. This is important and must be incorporated in all units.. It is quite easily realised that if a S.P. switch were used it may quite accidentally be wired in the neutral side and the active be alive on the unit. The H.T. and Filament connections are made to a six pin socket at the back of the unit.

The battery leads should be twisted together evenly and shielded for almost their entire length as an added precaution to prevent this.

This completes the description of the unit and now for a few details on its performance. At no load the unit delivers 300 volts. at a load of 50 mills corresponding to the current drain of the speech amp-modulator the voltage is 350 so a dropping resistor should be included in the receiver to drop the voltage to 250 maximum. The value of this Resistor is easily found by Ohms Law. at a load of approximately 130 millimps which is the total current drain of Transmitter, Modulator and aerial relay the voltage is 320 maximum. The 807 stage draws 40 millimps. The current drain on the Vibrator battery at this load is 10 amp and the drain on the Filament battery 6.5 amps. The batteries are 130 ampere hours rating. This means that they will last nearly 12 hours before needing recharging. The output voltage working on D.C. is approximately 20% less than on A.C. and according to reports from Control this does not appear to affect the signal very much.

(Continued, Page 8)

ELECTRIC SYNCHRONOUS CLOCK

... For those Mechanically Inclined ..

.....

This article is a copy of one published in The Zero Beat News several years ago. The clock has been built by the sender VK2OM and works very well. It is for operation on 240 volts 50 cycle.

The clock is not self-starting but has to be started by gently turning the spindle. The motor does 2 00 R.P.M. and has a worm wheel to give a 40 to 1 reduction on second's spindle. For the stator 2 plates are required, 3" in diameter and about 18 (10 g. is better if you can get it machined) or 20 gauge. This is marked out as shown in Fig. 1. The holes for the nails are drilled with a No. 37 Drill. Before drilling, hone off the shoulder of the drill so as to make a neat hole (shown in Fig. 2) which will make the nails a tight fit. 15 nails number 12 gauge are cut to $\frac{5}{8}$ " lengths and then soldered into the holes. This completes the two Plates for the stator.

A piece of Brass Fibre or cardboard tube $\frac{5}{8}$ " long and 1 11/16" inside Diam. is then slipped on over the nails of one plate and the other plate is pushed on from the other side (see Fig. 3). The inside face of the Plates is insulated with paper and the winding is put on (2 ozs. 45 gauge swg enamel), after winding insulate with a strip of paper, and then a piece of this sheet iron $\frac{3}{4}$ " wide and about 9 $\frac{1}{2}$ " long is fitted around the coil. This completes the magnetic set from the nails on plate on one side to nails in opposite side. The coil should have about 6000w D.C. Resistance, but is not critical (except from an economic point. The higher the resistance the less current) (5000 ohms will not operate my own electric light meter).

THE ROTOR: A piece of spring or cast steel 2" square is marked out as shown in Fig. 4 and after drilling is hacked out with a hack saw and finished to size with a file. When finished it should look something like Fig. 5 (less N.S.N.S.N.S. H.) After being drilled to take spindle fit same and try turning rotor inside stator. (it should turn O. K.) If it doesn't, file it down a bit or scrape a little off the nails. When it runs freely make it red hot and quench in water after which it is to be magnetized as shown. The jig for magnetizing is shown in Fig. 6 about 2 ozs. of 26 gauge is wound as shown on 6 poles mounted on an iron base. (I use 6- $\frac{1}{2}$ " bolts about 2" long) a 6 volt batt. is then flashed 3 or 4 times with the rotor sitting on top of the poles. (if you want a really strong magnet use 45v B Batt.)

The bottom end of the spindle is ground to a point and the bottom bearing is a screw removed from an old clock. (The escape

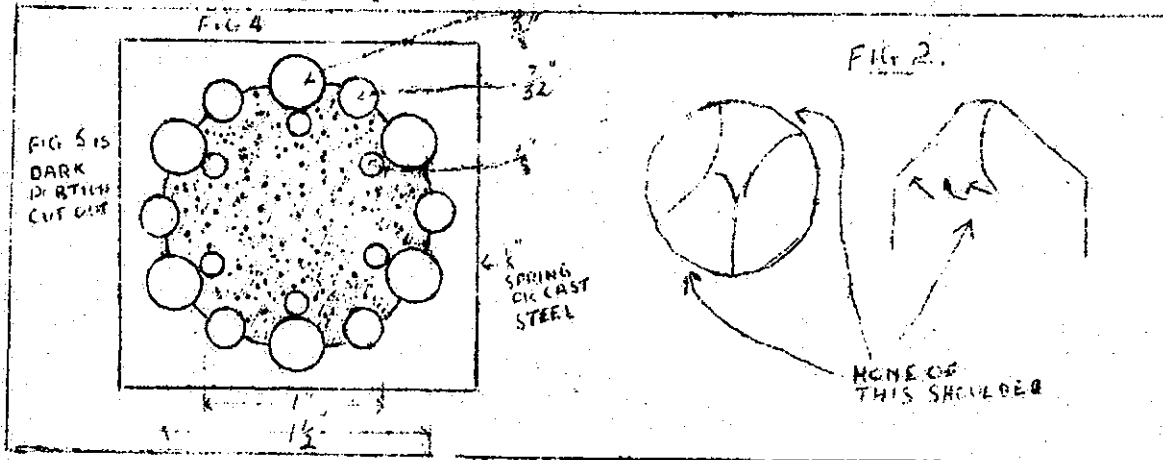
wheel bearings are used for this.) The other bearing is just a piece of 3/16" brass drilled to fit spindle. A worm wheel is next fitted to the spindle and this has to gear with a 40 tooth wheel (removed from the alarm portion of old clock) a half inch Whitworth bolt will do in most cases if the teeth on the wheel are filed a little. It will be much better if a worm wheel can be turned up in a lathe, but the bolt will work. The motor is now complete. An old? German alarm clock is required unless you happen to have a lathe. If you have let me know and I'll give details for making the whole works.

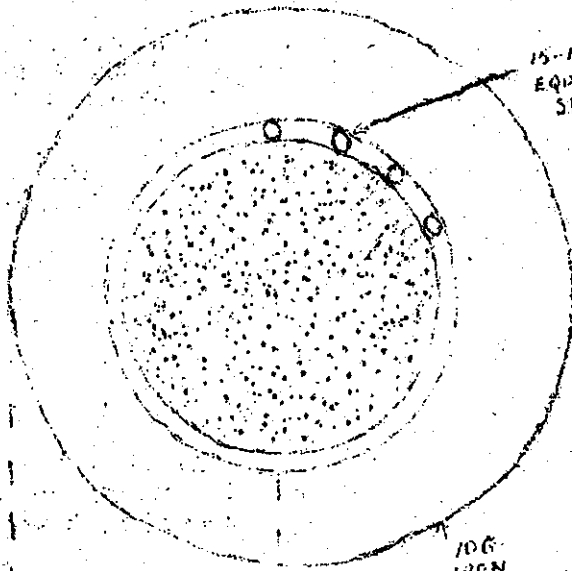
Remove all the works from the clock except the main spindle, the second hand spindle and the wheel and pinion coupling these two.

The second 's spindle is usually fitted with a 40 tooth wheel 1, if not in your case, fit one or get another clock. Now a spindle has to be fitted with an 8 tooth Pinion to mesh with the 40 teeth on the second's spindle and the 40 tooth wheel from the front of alarm portion is put on to the other end of this spindle. This wheel gears with motor (gearing is shown in schematic, Fig. 8). The clock complete looks something like Fig. 8.

PARTS & TOOLS REQUIRED: 1 old German alarm clock (a new one will do Hi.) 2-3" Diam. iron plates for Rotor. 1-2" square by 1/8" thick cast or spring steel for Rotor. 12 gauge nails. 1 piece of Brass, fibre or cardboard tube. 2 ozs. 45 gauge SWG enamel. 1/8" Whitworth bolt for worm wheel. No. 37 Drill (7/64" is nearest fraction but 7/1000" oversize). 3/8 Drill. 7/32 Drill. 1/8 Drill. Hacksaw, file, soldering iron, a little commonsense and plenty of patience. (I'm still thinking of that 45 SWG).

Any information required may be obtained from VK2OM who also has a magnetising jig for anyone who wishes to use same. Naturally half the fun of making anything is to figure it out for yourself... I got plenty of splinters in my fingers, but I managed the job and I'm no genius, so I guess the interested lads can do the same...I made it and it works.





106 IRON
FIG 1
STATOR PLATE

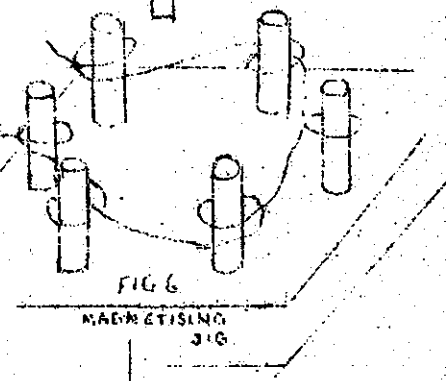
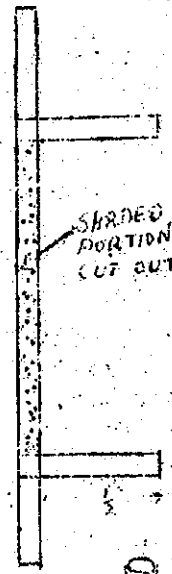


FIG 6
MAGNETISING JIG

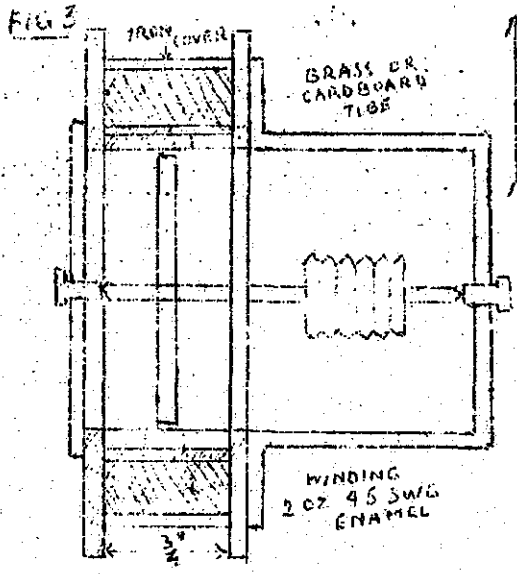
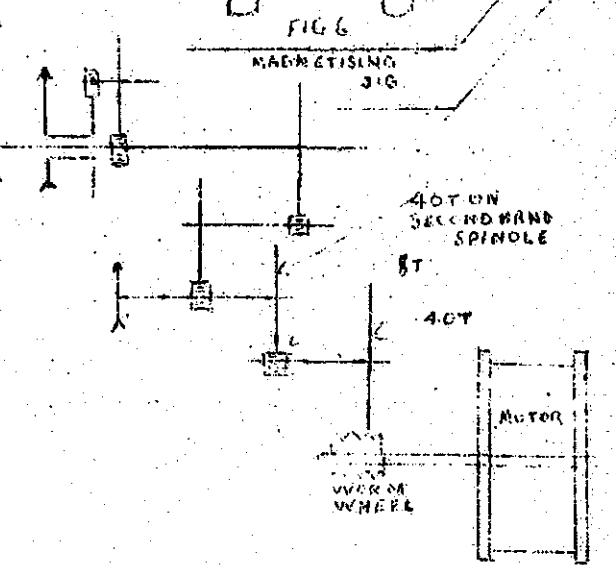


FIG 3



MOTOR

ANOTHER METHOD OF REJUVENATING ELECTROLYTICS

.. By VIKSABS ..

I read with interest in a recent issue of "A.R." of methods of rejuvenating old electrolytic condensers and thought I would pass on a method which I have found to be effective with 90% of wet electrolytics.

The reason for the failure of the condensers seems to be a thin dielectric film which forms at the junction of the aluminium anode and the supporting rod, these being usually clamped or sometimes riveted together.

The cure is to remove this unwanted film by connecting the condenser in series with a 40 or 60 watt lamp across the 240 volt ac mains. Usually nothing happens for several minutes and then the film suddenly breaks down, causing the electrolytic to sizzle and the lamp to light. The power should then be switched off and the condenser reformed by connecting to a D.C. supply of several hundred volts from a receiver power supply or the like for about ten minutes. After this period it will be usually found that the condenser has acquired a new lease of life.

Obviously, if there is no electrolytic at all in the condenser to start with this method will not work. I have fixed over a hundred or so condensers using this method, so thought it worthwhile passing it on to the boys.

...o00o...

Continued from Page 4:-

The Receiver is a super-regen and with the gain turned to maximum, no trace of hash or noise was noted, and as a further test the carrier was left running for a few minutes and Control reported no difference between A.C. and D.C.

Since completing this unit a L.T. fuse of 15 amps was added to the A plus lead in the Battery circuit to guard against overload should any of the components fail at any time.

In conclusion it is pointed out that with proper handling and strict adherence to manufacturer's ratings this unit will give 100% service. Remember Transformer, Vibrator and Rectifiers rank high on the priority list and it may be impossible to replace same. The motto of the Network is "Ready for Any Emergency". Never let it be said that you could not live up to it.

Any enquiries regarding this unit should be addressed to G. Fryar MW2484 extension 271, 113 a Teenyson Road, Gladesville, or R. A. Priddle, BW6006 or XF1885, Sraner Road, Greenwich.

SLOUCH HATS and FORAGE CAPS.

Please Mr. Editor, may I lodge an objection? You usually put "By 2YC" under my title, and that is giving me, usually, credit for a lot that I do not write. All kinds of chaps wearing all kinds of Australia's fighting Hats and Caps write this column, and all I do is to retype, these, their messages to the friends they still remember, till the SOS start again. In some cases I mention who the writer is, but where I am not sure this is wanted by my correspondent, I leave the call out. But this, I insist, is the Hams column and very little credit is due to 2YC, except for the "lousew" typing by means of one finger.

I nearly sent these notes down to VIM by hand as 30F was on his way home for a week's leave, after a nice long cruise "in northern and north-eastern waters" as the communique says. It is said their ship was sunk (by Dame Rumour) at least once a week while away, but as 30F reports Wilf 2ALP and the others "all in the pink" the loss of the ship seems to have been a little exaggerated.

Bill Lewis 2MB/6XB is now down in VIM doing his "pre-commission" course. Best of luck Bill, om, you deserved it long ago. 2XC must have about finished his by now.

Did you know 3RJ went to VK4 on "business" and, believe it or not, went both ways...in a train." How did you let him get away with it, Vaughan, can't you "make" him fly. Hi!

We do get the news the "hard" way sometimes. From the T & R Bull. I see that Charlie Miller 2ADE is the proud Father of a Daughter. Why keep the good news so dark in VE, em??? Congratulations, and I trust the young lady is fb, with 100% modulation at 3 a.m.

Sid Clarke also has a Baby daughter...talk about the silent service, Sid. With four BOYS I'll have to have a chat with you and Charlie. Hi! to see what it is I don't know!!!!

VK3CG...Johnnie Brogan of Merbein is a signaller in the 1st Aust., Independent Signals Group A.I.F. somewhere in Australia.

VK3VN...P.E.Evans formerly of Smeaton now a Flying Officer in the R.A.A.F.

VK3EC...Sgt. E. Cook of Swan Hill is still in the North with group 34 of the R.A.A.F.

VK3TD. Flying Officer A. N. Buzacott, ex technician at 3LK, Lubeck, is now with the R.A.A.F. Directorate of Sigs (Quite a lot of water has passed under bridges since the days at McMahons Pt., em!!! ...73 from the 2YC's)

VK3OJ Corp. Root. Stevens of a sigs group in New Guinea reports having met W7GTH Sgt. Verne Egerton of Oregon U.S.A.

VK3VZ...Signaller J.C. Duncan now located with Sigs Hq 12th Aust...Division.

VK3EH...Sgt. E. H. Foot of Balwyn at present with LEC School of Signals at Bonegilla.

VK3CT...L.C Graf of Group 962 R.A.A.F. doesn't worry about "slickers and passbooks" now. Hi!

VK3FW...Pilot Officer Bill Fulton is to be congratulated on obtaining his Commission. Bill is with Group 625, R.A.A.F.

VK310..A. L. Maquire of Stratford is a "Loot" with a heavy A/Battery.
VK3WH..A.W. Chamler is still with the R.A.A.F. at Ballarat and is
now a Warrant Officer.

4RF...left Canberra, but judging from the following from SRV, they
are all "star reporters" up there. By the way, Ray. Fred was here
at 2YC's the other night and says "there is no doubt about you." Hi!
He has been for a trip up north and now has a good "American touch"
as he reckons that the mosquitos are so big up there that when one
landed on a "drome the lads at first used to rush out to refuel it???

VK3RV...fills the page as follows -

"First the Roll Call of the Canberra Clan:-

VK3/2EO...Dave Duff, Chief Shore Wireless Operator.

VK3RV...Ray Smith, Petty Officer, Telegraphist.

VK2AMP...Jack Gore, Leading Telegraphist.

VK2ANK...Aog Allan Morris-Rees, Telegraphist

VK5Fa...Brian Anderson, Leading Telegraphist

Of the W's

W6LOW...W. B. Hurst, Lieutenant U.S.N.

W6RBA...B. Litwin, Radioman, First Class

W5FPX...C. E. Gibbs, Radioman, First Class.

W8GFB...A. Holzmilller, Radioman, First Class.

But as he says the establishment is now so big and there are so
many both of our and the US Naval men there that no doubt other hams
are on the station (Fred says you missed a W9. Hi!)

VK2EO is still going strong at the transmitting station at Belconnen
and has a crowd of Wireless Mechanics to train to add to his worries.
How he keeps all those 2EO rigs on the air is something of a miracle.
He certainly has 'em tamed. As the Xmitters are pretty active,
finding time to service them is a bit of a problem. When I last saw
Dave he was busy cleaning out one of the I20KW bottles. In some of
the Xmitters they put in four big "bottles" using them two at a
time, and the aerial currents is several hundred AMPS, and how! Yes,
sir, 2EO is a busy man these days. Would you believe it, he takes
keen delight in sending young and unsuspecting sailors out onto the
paddock on a push-bike so that they have to pass under the big set's
aerial. You should see the looks of astonishment when the youth top-
ples off when the RF makes the old push-bike a bit too hot to handle.
(I must remember TT when I pay my visit to Canberra, Dave...2YC).

VK3RV (that's me) is now the proud Father of a bonny daughter. The
junior op certainly takes up some time. This is my first and seems
to demand a lot of attention so 3RV doesn't get much time for any-
thing else, ask Frank O'Dwyer, he knows. (That's the use, Frank "run
away" to sea. Hi...2YC)..incidentally, apparently so did 4RF. Hi!) I
am as 4RF has told you in charge of maintenance at the receiving
station and am rather fortunate in "possessing" a rather modern
service lab., with plenty of test equipment to play with. There is
not much time for play though, as I have more than half a hundred
or so, of modern communication receivers to keep in working order,
besides high speed gear, remote control equipment for the xmtra,
diversity receivers, UHF gear

(Continued on page 14)

D I V I S I O N A L N O T E S

... Federal Headquarters ...

Federal Headquarters has now been located in New South Wales for close on two years, now the minimum period that any State may act as Head-quarters Division without reference to the other Divisions. This fact has been brought under the notice of the States concerned and they have been requested to forward their views regarding the location of the Federal Executive for the next two years.

One of the first acts of the Federal Executive in New South Wales in 1941 was to take a Census of all Amateurs in an endeavor to ascertain the Experimenters part in the war effort. The success of the Census was apparent from its inception and nearly 603 of cards were returned. As two years had elapsed since this Census was taken the possibilities of bringing it up to date were discussed at the August Meeting of the Executive and it was decided that although the Cards must now be considered out of date the question of a revision should be left until the cessation of hostilities.

The tenth anniversary of Amateur Radio was brought under the notice of Councillors and they were of the opinion that the magazine although in a rone-ed form compared favorably from a technical point of view with any experimental publication being published anywhere else in the world to-day. It was felt that the publication of the various Divisional Reports had done much to make the publication the mouthpiece of Amateur Radio in Australia. The Victorian Division assisted by New South Wales are to be commended upon their efforts and should gain a great deal of satisfaction that their efforts have also received commendation overseas. Congratulations, VK3.

Shades of the past. At its last meeting the Federal Executive received an application for a W.A.C. Certificate from Telegraphist Fred Lubach VK4RF. Let us hope that the International Amateur Radio Union is still issuing them.

.....ooo.....

NEW SOUTH WALES DIVISION

August General Meeting of the Division was quite the largest for some considerable time and quite a number of old and familiar faces were noticed among the gathering. In the absence of the President, the Chair was occupied by Harold Peterson VK2HP.

Members were informed that the present term of Office of the Federal Executive would expire in September and that Federal Headquarters had notified the Division of this fact. It was unanimously decided that New South Wales was quite prepared to act as Head-

quarters Division for the next two years and that the method of election be the same as in 1941. A vote of appreciation of the splendid work carried out by the Federal Executive during the past two years was carried by acclamation.

Several recommendations from Council were discussed by Members, the first being a suggestion that the Division endeavor to raise funds to augment the Australian Comforts Fund "Adopt a Soldier Scheme" Members were informed that under this scheme the payment of £2/12/- per annum would provide weekly comforts for one soldier for a period of twelve months. It was decided to inaugurate this fund immediately and through the courtesy of Messrs. Bennet 2VA and Road the September General Meeting to be held on the 16th day of that month will take the form of a Picture Night. In addition, it was decided that all members be circularised bringing under their notice this entertainment.

Another recommendation was that the Annual Dinner be revived. This suggestion caused considerable discussion and it was finally decided that each member be circularised in an endeavor to ascertain the approximate number of hams who would be present.

During the month two overseas visitors, Messrs. Al Stansfield W2NDJ and Jim Dimmock W6PBO were entertained and it was anticipated that they would have been present at this meeting, but Douglas decreed otherwise!

A striking example of faith in the Institute was exhibited by one of our country members recently. He forwarded sufficient funds to make himself financial up to 1947! That's the spirit. With chaps like you ham radio will always prosper.

Members will regret to learn of the passing of "Jerry" Junk VK2EY, who was accidentally killed on Saturday 21st August. 2EY was attached to VL2JK recently, and was rapidly proving himself a keen and capable operator. His passing will be mourned by a host of good friends. A wreath was forwarded on behalf of the W.I.A. and E.C.N.

The next Meeting of the Division will be held at Y.M.C.A. Buildings, Pitt Street, Sydney, on Thursday 16th September, and will as previously mentioned take the form of a Picture Night in aid of the A.C.F. "Adopt a Soldier Scheme" Don't come alone, bring the XYL and let her see the fine bunch of fellows you meet at the Y.M.C.A. each month.

...000...

EMERGENCY COMMUNICATION NETWORK

August General Meeting of the Division was made an E.C.N. night, all operators being called together to discuss the workings

of the Network generally, and to make suggestions regarding improvements. The main subject was that age old topic "Fone versus C.W." It was decided that a Morse Practice Class be held each Sunday morning between 9.30 a.m and 10 a.m immediately prior to the commencement of the Exercise. In addition, Messrs. Fryar and Thompson volunteered to act as instructors should operators be willing to support a class to be held on each Tuesday in the month.

Saturday 4th September was Civil Defence Day in Sydney and the Network was represented on the State Control Float in the procession that formed part of the celebrations. This Float depicted the manner in which State Control would work in an Emergency, Communication being the main feature. The Radio Section exhibited the type of installation at the outlying stations - VL2JL's, as a matter of fact. Two operators were seated on the truck and during the march Morse signals were transmitted in two different tones through loud speakers thus giving the impression that two stations were handling traffic. This ingenious idea was the result of a brain wave of Chas. Fryar VK2NP.

EDITOR'S NOTE:- Unfortunately owing to lack of space the rest of this report has been crowded out.

WESTERN AUSTRALIAN DIVISION

... Emergency Communication Network - By VK6FL ...

Whilst we are not in the fortunate position of being able to conduct a series of message handling exercises, such as recently held by the New South Wales Division, we feel that the stage is set, and the prospects very bright. Much good work has been done in recent weeks, and the installation at Central Control should be completed by the end of this month. Various tests have been carried out between fixed points, culminating in a general survey of the Metropolitan and Suburban areas on May 29th.

A Mobile unit operating from the car maintained satisfactory contact with two fixed Metropolitan Stations. Fourteen selected points in the various Control Areas, were tested and the results obtained auger well for the future of the E.C.N. in this state. The two fixed stations were operated by 6GM and 6LW whilst 6FL and 6NL spent the greater part of the day in the car.

In view of the temporary nature of the equipment in the car, and the transmitter power (4 watts) some doubts were expressed as to its ability to do the job. This proved mere delusion and those who took part in the test were very gratified with the results.

6LW Wally Peterson has done some excellent work with the transmitter for C.C. and is to be congratulated on a splendid job. Wally is full of enthusiasm and always ready to co-operate in any matters relating to E.C.N.

6GM George Moss, also doing great work and has the installation at C.C. well in hand. George and Wally work hand in hand, and between them have accomplished a great deal in the design and construction of equipment.

6FL..Full of enthusiasm, derives much pleasure co-operating with above in various tests. Particularly likes being called out at 0500 hrs (say's you).

6HL..also very keen. Seen at control Centre during course of instruction. Harry, did you forget your lines the other night? Hi!

Personalities are few, but many well known VK6 hams were seen at course of instruction for Communications Staff at C.C. As this course is almost completed we trust they will now take an active part in E.C.N.

6OB..Cliff Brown still as full of enthusiasm as ever, and doing a great deal to further the interests of E.C.N.

In conclusion, I might mention that we feel a great deal has been accomplished, and in this respect we owe a debt of gratitude to our worthy Secretary Charlie Quin 6OX, who has been tireless in his efforts to support and further the prospects of E.C.N. in this State. His time is limited and duties many, but never the less he always manages to do the seemingly impossible.

VICTORIAN DIVISION

The Annual General Meeting of the Victorian Division was very well attended, a representative gathering being present.

The election of President for the ensuing year was closely contested, Messrs. H. N. Stevens VK3JC; R. Marriott VK3SI and J.B. Marsland VK3NY were nominated for the position and on going to the ballot Mr. H. N. Stevens was re-elected.

Council elected for the next term were:- Messrs. R. Marriott, J. K. Ridgway; H. Burdakin; A. Clyne; H. N. Stevens; J. G. Marsland; I. Morgan; and C. Quin.

At the subsequent Council Meeting Mr. R. Marriott VK3SI was elected Chairman of Council. Secretary, Mr. R.A.C. Anderson, VK3WY. Mr. J.G. Marsland VK3NY was re-elected Treasurer.

Members are notified that if they are still unfinancial this issue of Amateur Radio, the September Issue will be the last forwarded to them. If they wish to continue to receive Amateur Radio, the Treasurer will be very pleased to receive their subscription.

.....
electrical equipment, etc. etc. Besides that there is new gear being installed all the time. However, I am now training an assistant to ease the burden a bit, while in my "spare" time I am teaching Radio to the WRANS. Thanks 3RY--2YC.

2ANP has forsaken the WRANS and brasspounding for a quieter life in one of those "censored" parts of the Services.

5PA has also recently been endowed with a Junior Op in the shape of a nice little daughter.

Mr. Editor, I ask you, five baby daughters on these two pages... are they slinging off at the 2YC's four sons???

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VK2NG; R. SMITH, VK2AIU; R. MILLER.

The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

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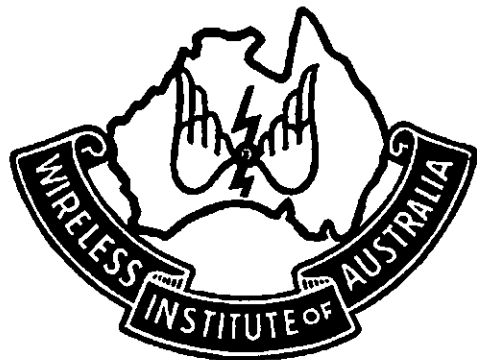
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SIXPENCE

OCTOBER 1943

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OF
AUSTRALIA



Published by the Victorian Division

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INCORPORATING THE N.S.W. DIVISIONAL BULLETIN

Vol. 11. No. 10

October, 1943

W. R. GRONOW .. VK5WG

V. E. MARSHALL . VK3UK

H. KINNEAR .. VK3KN

An outstanding page in the history of Australian Ham Radio was written ten years ago, when in October 1933, the untiring effort of the above Hams was rewarded by the birth of "AMATEUR RADIO."

Ten years ago, these Hams in their wisdom saw the need for some publication wherein all Divisions would have an equal opportunity of expressing ideas, news and results of experiments. In effect they visualised a magazine to be the mouthpiece of the Federal Organisation. Today, we the present Magazine Committee can truly claim that "Amateur Radio" is an integral part of Ham Radio in Australia.

Bearing in mind that its production is, and always has been a spare time job for the magazine Committee, we can be pardoned for acclaiming its survival as a meritorious achievement that could be brought about only by the spirit of Ham Radio.

After nearly six years of publication, when it was becoming equal to any other magazine--published, the outbreak of war inflicted a setback so serious, that it was only by retrenchment to its present form that it was able to survive.

We look to the future with confidence, having already plans for the post-war "Amateur Radio" under consideration awaiting the day when they may be placed in the hands of the printer.

ELECTRONIC VOLTMETERS

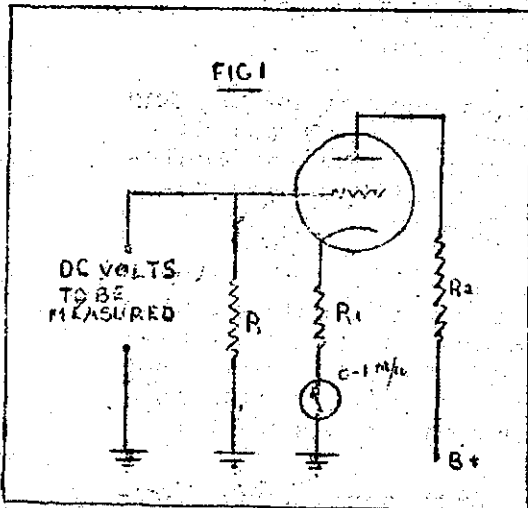
.. From an Article by J. H. Potts ..

.....

Within the past few years the electronic voltmeter has become widely accepted as one of the most simple accurate and convenient instruments for measuring DC voltages in high impedance circuits.

Essentially the electronic voltmeter differs from other vacuum tube voltmeters in that it is designed to measure DC voltages only. By limiting its application to DC measurements, greater stability, accuracy and simplicity are readily obtained. These advantages are extended to AC measurements when the electronic voltmeter is employed in conjunction with a suitable rectifier. In addition such instruments may be designed to serve as ohm-meters, as well as voltmeters, and in such applications enable measurement of extremely high resistances.

FUNDAMENTAL CIRCUIT .. The fundamental circuit of one of the simplest types of electronic voltmeters is shown in Fig 1. The meter in the cathode circuit of the triode indicates the cathode current. When a negative DC voltage is applied to the grid, the current decreases and vice versa. Thus the meter may be calibrated to indicate both the polarity and the magnitude of the DC voltage under measurement.



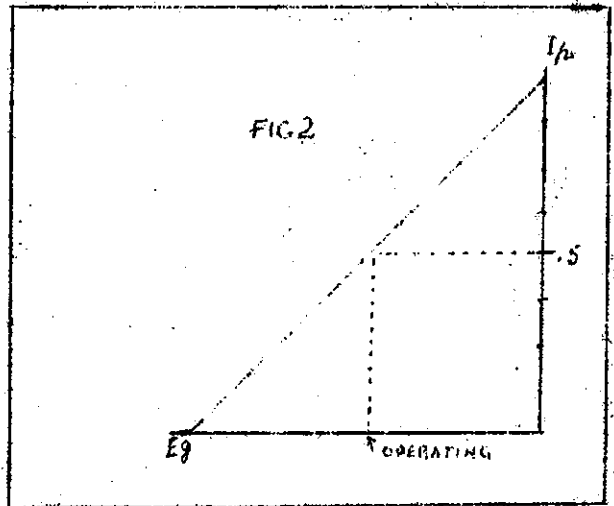
Now let us see what design considerations are involved in this simple circuit. First to complete the grid circuit when the voltmeter is disconnected from the circuit under test, the resistor R must be used. A high resistance of the order of 10 megohms, is desirable, since the amount of circuit loading and the ohms per volt rating depend upon the value of the resistance chosen. Thus, if R is 10 megohms and the meter is calibrated to read up to 5 volts negative or positive the sensitivity is

equal to 2,000,000 ohms per volt. To duplicate this sensitivity using a microammeter and a series multiplier, without the vacuum tube, would require a center zero meter designed to deflect to full scale in either direction for a current of 2.5 microamperes..

Damage due to accidental overload of the meter in the electronic voltmeter may be guarded against in the design. R2 serves as a limiting resistor which prevents the plate current - and cathode current - from rising to extreme values should the applied positive voltage exceed the range of the meter. When the applied grid voltage is negative the cathode current decreases, so the only effect of excessive voltage of negative polarity is to reduce the meter current to zero, so no damage can possibly result.

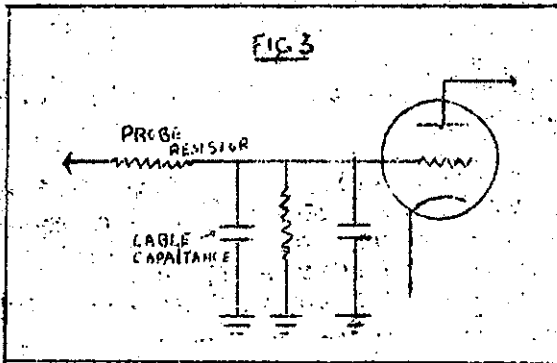
The use of the cathode resistor R1 provides degeneration so that greater stability is secured. Minor variations in tube characteristics then have negligible effect upon the calibration of the meter. However, R1 must not be too high in value, otherwise the tube will function as a detector and alternating voltages in the circuit under test will produce a rectified voltage which will register on the meter. To avoid this the cathode resistor is so chosen that the bias applied enables the tube to operate as a class A amplifier, and the plate voltage is selected to meet the range of the meter chosen.

OPERATING POINT .. A grid voltage, plate current characteristic of a typical triode is shown in Fig 2. Note that the operating point is chosen at a grid bias which produces a plate current of 0.5 Ma. The voltages and resistances in the circuit are so chosen that this value of plate current occurs in approximately the middle of the straight portion of the $E_g - I_p$ curve. Thus a 1M/a meter will read half scale when the electronic voltmeter is operating, but with no test voltage applied. If this point on the voltmeter scale is calibrated as zero, then a 5 volt change in a negative direction will cause a similar deflection in the opposite direction. It should be noted that, although changes in tube operating voltages will cause an increase or decrease in the meter current, they will not affect the calibration provided means are employed to re-adjust the plate current to 0.5.



PREVENTING RECTIFICATION ... Since the operating point chosen is such that the deflection in a positive direction is substantially the same as that in a negative direction for equal voltages of polarity, it follows that AC voltages within the operating range of the voltmeter

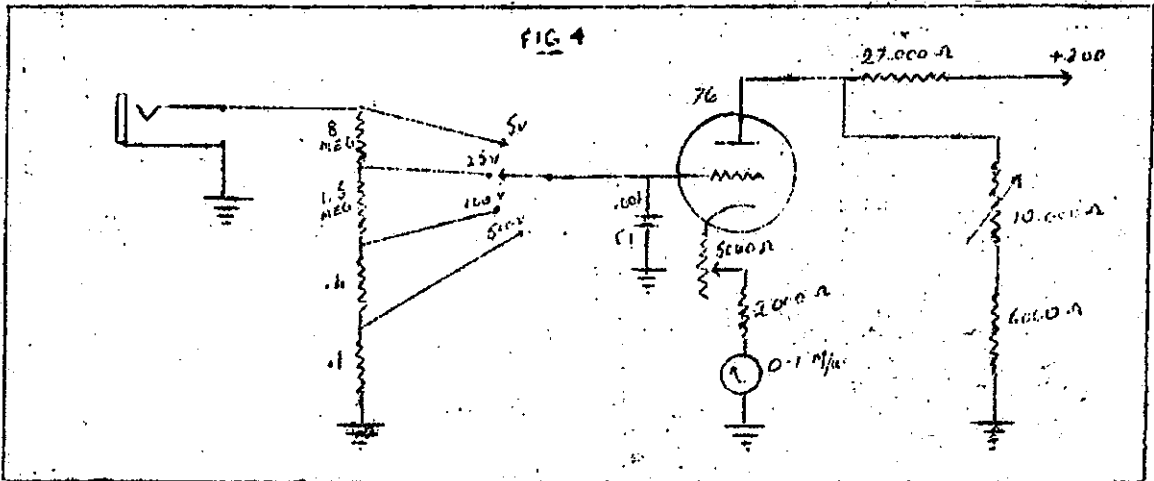
will not be rectified provided they are of pure wave form. If however, the alternating voltage applied is unsymmetrical in form, or of sufficient magnitude to drive the bias beyond cutoff, rectification will result unless special precautions are taken. This is done by employing a simple resistance-capacity filter in the grid circuit, as shown in Fig 3. The resistance can be placed in the probe end of the shielded cable which plugs into the input terminals of the electronic voltmeter.



A small capacitance, of the order of 0.001 mfd is placed across the input circuit. The grounded shield forms the balance of the capacitive section of the filter circuit. By placing the resistor in the probe the shielded cable capacitance is effectively isolated from the circuit under test, and it becomes possible to measure DC voltages in tuned circuits without introducing any more loading than would result if the isolating

resistor alone were shunted across the circuit under test. Since it is possible to make this resistance 1 megohm or more, measurements of DC in radio frequency circuits are thus made possible without appreciable detuning effect.

COMMERCIAL DESIGN .. The complete circuit of a typical commercial design of electronic voltmeter, as employed in signal tracing instruments of various types is shown in Fig 4.

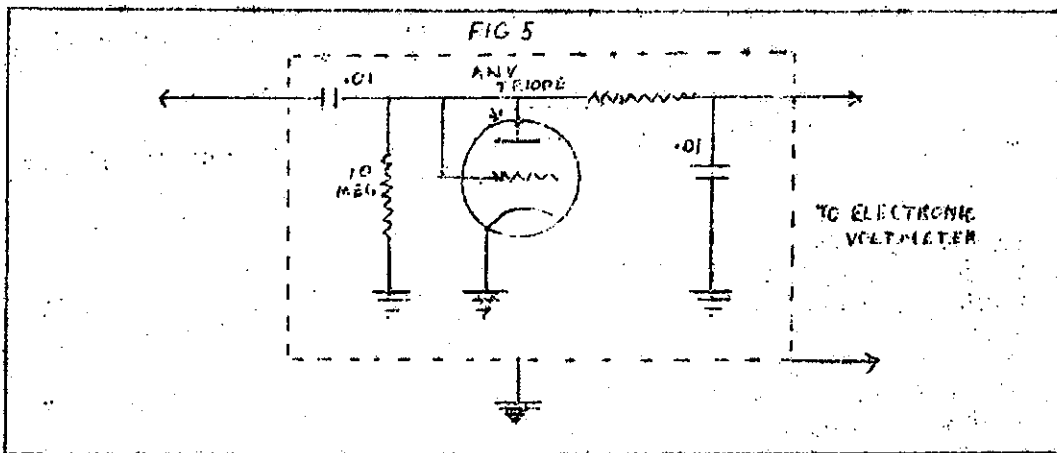


The filter condenser C1 is limited to a capacity of 0.001 mfd while a larger capacity would provide greater attenuation of AC voltages arriving at the grid, it would also increase the time constant of the input circuit to the extent that the interval required for the charge accumulated on the condenser to leak off

would become appreciable. During the period over which this charge is hold, the voltage applied to the grid remains effective, so the meter pointer does not return to zero until this charge is dissipated.

The 5000 ohm rheostat shown in the cathode circuit is adjusted to give the required sensitivity for the particular tube chosen. Once adjusted this rheostat seldom requires change when replacement tubes are substituted, except when the replacement differs widely in characteristics from that for which the original calibration was made. The 10,000 ohm variable resistor is used to compensate for power supply changes. The normal applied plate voltage (at the tube plate) is 70 volts.

RADIO FREQUENCY MEASUREMENTS ...R.F. measurements with the instrument can be made available by the use of a simple vacuum tube rectifier such as that shown in Fig 5.



The leads to the electronic voltmeter from the rectifier carry only DC and may therefore be quite long without causing difficulties. It should be particularly emphasized that the input resistor of the electronic voltmeter must be open circuited when this rectifier is employed, otherwise the sensitivity of the instrument will be appreciably reduced. The "Contact" potential of the rectifier will produce a reading on the electronic voltmeter, even when no AC voltage is being measured, but this may be taken into account when calibrating the instrument for AC, which must be done in any event. The readings for AC will be proportional to the positive peak of the voltage being tested. This will cause no error in measuring sine waves, but inaccuracies will result if complex waves are being measured.

....oOo....

TRANSITRON OSCILLATORS

Wide Range and High Frequency stability with untapped coils.

From an article in "Wireless World".

.....

Most readers are familiar with Hull's famous dynatron oscillator. A similar circuit, not so well known, is the negative trans-conductance oscillator which has been named the Transitron.

This oscillator possesses essentially the same type of negative resistance characteristic as the dynatron, having all its advantages without its disadvantages. Its characteristic is independent of secondary emission and remains practically constant for the life of the valve. It is a low power oscillator and will oscillate from 600 c/s to 60 Mc/s by changing the value of the associated L/C circuit.

It is claimed that changes in frequency resulting from a 33% change in screen volts may be kept within 10 parts in 10.⁶ another great advantage is that no coil tapping is required as in other types of oscillators. All that is necessary to switch from 160 to 5 metres is to change the coil.

The writer first built up a battery model on a bread-board. The circuit shown in Fig 1, the action being as follows:- Negative voltage applied to the suppressor caused electrons that have passed through the screen to be returned. Over a certain range, a positive increment of suppressor voltage allows more electrons to go to the anode, and thus decreases the screen current, which means that the suppressor-screen transconductance is negative. When this negative resistance becomes equal to the equivalent resistance of the tuned circuit (R1 in Fig 1) oscillation results.

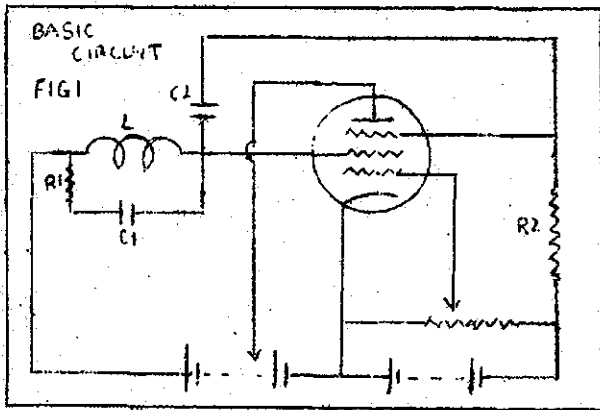
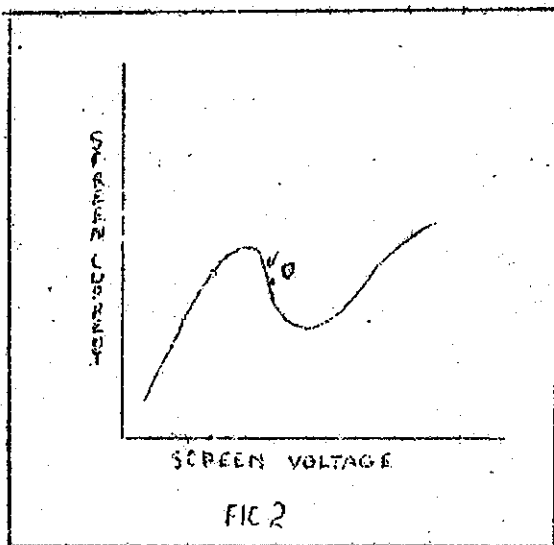


Fig 2 shows the screen current screen voltage characteristic 0 being the operating point. The relative values of C2 and R2 are important, if they are so small that the reactance of C2 is appreciable in comparison with R2 at the desired frequency of oscillation, then the voltage dividing action of C2 and R2 causes the change of suppressor volts to be less than that of the screen, and the system stops oscillating.

...

It is desirable to keep the amplitude of oscillation small, so as to keep the wave-form and frequency stability good. If a small negative bias is applied to the control grid, the total current flowing to the screen may be controlled and the negative slope of the current/voltage characteristic may be varied. Hence a flexible means is available for varying the magnitude of the negative resistance and thus the amplitude of oscillation. By arranging for the oscillation voltage to regulate the bias on the control grid, additional amplitude control may be obtained.



It was found that with the breadboard layout good oscillation was obtained down to 30 Mc/s. The circuit was then built up on a small metal chassis, a one point earthing system adopted and a Mullard EF50 placed in the circuit. (other suitable pentodes suggested are types 57, 58, 59, 6C6, 6J7 and 6K7). With suitable inductances the circuit was found to oscillate satisfactory down to a wavelength of $3\frac{1}{2}$ metres.

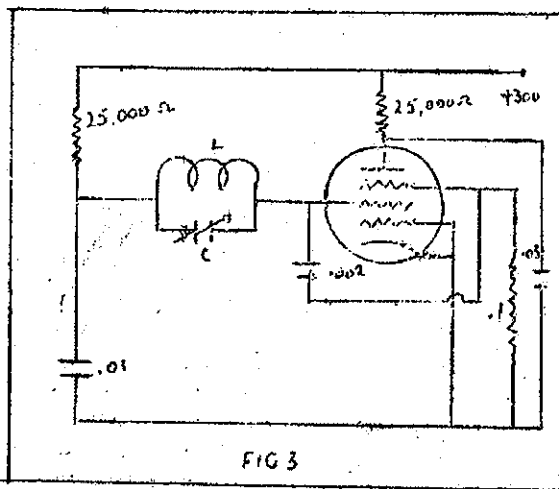


Fig 3 shows the circuit used. It will be noted that the suppressor bias has been omitted, as it was found unnecessary with this type of valve.

The enormous scope for this oscillator will be seen from the following list of advantages.

- (a) Stability
- (b) Simplicity
- (c) Ease with which output can be controlled
- (d) Purity of waveform
- (e) Ease in band changing (only one inductance required)
- (f) Almost any pentode valve will suffice.

The only disadvantage seems to be that only low outputs can be expected if (a) and (d) are to be satisfied. Some suggested uses for this type of oscillator are as follows:- (a) general purpose oscillator that will cover from 600 cycles to 60 Mc/s with variable amplitude control. (b) Oscillator in a superhetrodyne--no tapping on coil to cause switching trouble. (c) as a frequency meter, and (d) it should make a good variable frequency control for a 'Ham' transmitter when the good days return again.

SLOUCH HATS and FORAGE CAPS.

Well, well...how are all the baby daughters???...the 2YC sons are doing fb, thanks very much. Hi!

Into the shop at 2YC the other Sunday morning lobbed one of the old VK DX Merchants, one 2LZ. Con looks very fit and seems to have landed, at long last, a job right suited to him, "fixing up things" as any Sydney Ham can vouch for - that's Con's long suite. and I think Con would rather regret the day he loses the W.O. rank and gets a Commission where he would only be "sooing others fixed things" and I'm sure Con would rather be the "fixer" himself.

Pilot Officer (ahem!) Ray Carter VK2HC seems to have landed up in VK4 and is very keen on his work, which seems to take him seeing the sights. Says he sees hams "everywhere". Well, where are those notes om, haven't you seen what the Navy can do and they never leave FCT. Incidentally Wally wants to know how many times you want "Amateur Radio" redirected per annum. If it was peacetime we would know it was simply a matter of nonpayment of rent.

Sq/Ltr. Morrie Myers is still in VK3 and I believe 4AW is with him. What are you these days Arthur, and when are you coming up for the evening?

Frank Goyen 2UX our old VK2 WIA President now a Flight Loot up Wagga way is lighter by quite a few nice gallstones which he, so I believe, intends to see if they act like quartz .. grind me one for 7 mc, Frank, om.

VK2ALG Lt. Joe Ackerman is back again in Australia's Never-never country and once more the possessor of an outsize in Moustaches which, "he" claims is the envy of all. Reckons the catch is that he has many times been pulled up by complete strangers being mistaken for 2OZ John Olle...but adds he can live that down, perhaps. Hi! John if you are in VIS 'phone reply to MU1092. Hi!

2ALG has met quite a cross section of Ham Radio, including OA4M. One day he had lunch with a Fl/Lt and during the meal he was asked if he had any sigs experience before the War, on mentioning Militia, PMG and Ham Radio the visitor turned out to be 3CX who was associated with 3EM, 6JW 5ZX and ZL2SK among others. I wonder how many times in how many varied climates has this search for a brother Ham ended thus? Joe mentions meeting W3HHO, W6NFO and W5HRX, the last being a Ham and a Doctor with a brother home in the States also a Ham and also a Doctor...as 2ALG adds..Ripley. 2AMP, 2GG. 2KE, 2FN, 3XB, 2AFI and 4VZ are also mentioned by 2ALG and some details of them would fill up quite a few lines of your page, oms.

By the way 2AFW Tom Slawson was mentioned as a POW in the official lists issued lately.

From Cpl. Dixon VK3te, stationed around Albury way, after much "touring" around the country came a note of his whereabouts. Glad to hear from you, om, and passed it on the Fl/Lt. Jones. We hope to take you for another amble around VIS very soon. 3TE mentions that 3ZD Ron Williams is now a Loot in the Army over in VK6, while 3QB Jack Mills another Loot is at Bonegilla. 3WL Wally Neye is now a Major and is stationed in VK2 these days.

Oscar Blyth 3XW a W.O. in R.A.A.F. is now doing duty in the tropics. Some of the Hams up there should be due for leave shortly. 2QL for one seems to have had a long spell up there. How goes it Frank.?

VK2FO still languishes down in VK3, but seems to get about a good deal and renew acquaintance with many VK3's and the VK2's that sojourn down in the "cold country."

L/Tel Sid Clark is still down at Flinders Naval Depot and even met a Ham who got in touch with him by reading Amateur Radio. So you see we grow in advertising value and very soon we will be charging to even mention your call in the column. Hi! Remember me to Ken Bracken, haven't seen him since the Millers Pt. days.

I see where Sgt. Pilot Cec Light was on leave in London according to the Sydney Sun, but how long ago that was is a matter for very much conjecture, as you can all imagine.

Herb Stevens 3JO mentions that getting news of Hams is pretty hard going, as most of the news is "taboo" Herb's brother Bob 3OJ (Hope I have the right call sign for the right brother!!!) has been up in VK9 for over six months keeping the rigs going, with a spot of brasspounding whenever there is a shortage of ops. another case of the "useful ham" able to combine more than one job. Bob has also met W7GTH who is attached to a unit nearby and much midnight oil has been burnt yarning about "Ham Radio."

3OJ mentions that 3VH is now Major Hoobin in case it has not appeared in this column before. So the Hams are creeping up in the Army too as we have two Majors in this issue...anything higher than Majors offering oms??? Has anybody ever worked out of the Non Coms in the Navy????

3VH of VK3 Field Day fame certainly deserves his Major being called up at the outbreak of the War and seeing service in the M.E. in Libia, Crete, Greece and Syria and as soon as he returned home was at once sent to New Guinea, where his promotions began. He is back in VK again now and his job is too slow. Hi!

And now my usual "winge" as you all call it. I want some more notes as I haven't a solitary one left over for the next issue, having used up my "reserves." Ah!

D I V I S I O N A L N O T E S .

.. Federal Headquarters ..

Federal Headquarters are in receipt of a letter from the China Amateur Radio League who state that it is their intention to hold a Convention and Exhibition in Chungking on 1st. January 1944. The C.A.R.L. asked for an Exhibit of equipment from the W.I.A. or failing that a collection of Qsl cards.

The Executive felt that it would be impossible to forward equipment to China, but every endeavor should be made to forward a collection of Qsl cards and that Divisional Secretaries be written to and asked that they contact their members in an endeavor to obtain cards. These cards to be forwarded to the Federal Secretary, who would arrange for their transmission to Chungking.

In addition it was decided that the necessary authorities be approached with a view of arranging a broadcast over the National Shortwave Network similar to that arranged by the R.S.G.B. and the A.R.R.L.

.....

NEW SOUTH WALES DIVISION

The September General Meeting of the New South Wales Division held at the W.M.C.A. Buildings, took the form of a Picture Night in aid of the Australian Comforts Fund "adopt a Soldier Scheme." The function was a great success no less than Thirteen pounds .. being realised - sufficient to keep five soldiers in comforts for twelve months. As the Division was already keeping one soldier this makes our total, six. Our object is ten and the manner in which donations continue to roll in make it reasonably certain that this object will be attained.

Quite a number of interesting visitors were present including Wai W6MWO, Jim ZL4AF, Frank ZL3CD, and Cec Horne 2AIK. In view of the ceremony to follow, it was fitting that 2AIK should be present. As most of you chaps know Cec was secretary of the Division at the outbreak of war and was always very keen on inaugurate some form of emergency communication per medium of U.H.F. and drew up several schemes for submission to the authorities. Cec, who was on leave from his unit, is also a World War 1 veteran and joined up with the "Old and Bold" early in this war.

Another pleasing feature of the attendance was the number of ladies present, not forgetting, of course, a few junior operators. Wonder if anyone recognised VL2JX?

Our thanks go to Messrs. Bennett and Nead together with their assistants who went to no end of trouble to provide a very interesting entertainment. Thanks, fellahs!

During intermission the E.C.N. Trophy was presented to Section Leader Charles Fryar, VK2NP, who was in charge of VL2JI. The presentation was made by the chairman who pointed out to Members the sterling work performed by 2NP, both as an operator and as Traffic Manager. These remarks were supported by the secretary who stated that 2NP could be given the title of "a real good ham" without any fear of contradiction. Mr. Fryar in his reply paid a tribute to his fellow workers and stated that anything he had done was purely and simply a desire to help Amateur Radio.

The chairman brought under the notice of members, a letter received by Federal Headquarters from the China Amateur Radio League, and suggested that they hand into the Secretary their Qsl cards for transmission to Chungking.

At the time of writing, no decision had been made regarding the Annual Dinner. All members were circularised and although the majority of replies received were in favor, very few members could say definitely that they could attend.

EMERGENCY COMMUNICATION NETWORK.

The Second Series of the New Message Handling Contest has just concluded and what a series it was! Thirteen points covered seven of the competing stations. At the end of the first fortnight anyone of the seven had a chance of winning, but from then on 2JC and 2JL put on a great spurt with the result that at the end of the month they finished equal in the point score. It was a great performance on the part of both stations and the fact that they scored an equal number of points is indicative of their operation. Scoring 195 points out of 200 is pretty good going. Congratulations chaps.

Here is the complete Point Score for all stations:-

VL2JC	195	VL2JK	185
VK2JL	196	VL2JF	182
VL2JF	187	VL2JE	153
VL2JG	186	VL2JN	48
VL2JJ	185		

The above points denote a high standard of operating. Last month VL2JJ won the Point Score with 188. This month scoring only three less, they could only make fifth place. So you see you can't afford to lose a single point.

VL2JC. Congratulations chaps. You certainly put up a fine performance. If my memory serves me rightly, you started off in "B" Division, but this did not worry you. Over the last few months

no stone was left unturned to improve this station. Never mind Eric, practice, practice, practice.

- VL2JL Well done fellows; This station has been knocking at the door for a long time and was runner up to VL2JI in the First Message Handling Contest. They tell me all the boys are very pleased about the Code Session. Whatsa George?
- VL2JF. This station has done particularly well. It is a newcomer to the Network and is real Dx for Control. Operators "Shorty" Higgins and Ron Richardson are doing a fine job. All operators will join in wishing "Shorty" all the best in married life. So you decided to get married instead of buying a sheepskin to keep you warm. Well, well, well. Think I must have known something that day at Liverpool, om. You reckon?
- VL2JG. Gained another two points this month, but dropped back to fourth place. A falling off in signal strength was the main cause. Even 2NP and his impeccable procedure couldn't counterbalance.
- VL2JJ. A falling off in quality caused this station to drop back. These chaps are a keen bunch of workers, but I think you were over anxious to do well this time fellows, and this caused your fownfall. Never mind, keep the Cup has another four months to run yet and you're still in the lead. Be careful though.
- VL2JK. A particularly fine performance on the part of Ern Hodgkins, Ken Davidson & Co. 2JC, 2JJ and 2JL will have to look to their laurels from now on or I'm a poor judge. Glad you took that mike in hand, Ken. Its not so bad is it?
- VL2JF. This station has shown considerable improvement, but unfortunately they had one bad period very early in the series that militated against their chances. Keep it up fellows. Its going to be tough next month.
- VL2JE. Has at last managed to put in a consistently strong signal at Control but they can't hear VL2JB. Wouldn't it! These chaps are worthy of a real good pat on the back for the manner in which they stick to the job. They've certainly had some trials and tribulations. By the way Jack, how's that generator?
- VL2JN. Old Rip Van Winkle has come to light at last so much so that he gained all his points in one session. Now listen oldtimer, keep it up and lets hear from you every week. I'm sure you would like to see that cup on the Cocktail Cabinet sometime or other.

WESTERN AUSTRALIAN DIVISION

.. Emergency Communication Network ..

Since last writing these notes, members have had little to do in the way of message handling and such like, but much time and energy has been spent in completing the installation at Central Control.

It is very gratifying to those concerned to see the Transmitter and associated equipment operating so well. Many difficulties have cropped up, during the period of construction and installation, but the manner in which they were overcome reflects great credit on the persons of 6GM and 6LW and they are to be congratulated on an excellent job.

Little time was lost in making use of the Central and Mobile equipment. A Synthetic Exercise was held on the evening of July 30th involving Metropolitan Communication Staffs, and this date will be remembered by ECN members as marking the official use of the Emergency Network.

Without going into minute details of the exercise, it can be said that the ECN provided the necessary communications from several bombed out centres with little or no difficulty and in quick time.

6GM was in control at the Central Installation whilst the Mobile equipment was in the hands of 6FL and 6HL. Message handling being done by members of the Control Centres visited. This method leaves room for improvement as far as operation of the Mobile station is concerned and in future it is intended that the Mobile operators themselves will do all and any message handling by that unit.

Further to the above mentioned exercise ECN members had a surprise call at 0600 hours on the morning of August 3rd, and proved they could take it, by manning all stations in good time.

In this case they were not officially called upon to provide communication but they took the opportunity of conducting a further series of tests. This call showed up a few weak points which will have to be remedied in the near future.

Generally speaking ECN members are pleased with the results attained so far, but it is felt that a greater number of stations is required and that is a matter that Civil Defence Authorities will have to give careful thought in the near future.

There is still a great deal of work to be done, and with continued support from all members we may rest assured that the ECN in this State will grow bigger and better and will not be found wanting if the real test ever comes.

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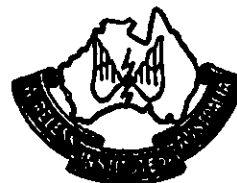
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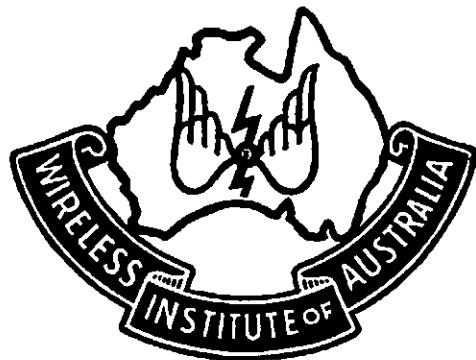
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VACUUM TUBE VOLTMETERS

... By Alex Clyne VK3VX ...

...

These articles have been written with a view to bringing together under one heading a complete summary of the main Vacuum Tube Voltmeter types, together with their respective characteristics, a subject which is dismissed in a column or so in most text books and Amateur Handbooks.

----- Part 1.

V.T.V.M. Types and Characteristics

.....

The need for a V.T.V.M. usually arises from one or both of the following:-

(a) The measurement of voltages appearing across high impedences calls for a measuring device which draws little or no power. A Conventional voltmeter consisting of a milliammeter with a resistance in series for a multiplier may, when applied across a similar resistance, introduce an error of up to 50%. Corrections may be made for this loading effect, but such a procedure precludes the taking of rapid readings, as may be desirable in, say, checking over a receiver.

(B) AC measurements may be made with moving iron and oxide rectifier meters but these instruments are restricted to low frequencies.

For the purpose of this survey we will divide V.T.V.Meters into two classes:-

1. Those introducing heavy loading.
2. Those introducing light loading.

However, before going into details of the various types it is necessary that certain definitions be clearly understood, and as these same definitions seem to be beneath the contempt of the writers of most text books and amateur radio manuals, there is all the more reason for including them here.

SQUARE LAW...means that the rectified current is proportional to the square of the applied AC voltage.

LINEAR...implies that the rectified current is directly proportional to the applied AC voltage. Both of these arise from the characteristic shape of the plate current versus applied voltage (grid voltage in the case of a triode etc.) curve. All tubes have a square law characteristic at low values of applied voltage, while most types become practically linear at higher voltages.

PEAK READING...A VTVM is said to be peak reading when the reading of the DC meter is proportional to the peak value of the applied AC voltage. IRRESPECTIVE OF WAVE FORM.

AVERAGE READING...when the DC meter reading is proportional to the average value of the applied AC voltage whatever the wave form.

R.M.S. READING...when the DC meter reading is proportional to the R.M.S. value of the applied AC voltage, again irrespective of wave form.

NOTE...and this is an important point...that any VTVM may have the scale of the DC meter calibrated to read directly all three values...peak, average and RMS...of say sine wave AC voltages; but if a voltage of a direct wave form be applied only one of the scales will be correct, according to whether the particular type of VTVM is peak, average or RMS reading.

Having these points well in mind, we may now have a look at the various VTVM types.

1. HEAVY LOADING TYPES.

a. DIODE WITH SERIES RESISTOR...The fundamental circuit arrangement of a series resistance loaded diode VTVM is shown in Fig. 2. It consists solely of a diode rectifier, with a series load resistance R, and a current meter M.

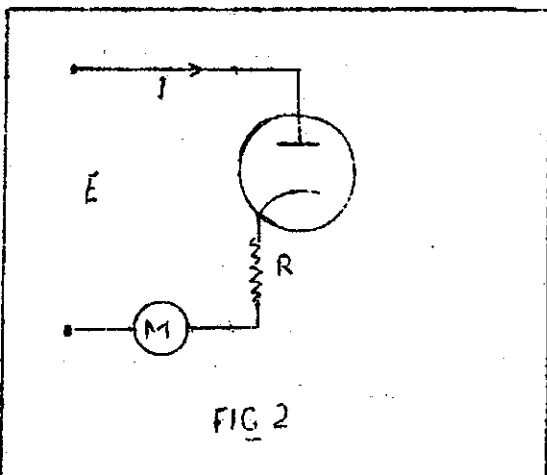


FIG 2

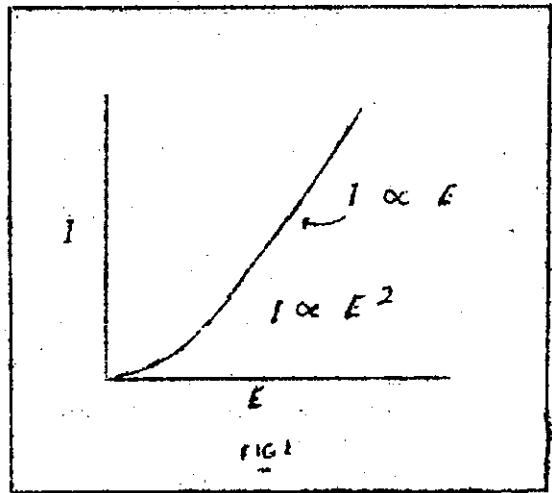


FIG 1

When a DC voltage sufficiently large to operate the diode on the linear part of the curve (above about 10 volts) is applied the current through the circuit is approximately $E \times R$ since the resistance of the diode is very small compared with R, hence for DC the VTVM functions simply as a milliammeter with a multiplier, and has no advantage over the conventional meter. A possible exception is that the diode can protect

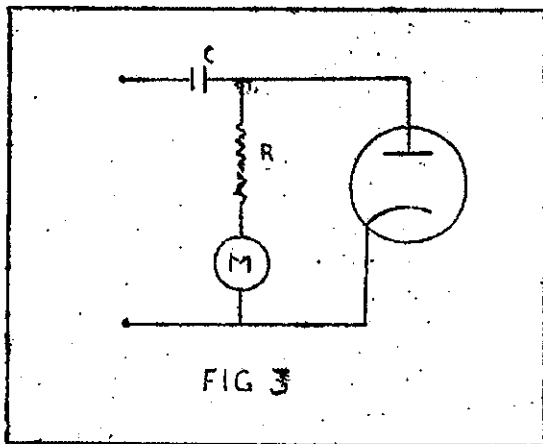
the DC meter against overload and against reversed polarity. A similar state of affairs exists when AC is applied, but of course the diode then acts in its true capacity as a rectifier.

As there is no capacitance included in the circuit the rectified current varies in proportion to the instantaneous value of the applied AC voltage, and when the varying DC current is passed through a DC meter, the latter indicates the average value of this current, being in itself unable to follow the rapid fluctuations.

The series resistance loaded diode V.T.V.M. is therefore an AVERAGE READING instrument. It should be noted however, that at very high frequencies it tends to become peak reading, due to stray capacities tending to hold the rectified current at peak value.

At very low values of applied voltage (below about 1 volt) the response is square law and the instrument tends to become R.M.S. reading. The linearity may be improved by using a very high value of load resistance, but this necessitates the use of a more sensitive and therefore more expensive D.C. meter.

B. DIODE WITH SHUNT RESISTOR... This type which is shown in Fig. 3 is peak reading due to the presence of the condenser C in the circuit, but like the previous type tends toward R.M.S. reading at low voltages. It cannot be used for DC measurements as with C shorted out and DC applied to the terminals the diode becomes practically a dead short.



On each positive half cycle, when AC is applied, C charges up, and during each negative half cycle it discharges through R and the external circuit, therefore the instrument is not perfectly peak reading; the current through the meter averages somewhat below the peak value.

In both resistance loaded diode VT Voltmeters the comparatively heavy current drawn during the positive half cycle produces a substantial load on the external circuit, the average loading being about half that of the equivalent DC meter of conventional type.

The frequency range of both resistance loaded diode types is very good. The low frequency limit of (a) is zero (i.e. DC) while that of (b) is determined by the time constant of C in combination with R. At the lowest frequency to be applied R (meg) \times C (mmfd) \times f (cycles per second) should be greater than 100.

The electron transit time sets the high frequency limit in both types. At high frequencies the error per cent may be expressed as

approximately: -

$$10 \frac{Fd}{\sqrt{E}} \quad \text{where } d = \text{plate-cathode spacing cms}$$
$$F = \text{Mc/s}$$
$$E = \text{applied voltage}$$

Where loading is not important these types are very convenient since only filament supply is required and a very compact unit may be constructed.

An indication of the high frequency limits, the following are the approximate maximum frequencies at which various tubes may be used with an error of 5%:-

- Standard receiving tubes ... 7 Mc/s
- Acorn receiving tubes ... 20 Mc/s
- Special instrument diodes ... 100 Mc/s (will give approx. measurements up to 1000 Mc/s)

c. GRID RECTIFIER...This V.T.V.M. consists of the familiar grid leak detector with a DC meter in the plate circuit. When AC is applied across the terminals rectification takes place in the grid circuit, the grid and cathode acting as a diode; the rectified current flows through R and increases the bias reducing the plate current and providing an indication on the DC meter M.

This type is normally backward reading, but by means of a suitable balancing circuit M can be made to read forward. This will be treated in Part 2.

If the applied voltage is large, rectification may take place in the plate circuit as well as in the grid circuit. Grid rectification produces a drop in the plate current, while plate rectification produces a rise, consequently a mixture of two lowers the sensitivity of the instrument.

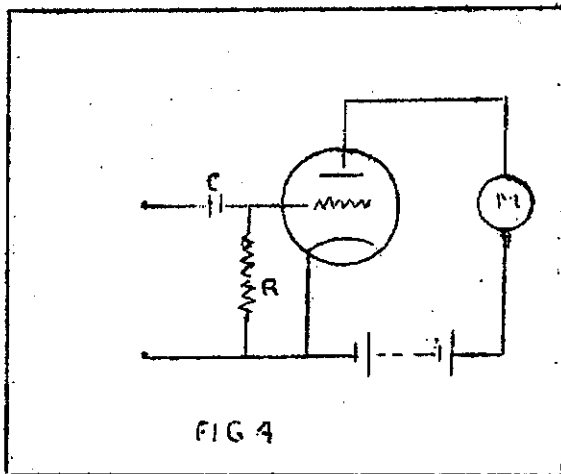


FIG 4

The mixture of grid and plate rectification is always present in some degree and therefore it is difficult to calculate circuit values for any given voltage range. R is usually determined experimentally and C may then be calculated from RCF 100 as for the shunt diode.

DC voltages may be read by shorting C. It is important to see that the grid does not go positive as this may result in damage to the tube. Calibration is unstable and frequent recalibration is necessary if accuracy is required.

This type is peak reading, like the shunt diode, and the same remarks apply as for the shunt diode in respect to loading, accuracy and frequency limits. The sole advantage over the shunt diode lies in the increased sensitivity.

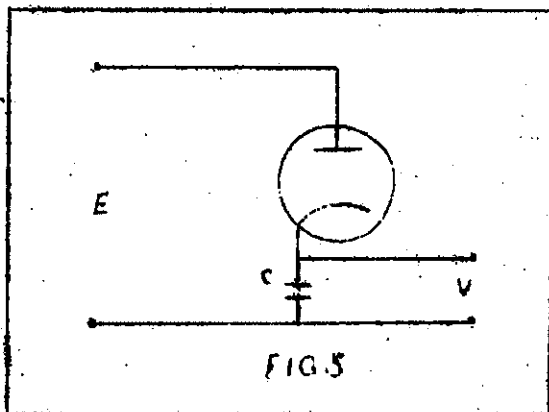
2. LIGHT LOADING TYPES.

(a) CAPACITY LOADED DIODE...NOTE...This type is often called the Peak Diode VTVM; but to avoid confusion with the Shunt Diode VTVM we will refer to it here by the above name.

One of the simplest and most convenient methods of measuring AC voltages, particularly at high frequencies is to measure the voltage across a condenser charged through a diode as in Fig 5.

When AC is applied the first positive half cycle is rectified by the diode and charges the condenser to a potential V which in the ideal case is equal to the peak value of E .

Provided that the losses are zero, the condenser then remains charged during all subsequent cycles, and therefore no current is drawn after the first positive half cycle, the instrument then has effectively an infinite input impedance. In practice the input impedance is limited by the insulation resistances between the input terminals and across the diode and the condenser, but these may be made very high.



C should be large compared to the diode capacitance so that all the alternating voltage appears across the diode. A value of C greater than 100 times the capacity of the diode is suitable; but should not be made too large, and then the charging current may damage the diode or at least considerably shorten its life.

The voltage V may be read by means of an electrostatic voltmeter, and the input impedance may be kept high by this means, but the instrument will not follow variations in the applied voltage, due to C holding its charge for comparatively long periods. For this reason a resistance of the order of 10-50 megohms is often connected across the condenser. This allows the condenser to discharge more rapidly; but if the resistance is too small the voltage V will fall below the peak value of E and

readings will be in error. (Note that this is no disadvantage if the meter be always used for measuring voltages of the same waveform with which it has been calibrated. However the input impedance will be lowered.)

As electrostatic voltmeters are necessarily delicate and expensive it is more usual to apply V to the grid of a DC amplifier and measure the change in plate current of the latter.

This is almost the ideal in VT Voltmeters, having very high input resistance, good accuracy, and a frequency range restricted only by the same factors as mentioned before for other types of diode VTVM.

(b) PLATE RECTIFIERS...These may be sub-divided into two types:-

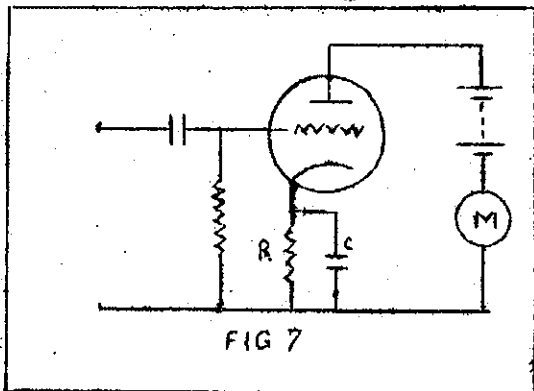
- (1) Square Law
- (2) Reflex or Linear

Both are simple plate detectors with a meter in the plate circuit the difference lies in the relation between the change in plate current with change in applied grid voltage.

In the square law type use is made of the Square Law Characteristic to produce a VTVM which is RMS reading, an advantage in some applications.

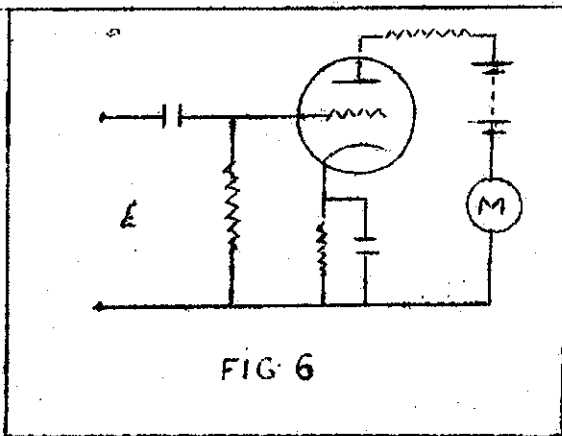
The RMS calibration holds only at low input voltages, however at higher voltages the characteristic becomes linear and the instrument tends to peak reading. This type is not widely used, the reflex type being generally preferred.

In the reflex arrangement (Fig. 7) the whole of the load resistance is placed in the cathode circuit, and it is then common to both the plate and grid circuits it gives rise to negative feedback.



The effect of negative feedback is to make the change in plate current approximately proportional to the change in applied grid voltage, over the whole range, thus producing a linear scale which tends to reduce the visual error in reading at the low end of the scale.

The sensitivity depends solely on the value of R, therefore quite large variations in tube characteristics and/or supply voltages may be tolerated.



Furthermore range changing is simple, as a switch may be used to insert various values of R in the circuit. The instrument may be made peak reading as shown, or average reading by omitting C.

When C is used its size should be such that the time constant of the CR combination is suitable ($R \text{ meg} \times C \text{ mfd} \times f \text{ cycles/sec}$ greater than 100) as otherwise the DC voltage across C will be lower than the peak value of E, as in the Capacity Loaded Diode and the reading will be in error.

However if C is too large the charging time will be too long and the meter will not follow variations in applied voltage. Therefore it is usually necessary to change C when R is changed.

The Reflex VTVM has the advantages of linearity, stability of calibration, high input resistance and flexibility, while the accuracy is generally good.

In Part 2 to be published next month, Mr. Clyne will discuss Slide-Back VT Voltmeters, Magic Eye Indicators, D.C. Amplifiers and Balancing Circuits.

....ooo....

NEW RECORDING CHARACTERISTIC

The following are some details of a new recording characteristic, the use of which is claimed to give a considerable reduction in noise level.

The frequency characteristic in general use for disc recording is the "so-called" "Constant velocity," in which the amplitude of cut is inversely proportional to the frequency above the cross over point (which varies between 250 and 300 c/s) below which a constant amplitude characteristic is used; i.e. the amplitude of cut remains constant and independent of frequency with reference to a given input.

A system of pre-emphasis and compensation with what has been termed the "orthacoustic characteristic" has recently been developed, which increases the recorded level of part of the low frequency range, and all frequencies above the cross over point. This technique is based upon the frequency-energy analysis of speech and music which indicates that low and high frequency parts of the audio spectrum normally contain a lower energy level than the portion between 100 and 500 c/s.

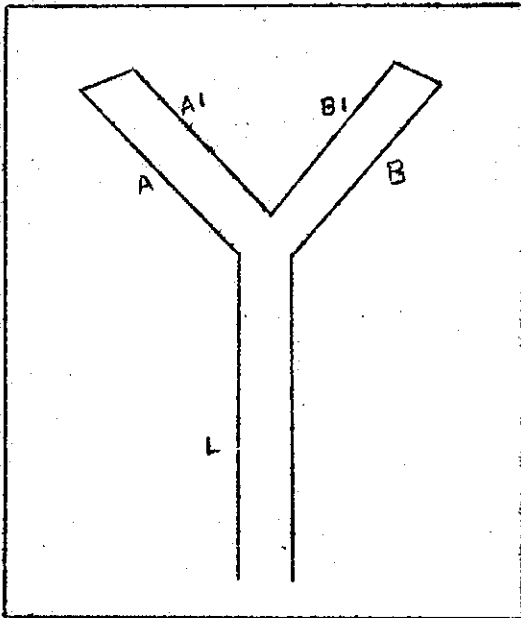
This research led to the realisation that both low and high ends of the spectrum could be increased in amplitude on a recording without danger of over-cutting at the low end and without producing too steep a waveform for accurate cutting and play back needle tracking at the high frequency end. Recording these low and high frequencies at higher than normal levels and

(Continued on page 8)

A NON-DIRECTIONAL DIPOLE

The normal radiation pattern of a horizontal dipole is approximately a figure-of-eight for horizontally polarised waves.

To obtain non-directional qualities the arrangement as shown in the diagram has been devised. It consists of two "double" quarter wave limbs A, A1 and B, B1 set at an angle of 90 degrees to each other and connected directly to a two wire transmission line L.



The response of such an aerial was found to be substantially circular, i.e. non-directional in the horizontal plane. The wires A1 and B1 may be made thicker than the other wires in order to better match their impedance to the line. The distance between the wires A and A1 or between B and B1 should be a very small fraction of the working wavelength. The two outer ends of each pair of wires are connected together so that although the currents flowing through them are in opposite directions along the wires (owing to phase reversal at the closed ends) the currents flow in the same direction in space. In other words the radiation effect is the same as if each pair of double wires were replaced by a single wire.

.....XXXXXXX.....

RE-JUVENATION ELECTROLYTIC CONDENSERS

Mr. Sid Clark sends us through Jim Corbin 2YC, further information about re-juvenating electrolytic condensers.

To put them back into service he used to carefully remove the top seal, then added distilled water to make up for the loss of solution. After enough time has elapsed to allow the solid to dissolve the seal was replaced. They can also be reconditioned by cleaning out and refilled with a saturated solution of Borax and water.

New Recording Characteristic.

reproducing them at correspondingly lower levels, so that the net result is the same as though no pre-accentuation had been used, makes possible a reduction in the noise level of the system.

SLOUCH HATS and FORAGE CAPS

(Send in your Christmas 73s for your friends)

This, as I am always telling you all, is your column. Well, how about you chaps writing it for the December, and if you can, January issues. The idea is this. Christmas Cards etc. are scarce at forward area stations and many of you will wish you could send your 73s to those hams all over VK, you used to work...just how long ago?? So we offer you your column, to send your Christmas 73s either collectively if there are a lot of you together, or individually, to those VKs you used to QSO who may now be in VK6 while you are in VK9. So hop to it chaps, AIR MAIL just about goes everywhere so use it to send your 73s together with your address to all your Ham friends and they will read it in your column. Oh, yes, they'll see it...it is marvellous how widely Amateur Radio travels these days. So oms, AIR MAIL it at once to your Div HQ, P.O. Box 250.

Another idea...when you pay your subs this year. How about using the back of the account form to scribble a few notes on. Your divisional Secretary will QSP them on to me. Just a few lines will do (more, of course will do better) telling where you are, where you've been and all the hams you have seen. So oms don't forget when the Sub. account arrives.

What do you know, Charlie Miller after all these years is now a Sargeant. P.b, Charlie om, they must have noticed that you were in the R.A.A.F. at last. Let's hope they remember you when they are handing out the Pilot Officers, etc. etc.

Now I'm a bit worried about VK2ALG's Moustachoes...saw a lad t'other day and says he, what's this about John Olle. He hasn't got a big Mo...s'matter of fact, I reckon he looks a bit like Clarke Gable!!! I say Joe, is that what you meant, where his resemblance to you comes in?????. From the way this is shaping I will need a police guard very soon. Hi! (2YC)

Did you know Vaughan Marshall was a Group Captain these days? Not so bad for a Ham, you know....only about two more rungs left on the ladder now, isn't there Vaughan, before reaching what one would call Olympian Heights. Hi!

VK5JT Joe Kilgariff is still Fl/Sgt at Adelaide W/T Station and seems to see some of the VK5 gang on and off. Mentions that he had heard from Clarrie Castle 5KL who has been n 15 months up in the RAAF around Darwin...5KL is now a Corporal these days.

Saw Ray Deane 5RD a month or so ago. He spent a lot of time up North but is now at Mallala wearing RAAF Flight Sargeant insignia.

VK5LD Launce Deane, now a Fl/Lt is also somewhere up North. Also up there is F/O Allan Heath, better known as VK5ZX.

From the "Melbourne Herald" of 6/10/43 we learn that Mr. & Mrs. Tinkler VK3ZV, who has been missing since the fall of Singapore, stating that he is fit and being well treated. The card is undated. Incidentally, while on this question, Bill Moore's Mother also received a card from VK2HZ, and this one seemed to consist of phrases like the EPR cables sent overseas.

From Lance Corporal Jim Watson VK3NQ, who is with a Signal Training Battalion at Bonegilla, we learn that Dick Carter VK3GC was one of the few survivors from the Hospital Ship "Centaur."

Johnny Traill 2X2 is not now dealing with postings in an official capacity so who knows, he may post me those long promised notes!!!

VK2OR has reached the rank of Sqd/Ldr and is at present sojourning in England...finding out the "hows and the why's" I guess.

We don't hear very much of the Silent Service, but another of the members of the Victorian Division who has been serving since the outbreak of war is Jim Kerley. Jim was a member of the 200 metre allocation Committee for a number of years. No information is to hand of where he is, or has been serving. Jim holds the Rank of Petty Officer R.A.F.V.R.

VK3WE Sergeant Bill Williams has a new second op. - a son, whom we understand has been named Keith in honour of Keith Scott VK3SS who is reported to be nearly as proud as Bill. Hi!

P/O Jack Howes is somewhere up North and seems to retain his sense of humour in spite of the heat. Listen to this "Sometimes the 'honourable gentlemen' drop in for a social call occasionally and usually leave a present or two, and sometimes, we insist upon them staying with us...there are some of them down the road in a paddock...nice people." You will do, Jack. Hi!

Jack Patterson is holidaying up around Cape York where all SW DX pounds in R9 all day. He has unfortunately only met three "hams" up there and these chaps ran around on four legs and snorted (much the same as high power fone boys...chap must be a CW man..2YC). At the time these hams were a welcome edition to the menu which had been of the tinned variety for a couple of months.

VK3UC Pilot Officer Doug. Norman is to be congratulated upon receiving his Commission. Doug is now attached to Southern Area HQ after service in New Guinea where he earned a "Mentioned in despatches" last year.

Over among the VK6's in VK3FR Sgt. Fred Smith who is instructing at a Signal School at Narrogin, W.A. Fred advises he is enjoying himself and putting on weight.

From VK3AH who uses that "distance covering AFPO7I" and is, I think, way up Nth. Queensland, reports the following among the RAAF in his area. Fl/Lt. Ron Streeter 3RC, Ray Graf VK3CT, Sgt. Adrian Miller VK3AH, Tom Ham (a real "ham") VK4WX, and VK6FH who is a Fl/Lt.

By the way does anybody ever hear of any VK7's anywhere around the place. I heard some time ago that Jack Batchler 7JB was reported as having been accidentally discovered in Central Australia, but other than that I rarely seem to mention them in this column.

Bruce Chapman VK2BA/VR4BA a Lt. in the Navy is now reported to be having a quiet time down South after a long spell of duty in Northern waters. But after his long sojourn in the Solomons before the War Bruce should be able to take it up North.

I believe that Rex Cawthron 2VG and Bill Lewis 2YB/6YB have both recently got their Commissions with the R.A.A.F....fb oms.

VK3KP Capt. Denis Ayre of an AIF Wireless Section in New Guinea in sending greetings to the boys advises that he is feeling pretty

(Continued on Page 14)

... D I V I S I O N A L N O T E S ...

- FEDERAL HEADQUARTERS -

...

Upon receipt of a letter from C.A.R.L. all Division's were circularised and informed of this coming function, and requested to forward a selection of cards for transmission to China. The States set to with a will and a splendid assortment of cards should grace the walls of the Convention Hall on 1st January 1944. Perhaps the greatest number of cards were received from VK7 and 7B3 deserves a word of praise for his selection. These consisted of quite a few "A's" and "OA'S" whilst appreciating the motive behind the offer the Executive felt that they really couldn't forward treasures like these on to Chungking.

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NEW SOUTH WALES DIVISION

The October General Meeting of the Division was held at Y.M.C.A. Buildings, Pitt Street Sydney, and boy, what a meeting it was. Among those present were Squadron Leader Arthur Mitchell (R.A.F) G8DF/VP2ZA, Sergeant Joe Triehy W1 KVB. Flight "Loot" Basil Dale VK2XX/9XX. Frank O'Neil ZL3CD, Jim Strahan ZL4AF, Flight "Loot" Len Chappel VK7LC ditto C, Tilbrook VK5GL, Lieutenant Joe Ackerman VK2ALG and to cap it all Signaller Dave Hogan who first received a bite from the radio bug when he joined the A.I.F. and only three weeks ago sat for his ticket.

Each visitor was asked to say a few words and the first to start the ball rolling was G8DF who told of his experiences in various parts of the world including VP2. Incidentally Arthur is one of the "most human" G's that we have met to date. If it were possible I would have liked to print ZL4AF's fighting speech with reference to post war ham radio and those people who adopt a negative attitude regarding the holding of our bands. Well spoken, Jim. Too bad you must go back to the land of the "Shakes", we could use you out here. Also, we would like to tell the gang the story of the ham who overlooked a certain enemy airstrip and sent back vital information to? That will have to keep until the war ends. Joe Ackerman told us the story of the grapevine and how it operates between Darwin, Alice Springs and Sydney. You know these A.W.A.S. must have something akin to the ham spirit. Whatsa, 2ALG?

All in all these chaps proved themselves real hams from the Squadron Leader down. Each and every one has managed to "acquire" something that will help the post war rig!

The ballott for the election of the Federal Executive for 1943-45 was declared and resulted as follows:-

- | | | | |
|---------------------|---------------|--------|-------------|
| Federal President | F.P. Dickson | VK2AFB | (unopposed) |
| Fed. Vice President | H.F. Peterson | VK2HP | |
| Federal Secretary | W.G. Ryan | VK2TI | (unopposed) |
| Executives | C. Fryar | VK2NP | |
| | W.J. McElrea | VK2UV | |

The next Meeting of the Division will be held on Thursday 18th November, and all Amateurs are invited to be present. By the way - a few chaps have been confused by the Y.M.C.A. Notice Board showing the W.-A. Meeting as commencing at 6 p.m. Three meetings are held on Thursday night. 6 p.m. Federal Executive. 7 p.m. State Council; 8 p.m. General Meeting. Hope this clears up a little misunderstanding.

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EMERGENCY COMMUNICATION NETWORK

Since the last batch of notes appeared, considerable progress has been made towards re-organising the Network to fit in with N.E.S requirements. The Director of National Emergency Services has formally constituted the N.E.S. Wireless Committee and this body consists of Messrs. Wetherill (R.I.'s Dept.) Sergeant J. Raynor (Police Radio) R. Priddle and W. G. Ryan (W.I.A) under the Chairmanship of the State Operational Controller Colonel F. Lorenzo D.S.O. with Mr. H. Grosky of N.E.S. as Secretary.

This Committee, which is to act in advisory capacity, meets each month and at its first meeting made the following appointments:-- Deputy Controller, Wireless N.E.S. W.G. Ryan VK2TI, Technical Officer Wireless, F. P. Dickson VK2AFB, Wireless Training Officer C. Fryar VK2NP. These are key positions in the Network, the Deputy Controller being directly in charge of Emergency Wireless Communications whilst the other two positions are self explanatory. This is quite a feather in the Institute's cap and all Members will doubtless be proud of the honor paid these officers.

In order to give Radio Operators an insight into the workings of the various District Controls to which they are attached a series of visits of inspection have been arranged to the various Centres. When these inspections have been completed all Operators will visit both State and Metropolitan Controls and thus when they either have to send a message or receive one they will be able to picture just what is behind it all. The message will not be a dozen words or so scrawled on a piece of paper. They will have a definite knowledge of the meaning of the message.

Stations are now using a very much revised procedure. This new method of handling messages has been acclaimed by all operators but at the time of writing a few rough edges still remain to be rubbed off.

With the introduction of the new method of traffic handling it was decided to curtail the October exercises for the Cup to three week-ends and as a result VL2JL succeeded in gaining 147 points out of a possible 150. VL2JK was a close second with 146 and VL2JC third with 145. This is very close scoring indeed. From a perusal of the scores listed below you will see that 7 points covered the first seven stations!

Here are the scores:-

VL2JL	147	VL2JP	140	VL2JG	136
VL2JK	146	VL2JJ	140	VL2JF	121
VL2JC	145	VL2JN	140	VL2JE	88
VL2JM	143				

Now that three series of Exercises have been completed, I think that all Members of the Institute would appreciate it quite a lot if the three months scores were given. Here they are:-

<u>AUGUST</u>		<u>SEPTEMBER</u>		<u>OCTOBER</u>	
VL2JJ	188	VL2JC	195	VL2JL	147
VL2JG	184	VL2JL	195	VL2JK	146
VL2JP	180	VL2JP	187	VL2JC	145
VL2JC	178	VL2JG	186	VL2JM	143
VL2JK	172	VL2JJ	185	VL2JP	140
VL2JF	165	VL2JK	183	VL2JJ	140
VL2JL	149	VL2JF	182	VL2JN	140
VL2JE	82	VL2JF	182	VL2JG	136
VL2JN	48	VL2JE	153	VL2JF	121
VL2JM	nil	VL2JN		VL2JE	88

From these figures you will see that VL2JL has established a slight with a first and an equal first, but against that he was way down in seventh place in August. VL2JJ has a first place, a fifth and a sixth, but now they've also a new 25 mmfd condenser to watch out. VL2JC has an equal first, a fourth and a third. If you any of you chaps can pick the ultimate winner you're pretty good!

VL2JL..Again congratulations chaps. I'll bet you needed a new size in hats one Sunday morning a few weeks ago. How do you like the new phonetics. Too bad we haven't a VL2JL isn't it!

VL2JK..Well done you lads. Yours was a particularly fine performance. There is only one ham attached to this station and during two out of the three week-ends he was away off duty. Ken and Charlie did a real good job and should develop into real good hams when its all over. By the way Ken I wonder if 2JL heard you trying out the new relay? You're very lucky Ern in having such keen helpers.

VL2JC..Slipped back a little this month. Gordon my boy you can't afford to slack up for a minute or else the wolves are hard on your trail. How are the "V" Beams om? Can you fold them yet? Better luck next time.

VL2JM..Operated by our new Federal President did quite a good job. Perce has all the resources of the A.G.L. Go behind him so watch out for the new aerial. By the way Perce how's Felix and family?

VL2JP..Dropped back a couple of places this time. Of course, when a fellow goes on a honeymoon anything is likely to happen in more ways than one. Better luck next time om.

- VL2JJ..A dark horse for next round. Found out their trouble at last. By the way Arthur, hope that fifth anniversary was all that you hoped it would be.
- VL2JN..Well done Len Blackett. Too bad everyone isn't as keen as you.
- VL2JG..This station is rather a disappointment dropping from second place in August to seventh place in October, What's happened to that signal Jeff?
- VL2JE..Thanks a lot Jim. The manner in which you "stick" is very much appreciated. Too bad you had to miss that inspection at Artarmon.
- VL2JF..Still plodding along. Perce Feeney will soon be Chief Relay Officer. Doing a good job om.

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... VICTORIAN DIVISION ...

We were very pleased to welcome to the last meeting two interstate visitors in the persons of Captain D. B. Knock 2NO and Lieutenant J. Ackerman 2ALG.

Captain Knock being asked to speak said he was very pleased to be present and congratulated those, not only in this division but other Divisions, who remained in civilian life, on their wonderful efforts in carrying on the Institute, for he visualised that after the war the Institute would expand enormously. "Amateur Radio" he said was eagerly looked forward to by members of the defence forces as though it were wable in some measure to follow the movements of fellow Hams.

Lieutenant Ackerman gave a short talk of his three years on active service some of the time being the Units official photographer. All being well he hopes to be at the next meeting when he will give an illustrated talk. You had better turn up chaps its sure to be good. The night is Tuesday December 7th.

Stan Skinner turned up at the meeting proudly displaying a brand new A.O.P. Certificate which he had obtained at the recent examination. Congrats OM.

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A new feature to commence in the next issue December will be a page of review of Technical Books. An arrangement has been made by the Review Editor Mr. A. Clyne, VK3VX to obtain books from McGill's for this purpose.

...

SLOUCH HATS AND FORAGE CAPS -

Good himself. He recently sent out an SOS for a bug key via 3JO who was able to put him on to the right man.

And now in conclusion, don't forget those Christmas and New Year 73s to all your old VK friends...use the AIR MAIL...and QSP them to either your Divisional Sec or to Jim Corbin 2YC, 78 Maloney St., Eastlakes Mascot.

We regret a mistake in the last paragraph on page 9. It should have read - "Mr. and Mrs. Tinkler have received a card from their son F/O Arthur Tickler"....Ed.

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

H A M S !

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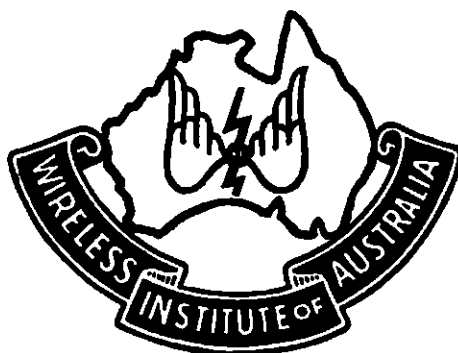
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SIXPENCE

DECEMBER 1943

AMATEUR RADIO

THE
OFFICIAL ORGAN
OF THE
WIRELESS INSTITUTE
OF
AUSTRALIA



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AMATEUR-RADIO

INCORPORATING THE N.S.W. DIVISIONAL BULLETIN

Vol 11. No. 12.

December, 1943

VACUUM TUBE VOLTMETERS

Part 2

... By Alsc. H. Clyne. V K3VX ...

(a) BALANCING CIRCUITS...When a triode or other multielement tube is used in a VTVM circuit as in the case of the Grid and Plate Rectifier Types, there will always be a residual plate current, usually of the order of 0.2 M/a. This causes an initial reading or "false zero" on the indicating Meter and apart from being an inconvenience it restricts the scale range."

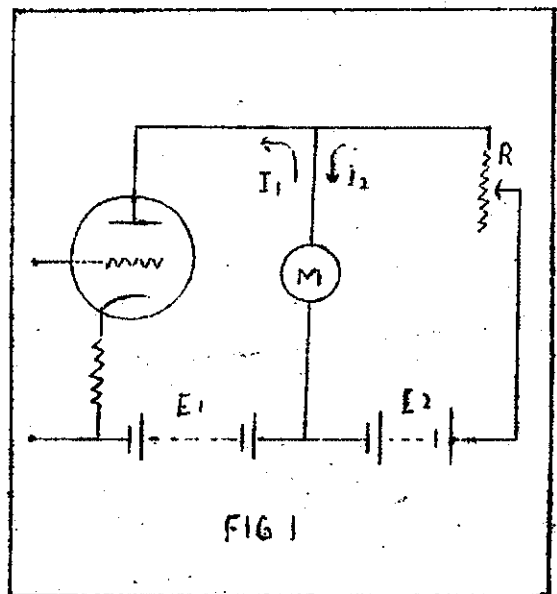
Therefore it is desirable to have some means of removing or balancing out this residual current. This may be best achieved by using a balancing circuit of the kind shown in Fig. 1.

In this arrangement the residual current I_1 is balanced through the meter M by the current I_2 flowing through the auxiliary or balancing battery and the variable resistor R .

This method however introduces complications in the shape of the auxiliary battery, but fortunately it is possible to obtain the same result by utilising the voltage drop across a resistor in the plate circuit as in Fig 2.

This gives the same effect due to the fact that the tap point on R_1 is positive with respect to the meter end of R_1 , and so the current I_2 flows through the resistor R and the meter in opposition to the residual current I_1 .

Both of these methods of balancing are simple and effective but it is necessary to adjust the balancing current from time to time in order to compensate for varying supply voltages and the

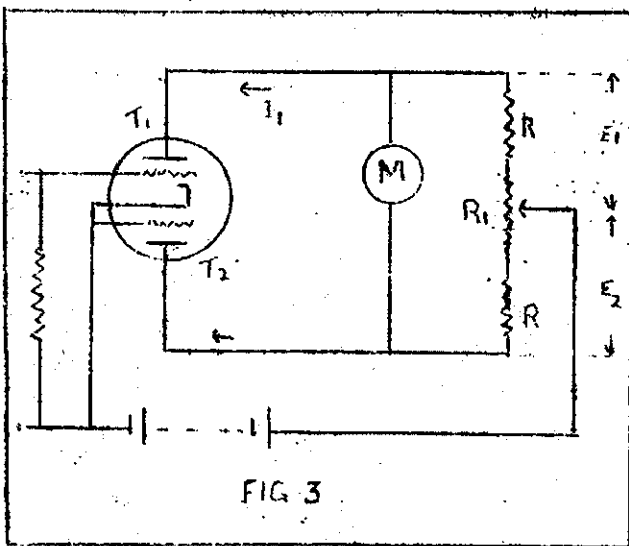
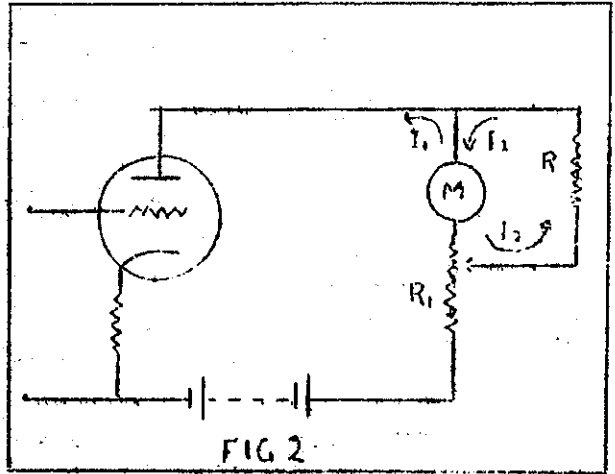


effects of tube deterioration. Such disadvantage may be obviated by the use of a balancing tube which in its most convenient form could be a twin triode, one triode being the voltmeter rectifier or the DC Amplifier and the other the balancing tube. This method is shown in Fig 3.

In this case T1 is the meter triode and T2 the balancing triode.

When the instrument is at rest the cathode, grid and plate potentials are identical in both triodes and therefore each draws the same residual current. Resistors R are identical and R1 is assumed tapped at its mid-point and therefore E1 and E2 are the same. Thus there is no voltage across the meter and consequently no current through it and it reads zero.

When a voltage is applied to the instrument terminals, I1 changes, I2 remains constant and E1 and E2 are therefore no longer equal and a reading results on the meter.



This method has the advantage that once adjusted it will retain its adjustment over long periods, since any change in supply voltage or tube characteristics will affect equally both units of the twin triode. R1 is made adjustable so that initial discrepancies in tubes and resistors may be compensated for.

An important application of balancing circuits is frequently found in connection with grid rectifier voltmeters wherein the balancing current may be so arranged that the meter terminals can be reversed, the instrument then becomes forward reading, thus removing one of the disadvantages of this type of Vacuum Tube Voltmeter.

removing one of the disadvantages of this type of Vacuum Tube Voltmeter.

.Part 3 will be continued next month.

CORRECTION...In the last paragraph on page 2 of November issue, "E x R". It is obvious that this should be E divided by R.

AMPLITUDE MODULATION UP TO DATE

Because frequency modulation is very much in the limelight these days it must not be thought that technical interest in amplitude modulation is exhausted. In fact, many interesting developments in amplitude modulation systems of high efficiency have taken place recently and some account of these will no doubt be of interest to readers.

The first system is termed cathode modulation and was becoming popular in amateur circles before the war. The popularity was no doubt due to the fact that it combines the advantages of both plate and grid modulation.

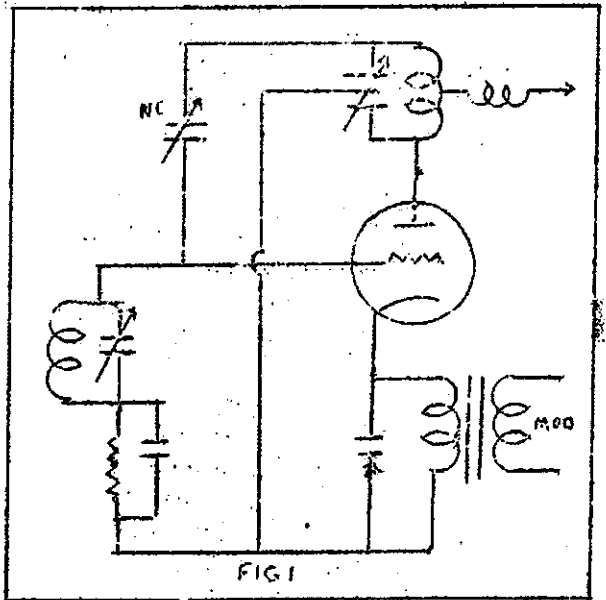
In the normal grid and suppressor grid types of modulation the effect is roughly that the modulated stage runs at a lower efficiency when unmodulated than is normal class C stage, and operates at a greater efficiency on the modulation peaks, this being obtained in practice by reducing the radio frequency excitation and increasing the grid bias. Compared with anode modulation, where the RF excitation may be adjusted for slight over drive and plate efficiency may be as high as 75%, the grid modulated stage is not likely to exceed an efficiency of 40%. However, what is more serious is that owing to the lowered plate efficiency, the actual power dissipated by the valve as heat is increased. When running at the limits of rated heat dissipation, the grid modulated stage is capable of much less actual carrier output than an anode modulated stage. It should be remembered that a grid modulated stage dissipates most heat when unmodulated for then the efficiency is lowest.

An anode modulated stage, on the other hand, only dissipates the maximum power upon relatively transient modulation peaks. The net result is that the actual carrier power available from the anode modulated stage is of the order of four times the output to be obtained with a grid modulated stage for the same anode heat wastage.

Cathode modulation enables the difficulties inherent in orthodox grid modulation systems to be overcome. As the name implies, the low frequency modulating impulses are injected into the cathode circuit of the class C stage as shown in Fig 1. The cathode circuit may be regarded as common to both the anode and grid circuits. Thus if the cathode is made more positive with respect to the chassis potential, and hence with respect to the grid potential, the effect is an increase in the negative grid bias with the result that the anode current falls. However, as the cathode swings more positive with respect to the chassis, the effective anode-to-cathode potential is reduced, as the anode is held at a fixed positive potential above the chassis. This has the effect of lowering the effective value of the anode-to-cathode voltage, which is equivalent to a reduction in the total high tension potential applied. This results also in a fall in anode current.

When the cathode is swung more negative by the modulating wave

form the conditions are reversed and there is an increase in anode current. Thus the modulating signal when applied to the cathode circuit results in voltages appearing on both the anode and grid which are in phase. As there is a certain amount of anode modulation produced, some power is actually supplied by the modulator to the anode circuit, although this is much smaller than the amount supplied by a normal anode modulator. In the cathode modulation system this is equivalent to about 20% to 30% of the actual anode modulation, the remaining 70% to 80% of the modulation depth is supplied by the grid modulation that is also produced by the cathode applied modulation.



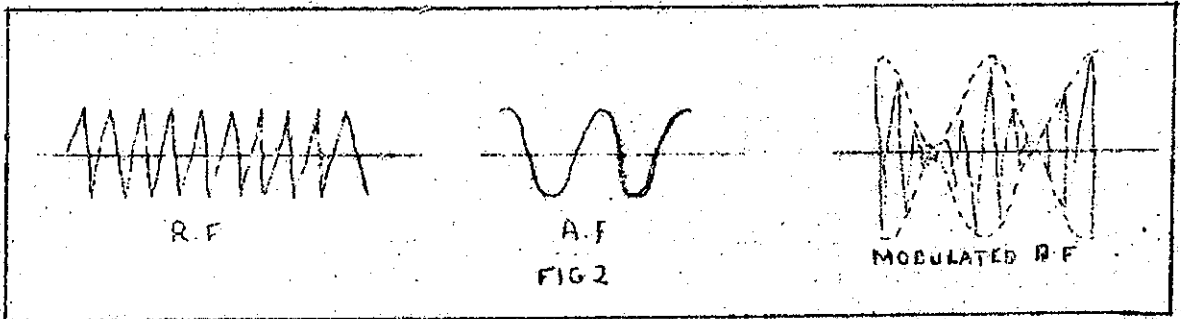
Consequently if we swing up to full plate efficiency, at a point that corresponds to 70-80% modulation, our plate efficiency when not modulating is higher than with straight grid modulation and may approach 60% or so.

CIRCUIT ECONOMIES....The radio-frequency drive power required for the cathode system is about the same as that for a normal class C telegraphy stage, i.e. slightly less than for plate modulation, also, the cathode modulated amplifier has a lower peak-plate current than with anode modulation, which results in longer life of the valve. The peak plate voltages are also reduced, so that the tank tuning condenser need have only two thirds of the spacing required for a comparable plate modulated stage. The actual audio power requirements are about a quarter of those for anode modulation.

Cathode modulation would therefore appear to be an ideal solution of the problem of obtaining grid modulation, having an efficiency not greatly inferior to anode modulation. It is claimed that by the use of cathode modulation, modulation depths of 200% to 300% may be obtained without overloading the transmitter. To see how this is achieved, let us briefly consider the process of modulation. Fig. 2 represents the high-frequency carrier, a sine wave modulation signal and a resulting carrier just modulated to a depth of 100%.

For 100% modulation the carrier wave is reduced to zero on the negative peaks of the modulating wave, and swings up to twice the unmodulated value on the positive peaks. If we assume we are anode modulating a perfect class C amplifier stage, then our modulating signal must swing the anode voltage to zero on the negative peaks,

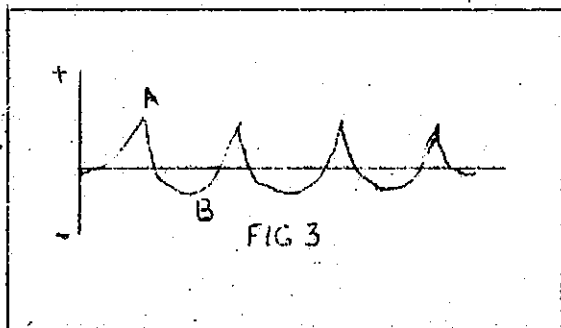
and to double the actual DC voltage on the positive peaks.



In practice a Class C amplifier is not exactly linear, especially when the anode approaches zero volts, and to avoid distortion the modulation depth is usually not carried quite to the 100% limit. To return to the perfect case of Fig 2, it is easy to show that for a modulation depth of 100% the low-frequency power required is equal to half the actual DC power input to the modulated stage.

The actual wave forms of speech, however, are considerably peakier than pure sine waves. This means that for the same voltage swing a speech wave form represents rather less actual power than a sine wave. In other words, although a complex speech waveform and a sine wave may have the same voltage swing, their RMS value will be different. However, from our discussion on modulation it would appear that to fulfil the requirements of 100% modulation we shall require exactly the same voltage swing as when using a pure sine wave. Our speech amplifier must still be capable of handling this voltage swing, although the actual energy in a speech wave form is less. Actually, the power in a speech wave form is only about half that in a sine wave form of the same peak power.

The above reasoning about speech wave forms assumes that even if they are peaky they are symmetrical. It appears that this is not really so, providing the extreme low frequencies are attenuated. The appearance of speech wave forms under these conditions is sketched in Fig 3.



The peaks are all in one direction, and those marked A may have an amplitude which is from two to three times the amplitude of the peaks marked B.

If we apply such a waveform to modulate a transmitter, we can obviously apply it in two ways. If we arrange the polarity so that it is the sharp peaks

which just swing the carrier to zero, we obviously do not swing the carrier upwards on the positive peaks B to anything like the full height of twice the unmodulated carrier. However, we cannot increase the amplitude of the modulating signal any further, as otherwise we shall be cutting the carrier off completely for considerable periods on the negative peaks thus causing considerable distortion. Now if we reverse the polarity of the wave, the sharp peaks will swing the carrier just up to double its unmodulated value on the positive peaks, but the negative peaks B will not swing the carrier down to just zero. If we increase the amplitude of the modulating signal so that the blunt peaks B swing the carrier level down to zero, then in the positive direction we must be able to swing up on the sharp peaks to an amplitude which may be two or three times as great as the normal value of double the carrier level necessary for modulation with symmetrical wave forms. This would correspond to modulation depths of the order of 200% to 300% and corresponding apparent increase in the loudness of the signal in the receiver. The reverse case would correspond to a signal weaker than we should expect for the depth of modulation. Both of these conditions correspond to 100% modulation, however, assuming our class C amplifier is capable of handling the excessive peaks linearly.

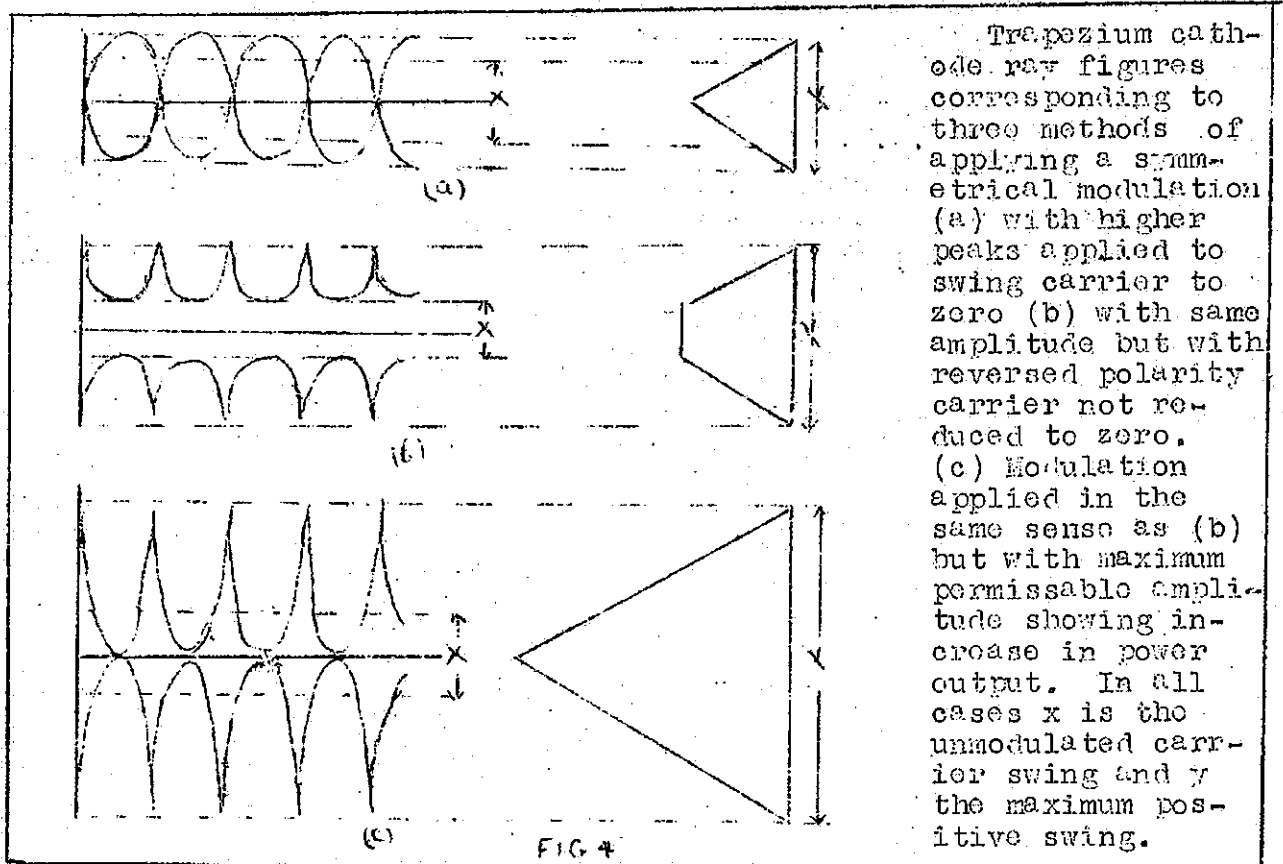
A cathode ray tube connected to show trapezium modulation figure would give a triangle in both cases when we are just swinging the carrier to zero. In the case where we have peaks extending into the 200% to 300% positive region, however, our triangle would be much wider than if we were modulating 100% with a sine wave. In the case where the high peaks are arranged to swing the carrier down to zero, we should again get a triangular figure, only it would not open out in the positive direction to the same extent as with sine wave modulation.

These cases are illustrated in Fig 4, together with the trapezium figures to be expected on a cathode ray tube. The advantage of using the condition where we expect to swing the carrier into 200% modulation region is obvious, for we should be radiating a signal something like four to nine times the power obtained by using the reverse polarity. It is obvious that to use this system successfully considerable care must be taken. A cathode ray tube is essential for checking the operation, and the class C final amplifier requires some attention to ensure that it can handle the extended peaks.

As the modulating voltage swings in a positive direction must be two or three times that required for normal modulation the speech amplifier must be capable of handling this swing, which is equivalent to from four to nine times the power capability required for normal anode modulation.

It must also be remembered that the valves in the class C amplifier stage should be capable of handling the increased peaks, and also the tank tuning condenser should have increased spacing, if necessary in order to avoid flash-over on the modulation peaks.

However, in the case of the transmitter where the input to the final amplifier is limited arbitrarily to a low value, this system should enable very effective use to be made of limited inputs.



Trapezium cathode ray figures corresponding to three methods of applying a symmetrical modulation (a) with higher peaks applied to swing carrier to zero (b) with same amplitude but with reversed polarity carrier not reduced to zero. (c) Modulation applied in the same sense as (b) but with maximum permissible amplitude showing increase in power output. In all cases x is the unmodulated carrier swing and y the maximum positive swing.

FIG. 4

A further point of interest is that it is stated that only male voices show this asymmetric effect, while apparently if one inhales while speaking instead of exhaling the polarity of the wave form is reversed. Normally the polarity of the wave form is adjusted by reversing the microphone connections.

It is hoped that the above may be of interest to those interested in speech transmission, and that some of the points raised may have cleared up some of the legends surrounding the modulation question. The extended peak modulation, for example, may possibly explain why some amateur transmitters were able to obtain increases on their aerial ammeters far in excess of that to be expected on normal modulation.

- THAT HE WHO FIGHTS MAY READ -

A page of book reviews conducted for the benefit of
Hams in the Services, and others similarly situated

"To the Radio Amateurs of Great Britain and the British Empire
who in the Service of their Country have kept alive the Spirit of
Amateur Radio....."

So reads the dedication of the Amateur Radio Handbook, published
in London by the R.S.B.B.

It is with considerable pleasure that we open our monthly book
review with a glance inside the covers of a really first class Ham
handbook. To those who have regarded the G Hams as being a jump
or two behind the W's, a perusal of this handbook will be sufficient
to change their opinions in no uncertain manner.

The Amateur Radio Handbook commences with a thorough treatment
of Radio Fundamentals, without such of course, no such work would
have any claim to completeness. This introduction is logically
followed by a chapter on Radio Valves and their uses, which is
quite convenient in its subject matter.

At this point there is a digression in the shape of a chapter on
Workshop Practice, which is treated in as much detail as one would
expect in a book devoted to that subject alone. As an indication
of the scope covered, this chapter goes so far as to set out methods
of sharpening and tempering twist drills and other tools.

After a chapter on Radio Receivers, there follows one entitled
"Crystal Band-Pass Filters." This chapter alone is worth the price
of the whole book, consisting as it does of 13 pages of concentrated
information on a topic which has in the past decade become of great
importance. For those interested in Crystal Filters, and indeed
for any Ham, this chapter makes the Amateur Radio Handbook a "must."

The remainder of the Handbook deals with Transmitters, Modulation,
eying, Audio Equipment, and all the other usual subjects. High-
lights are chapters on Artificial Aerials, Calculation of Great
Circle Distances (and we mean calculation no globes and pieces of
string) and Television Technique.

The Handbook winds up with a list of reference books, no less
than 97 are listed.

This is an excellent work, the subject matter is clearly presen-
ted, with an abundance of diagrams to back it up. The only fault
we could find was the complete omission of any reference to linear
tuned circuits for UHF receivers, although they are given some
prominence in connection with UHF transmitters.

Congratulations are due to the RSGB for producing such a fine
handbook under the stresses of wartime conditions.

(The Amateur Radio Handbook, R.S.G.B. London. Our copy from
McGills Newsagency, Melbourne...308 pages...Price 8/3).

Review Editor....A. H. Clyne.VK3VX

SLOUCH HATS AND FORAGE CAPS

Well, well, those Christmas 73s are a bit slow in arriving, so apparently the Mails for Second Class Mail matter to the troops are not as good as we thought they were. Oh, well, no doubt they will arrive in good time for the next issue - that is, as I said before, if you used the Air Mail, hi! In any case I want some more notes as the Reserve has been pretty well used up and visitors are very scarce these days in VK2.

By the way, if any of you Hams from "foreign climes" (VK3,4,5,6 etc.) ever land at Mascot Aerodrome on your way from one place to another, so to speak, please remember Eastlakes and 2YC are only a mile away at the most and a bus from near the Aerodrome takes you to the shop door...we are here all day and it being a Ham establishment we never go to bed early...so you of the RAAF, etc., please remember.

To start with...you chaps are not a bit of good with the news. In VK2 papers there was quite a bit about one named McCarthy who servos with an RAAF Beaufighter Squadron. I am told that he is Keith McCarthy of 3FX and 2VM, wellknown on the air with both calls. Does anybody know anything extra about him. If I remember correctly he has at least one decoration.

Congratulations to Alex Slight 2ZA on his promotion to Wing Commander. 2ZA was in the permanent RAAF and was noticeable for the way he made all the Reserve Hams welcome when they were called up to Richmond in those far off days when this War began. I believe 2ZA is somewhere up North.

From VK3RY up at Canberra comes the following.. "Yours truly is still plugging along, up to my eyes in work and more in sight. Am trying my hand at some high fidelity gardening. Guess I will have to get the signal tracer to work over the weekend as it looks like my lettuces are suffering from electroslugolosis. Do you think that "AR" would appreciate an article on the "Cure of Parasitic Oscillations in Climbing Beans", I hope to do lots of research into this absorbing subject during the Summer.

VK2ANP Jack Gore has an fb bug in a tiddly box but doesn't get a chance to use it in his new job. He is settling down to a quiet life...just a martyr to the cause.

VK2ACG Allan Morris Rees...Allan is new back at Harman after having served at all the Canberra Naval W/T Stations. He is still pounding brass. Ham radio was never like this...not even a thrill now in having a choice of QRO rigs to key...after four years of it in the Navy.

VK2EO Dave Duff...is at present on long leave, but I don't know whether he went away or not...(How about a trip to VIS, Dave... haven't seen you for years and years, 2YC)

VK5FA Brian Anderson has just returned from 14 days' leave spent with the jf and junior Op in his home state. Don't know how these people get leave, I must find out the recipe. 5FA & 2ANP work together.

Another VK5 reported a little while ago on leave was Fl/Lt Ross Harris of VK5FL who after serving North was on leave in VIM.

Sq/Leader Morrie Myers 2VP has, on the other hand left VIM and gone North. My lads asked Morrie how many planes were in his Squadron. Hi!

VK3HT..Signaller D. G. Britt of Doncaster is still with the 16th Australian Field Regiment and now has a VX number.

VK3XR Captain Jack Winton is still serving with the 2/II Australian Field Regiment A.I.F. but we have now details of his movements since his return from Overseas.

VK3WC..Sgt Chas. Nelson of Ararat complains that he hasn't met any hams lately although he expected that 3UK would be visiting his station shortly.

VK3FR Sargeant Fred Smith writing from 3 Aust. School of Sigs at Melville W.A. advises he is very busy instructing Radio Theory and always puts in a good word for Ham Radio when the opportunity arises (if only all the Hams had the "spirit" on, 2YC) He receives AR each month and is pleased the gang are still able to turn it out.

VK3LN Sgt Len Moncur RAIP and CPL Ron Higginbotham 3KN have been getting their names in the paper. Both have recently been presented with a son (Attabey!! 2YC)

Oldtimers on the air will be pleased to learn that Bob Dalton is a Group Captain in the RAAF. Bob is an old Flying Corps man of the last war and we understand he is OC of a training school in Victoria. He held the call of VK3UI for many years but was not licensed for a year or so before the war.

VK5LF and VK3TM are together somewhere up North. Both of these are pretty oldtimers, too, getting their licences about 1925. 5LF says his first Yank was W6HM the late Clair Foster. Len of 5LF wants his 73s to be converted to 2NS, 2HM, 2ZN, 2LG, 2CM, 2BK and 2RJ with whom he has many great QSOs "way back."

I believe Bob Chilton 2RC is now CO at one of the Northern VK RAAF Zones, in his particular division of activities. Give me a ring when you next hit VIS, Bob, om.

Newly commissioned in the RAAF are Paul Watson VK3PT of Warracknabeal and Adrien Miller of Canterbury. P/O Adrien (3AH, in case you don't know would appreciate a note from all ham friends. He extends Christmas and New Year greetings to them and given his address Group 599 RAAF Mascot N.S.W. or 2 Logan St., Canterbury. E.7.

Sgt. Frank Walker VK3EV of Camberwell may be found at Block 7, No.1 Coy, No. 1 Sig. Training Bdn. Bonogilla Vic. He also tells me I made Ron Stroeter a Fl/Lt instead of a Fl/Sgt...but Adrien that's what he really "should be".

Leaving the VKs we have a note from Vern Dimmick who seems to spend his time travelling about VK. Vern reports that he has run across the following Hams:-

W2LRD Loc Hob; W2FOB Louis Mirani; W2EEN Bill Merity; W3DOT Frank W. Logan; W4HWF Lt. Gene Hozel; W4CVN Cpt. Henry Eskew; W4DRT Capt. Dumas; W6SZG Major Martin; W2BAF Lt. S. Laber; W8ICC W/O Harry Stoiger; W9CHO Lt Luther Pierce; W8FCA Lt. B. Windle; W4MV Cpt. Settle; W3GSO Lt. Hartman; W7CRE M/Sgt. Dick Beasley; W9HLO Carl J. Finger; W2KJY Edwin A. Kirchhuber; W2NDJ Lt Stanfield; So apparently, there are plenty of W Hams knocking about if only one (continued on page 14)

D I V I S I O N A L N O T E S

.. Federal Headquarters ..

The newly elected Executive held its first meeting on Thursday 18th November and one of its first acts was to place on record an appreciation of the services rendered by the retiring Members Messrs. Friddle and Gough.

Despite repeated efforts it has not been possible to alter the attitude adopted by the Chief Radio Inspector with reference to a proposed broadcast to the China Amateur Radio League. It seems remarkable that both the R.S.G.B. and the A.R.R.L. could make arrangements without infringing any international regulations. One can only come to the conclusion that as far as Australia is concerned officialdom "just couldn't be worried" thereby handing a very nice slap in the face to a very gallant ally. Incidentally, Chinese Amateurs are still active and are serving as a valuable means of communication between the various provinces and Chungking.

Councillors were astounded to learn - per medium of an overseas visitor that a Network is functioning in South Australia and also - per medium of the National Emergency Services, N.S.W. that Hobart has a similar organisation. It is extremely regretted that some States cannot follow the example of Western Australia in keeping Federal Headquarters informed of the doings in the various States. The Federal Executive have no designs upon the organisation or have they any desire to act in an executive capacity as far as the individual States are concerned, but what they do ask of each State is that they be kept informed of just what is happening. In the case of South Australia, correspondence from Federal Headquarters has been ignored and as the person to whom it was addressed was at one time a Federal President he should realise just how important it is to pass on information.

The Federal Executive of the Wireless Institute of Australia wish all Divisions of the Institute and kindred societies the Compliments of the Season and trust that the day will soon arrive when these wishes may be delivered in a different manner.

...ooo...

NEW SOUTH WALES DIVISION

At the November General Meeting members extended a hearty welcome to Ft. Sgt. Fred Stirk VK2ABC who was enjoying a long awaited leave. Unfortunately, although a fone hound in the good old days, Fred did not have a great deal to say. Other visitors were Steve Skinner VK2?/VK3? Steve recently passed the A.O.C.R. and seeing the light decided to move to VK2!

An Honorary Membership Card recently printed for presentation to overseas visitors was favorably commented upon and those

Amateurs eligible for same were duly elected.

Upon the declaration of the poll for the election of the Federal Executive tributes were paid to the sterling work performed by the retiring Federal President Ray Priddle VK2RA. 2RA through pressure of business was unable to stand for re-election and thus the Institute Federally lost one of its most valued workers since the days of Bill Moore, VK2HZ. In moving that it be placed on record the Institute's appreciation of 2RA's services the Federal Secretary stated that much of the credit - if not all, for the work carried out by the retiring Executive could be given to Ray Priddle particularly with reference to the Federal Census which did so to let the Australian Experimenter know that the Institute was still functioning. These remarks were supported by the Federal Vice-President who stated that during the whole of the term of office, he was only able to take the chair once. 2RA in his response stated that his job had been rendered comparatively easy by the splendid teamwork existing among Members.

For those members statistically inclined, here are the election figures: -

<u>Vice President</u>			<u>Executives.</u>		
H. F. Peterson	VK2HP	39	W. McElrea	VK2UV	43
G. Fryar	VK2NP	11	C. Fryar	VK2FP	33
F. Gough	VK2NG	2	N. Gough	VK2HG	24
W. McElrea	VK2UV	2	E. Hodgkins	VK2EH	14
Informal					

Members were informed that the sum of £16/16/- had been collected to date for the A.C.F. "Adopt a Soldier Scheme." Thirteen pounds has already been forwarded to the A.C.F. and it is hoped to make balance in hand up to £5/4/-. A very generous donation of £2/ 12/- was received from Reg Fagan VK2RJ. Many thanks om.

It was decided that the December General Meeting would take the form of a "Pound Night" Every member being asked to bring some form of refreshment, alongwith either liquid or solid so that something akin to the festive season may be generated. Don't forget. Thursday 16th December at the F.M.C.A.

The Chairman of Australia New South Wales Division take this opportunity of wishing all amateurs the Season's Greetings, and let us hope that Xmas Greetings in 1944 will be exchanged by Experimental Stations.

.....

EMERGENCY COMMUNICATION NETWORK.

November saw the completion of the visits by operators to the various District Controls to which they are attached. These visits culminated with an inspection of Metropolitan and State Controls.

At State Control operators were addressed by the Director of National Emergency Services, Mr. R. Hicks, who expressed his appreciation of the work carried out by the Network. The State Operational Controller then gave a description of the workings of this particular Control and all present were astounded by its statewide ramifications. Morning Tea was served by Mesdames Goven and Lusby!

On Thursday 25th November a series of motion pictures, silent, talkie and color were shown operators so that they would have some knowledge of the work performed by the various Essential Service parties who operate under N.E.S.

Whilst visiting the various District Controls Radio Operators were given the opportunity of both receiving and transmitting messages per telephone instructions being given by the VL operators and it is anticipated that some happy if not life long friendships will eventuate!

Sunday December 12th will be a great day for the Network. For the first time since its inception it will take part in the N.E.S. Exercises arranged for that day. We'll tell you all about it in the next issue.

The most important event during the past month has been the installation of the Central Control, VL2JB, at its new location. Members may have noticed a couple of ten metre doublets on the top of one of the highest buildings in Sydney. The installation of the transmitter proved two things. When you have feeders three hundred feet long the RF doesn't like twisted VIR but if it's Polystrene cable its an entirely different story. It's just the difference between minus R1 and plus R9!

One very pleasing feature of the change was the strong reception of VL2JB by VL2JE. Previously Control had been unable to receive VL2JE quite well, but unfortunately VL2JE couldn't hear control which meant that outward messages from VL2JB had to be relayed. This in turn meant that the message handling capacity would be lowered. Boy! If you could have heard the relief in 2AJW's voice when he rang through to say that he could even hear us breathe! He wasn't the only one who was pleased. Let's hope conditions weren't abnormal.

Another astounding piece of reception was that of the signal from VL2JP. VL2JP is about 12-14 miles airline from the present location and they just romped in. I believe this reception astounds the "Brains Trust" at C.S.I.R.

Due to the various moves no Message Handling Exercises were held during November, and it is doubtful whether any will take place during December, what with the N.E.S. Test, Xmas and New Year Holidays. When the Exercises do commence again its going to be a very difficult job to pick the winner and the station that gains the most points will know that its been racing!

.. VICTORIAN DIVISION ..

The efforts of the Victorian Divisional Council in endeavouring to have an Emergency Communication Network recognised by the Authorities received another blow in the form of a letter from the ARP authorities which, to quote the letter in a few words "Although the idea of an emergency Radio network was sound, it was considered that under present conditions the expense of installation was not warranted. The scheme however, would be kept in mind as it could be used in time of National Emergency, such as bush fires."

To follow this letter up, the secretary has forwarded a further communication to the Chief Air Raid Warden pointing out that this gear was already in the possession of the Hams and would not have been of any expense to the authorities.

We deeply regret to announce the death of Mrs. J. C. Hutchings VK3HM. To her husband and to VK3HL and VK3HJ we extend our sincerest sympathy.

The Laboratory Committee are continuing their check of the gear owned by the Victorian Division, and already several pieces of equipment have been tested out. As we have explained in earlier issues of this Magazine the object of this Committee is to endeavour to equip a laboratory with various testing equipment for the use of members who desire to check components and other gear.

Friends of Jim Marsland VK3NY will be pleased to know that he is progressing favourably after a recent operation in which he lost his appendix. Jim has a souvenir in the form of a nice X-ray photograph....all he wants now is Television...

...oOo...

SLOUCH HATS AND FORAGE CAPS.

could pick them. As I've said before, any W Ham in the Capital Cities is only too welcome at any VK Ham Shack...Get in touch with the Divisional HQ. In VK2 we have WIA notices at most American Centres, but if you don't see those 2YC's phone number is always in these notes, oms. Now, we expect these 73s to roll in from now. The Mag was read in Darwin on Nov. 13th, and we received an answer from Jim Kerley, whom you will find at the Naval Post Office, Darwin. All hams are invited to drop in and see Jim, even on beer issue day, he will be very glad to see them "and, he sells the cheapest stamps in Darwin" Jim wishes to be remembered to Herb Stevens, Ivor Morgan, Jim Marsland (sine appendix, I hear), Vaughan Marshall and the rest of the VK3 gang he used to know.

73's OMs and to all those who write this column, thanks a lot. (VK3 just about wrote this issue...hi). Send or 'phone notes to Divisional Secretary or to Jim Gordon, 73 Maloney St., Mascot, Phone MU1092 .

...oOo...

**THE EXPERIMENTAL
RADIO SOCIETY
OF EGYPT.**

HAMS ON ACTIVE SERVICE
are assured of a welcome.

Write FRANK PETTIT, Catholic Club,
Mustapha Barracks, Sidi Gaber, Egypt.
or Phone:

Alexandria 27315 (SU1SG)
or Ramleh 498 (SU1RD)

CHANGES OF ADDRESS

Members and Amateurs in
general are reminded that
the Radio Inspector should
be advised of any change
of address.

Also notify your Divisional
Secretary.

**HAMS
ON SERVICE**

Other hams are interested in your doings.

Drop a line occasionally to your
DIVISIONAL SECRETARY

or to

J. CORBIN, VK2YC,
78 Moloney Street,
EASTLAKES, N.S.W.

**The Radio Society
of Great Britain**

A cordial invitation is extended to all

HAMS ON ACTIVE SERVICE

to visit the Society at

**NEW RUSKIN HOUSE
28-30 LITTLE RUSSELL STREET,
LONDON, W.C.1.**

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VICTORIAN DIVISION

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The N.S.W. Division meets on the third Thursday of each month at Y.M.C.A. Buildings, Pitt St., Sydney and on invitation is accorded to all Amateurs to attend. Overseas and Interstate Amateurs who are unable to attend are asked to phone the Secretary at FX3305.

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