"Service"

A DIGEST OF ELECTRONIC NEWS AND VIEWS

THIS magazine is designed to present students with current news and information affecting the field of Electronics. Articles dealing with general business subjects which in many cases the student finds necessary for his complete success, will also be included. To enable readers to obtain original articles, details of the origin of any condensed matter will be quoted.

The highlight this month is the advance publication on pages 5, 6, 7 and 8 of our newly revised Amateur Operating Course. P.M.G.'s examinations are more comprehensive now than in the pre-war years, but the new course is designed to fully cover all requirements. Note that intending students should have completed, or have reached the standard set by the A.R.C. Service Engineering Course, before applying for enrolment. If you have any friends who may be interested, tell them about the new course—full details will gladly be sent upon request.

JUNE, 1946

WHAT TO LOOK FOR IN THIS ISSUE

This monthly publication is produced by the
AUSTRALIAN RADIO COLLEGE PTY. LTD., 206 Broadway, N.S.W.

AMATEUR OPERATING

By G. WALDOCK, A.R.C. Technical Staff

IN our last article we covered very briefly the history of amateur radio. We now propose to tell you of amateur radio as it is to-day, or to be correct, as it was prior to the war. At the moment it is somewhat handicapped by the restrictions on those wavelengths upon which amateur operators are allowed to work.

In the early days prior to the war, the average amateur stations in Australia operated with a power around 25 watts (Input to final stage). This was mainly due to the fact that the regulation governing power input limited it to this figure. In about 1937 the regulation was altered to 50 watts, many amateurs took advantage of this, but generally speaking the majority operated at 25 watts because an increase in power meant additional cost, due to the fact that much gear had to be scrapped, particularly such costly components as high voltage transformers, rectifiers and tank tuning condensers. Also additional stages were found necessary to drive the larger power amplifier.

To the ham starting off at that time all these problems were not encountered, because knowing the power allowed he could plan his station accordingly, and thereby make provision for the power capabilities of his rig (transmitter). In special cases where the amateur can satisfy the department that higher power is necessary for the experiments that he desired to undertake, this would be granted.

From the figures above you will notice that from the 3.5 mc/s band up the low frequency end of each band is in exact harmonic relationship. This makes it very handy from the ham's angle because if he is using a crystal for controlling his frequency, the harmonics will fall in the other band making it possible for the station to be operated in two or three bands with the one crystal. You will see from the frequency table the 1.715 mc/s, 3.5 mc/s and the 7.2 mc/s bands are shared by the commercial tele-

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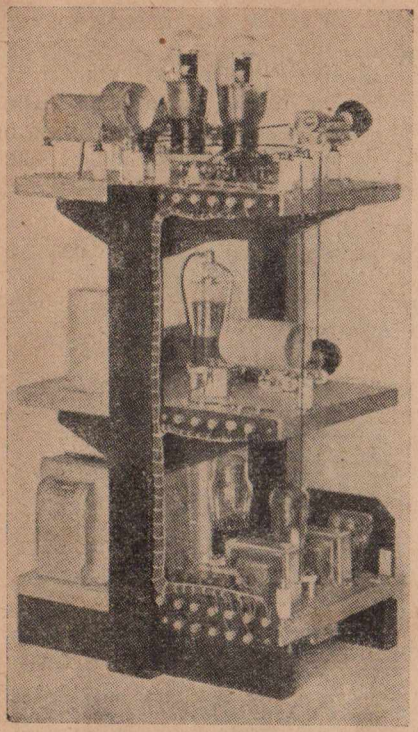
The frequencies allowed pre-war were as follows:

	224 mc/s	to	240 mc/s	(1.34 metres	to	1.25	metres)
	112 mc/s	to	120 mc/s	(2.68 metres	to	2.5	metres)
	56 mc/s	to	60 mc/s	(5.35 metres	to	5.0	metres)
	28 mc/s	to	30 mc/s	(10.7 metres	to	10	metres)
	14 mc/s	to	14.4 mc/s	(21.4 metres	to	20.8	metres)
(Shared	7.5 mc/s	to	7.3 mc/s	(41.67 metres	to	41.10	metres)
Band)	7.0 mc/s	to	7.2 mc/s	(42.68 metres	to	41.67	metres)
(Shared							
Band)	3.5 mc/s	to	4.0 mc/s	(85 metres	to	75	metres)
(Shared							
Band)	1.715 mc/s	to	1.99 mc/s	(175 metres	to	105.8	metres)

mc/s = megacycles = KC ÷ 1000.

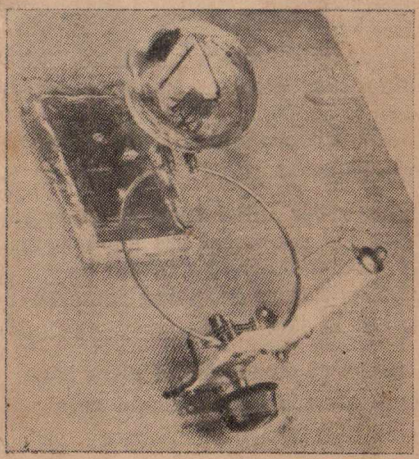


A well designed 160 meter crystal transmitter for Telephony or Telegraphy.

phone and telegraph stations. 1.7 m/c is not used very much in Australia, the 80 metre band is used mainly for local "rag-chewing," and the 7.2 mc/s band has the 7 mc/s to 7.2 mc/s band adjacent to it which is not shared.

The bands which are the most favoured are the 40 and 20 metres, 40 metres is used mainly for interstate qso (Communication between stations), and when conditions are suitable for DX work it being possible to work overseas stations. The main band for DX work is 20 metres when conditions are good and using an efficient transmitter and receiver, providing the operator is careful in using the correct operating procedure there is no end to the DX stations in many countries which he can contact. Even in one night of operating it is often possible to contact stations in eight or nine countries going right around the world. It must be understood of course that a newcomer cannot necessarily achieve this at first, unless of course he is extremely lucky, and has an exceptionally good location for his transmitter. The successful working of DX requires experience and a good deal of operating ability, which is only attained after a fair amount of practical experience, it cannot be obtained otherwise.

The 10 metre band for many years prior to the war was of very little use due, it is stated by some



Transmitter for working at one meter or below. A special tube with extremely low inter electrode capacities (WE 316A) is used.

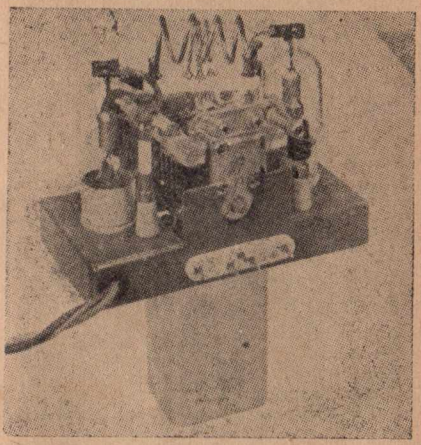
experts, to the sun spot theory which revolves in cycles of ten or eleven years. During the period about 1937 the 10 metre band opened up for DX and some very fine results were achieved by hams in various countries and many records were established. An American ham being first to WAC (work all continents) on this band.

The 5 metre band which is of an ultra high frequency has been used to some extent in Australia. This band was used mainly for local and short distance work over distances of ten to fifty miles. It is popular in one way due to the compactness and ease of construction of the necessary apparatus. This compactness lends itsef to mobile installations in cars or may even be carried by the operator. The aerial both for transmitting and receiving becomes easier to install, particularly where the station is to be where there is limited space. In Australia work on 5 metres was mainly in the capital cities where there were numerous hams within comparative short distances of each other, although hams in Newcastle and Wentworth Falls were able to communicate with Sydney stations.

The other ultra high frequency bands 112 mc/s and 224 mc/s were not used in Australia to our knowledge, but were receiving some attention in the U.S.A.

In the construction of ultra high frequency transmitters and receivers careful design is necessary particularly with layout wiring and the insulating materials used in the various components.

In our article next month we will cover the standard of technical knowledge required for the amateur certfiicate, also the best method to overcome that main hurdle of all would-be hams, the morse code.



A transmitter for 28 and 56 megacycles showing the careful layout. The chassis is not much larger than the palm of your hand.

AT LAST . . .

we are far enough advanced with the new Amateur Operating Course to reproduce a prospectus on the next page. Training will officially commence by approximately September 1st, 1946, when the first lessons will be posted to those enrolled. Any person interested may enrol immediately. Please send for an enrolment form if you do not wish to cut your copy of "Service."

AMATEUR OPERATOR'S CERTIFICATE OF PROFICIENCY COURSE

SYLLABUS

1. Introduction. Status of amateur radio. Historical background. The nature of radio signals. Elements of wave propagation.
2. Learning the Morse Code. The International Morse Code. Sounds of various letters. Practising. Symbols representing numbers, punctuation and special characters. Circuits of receivers for code practice. Handling a key. Circuits of oscillators for practise in sending.
3. Atomic structure, and the electron. Electrical units. Definition of International Ampere and International Ohm. Ohms Law. Types of current flow. E.M.F., Voltage, and potential difference. Inductance, Capacity and Impedance.
4. Magnetism. Permanent magnets. Electro-magnets. Magnetic fields. Electro-magnetic units. Field strength. Pole strength. Flux density. Permeability. Reluctance. Remanence. Hysteresis. Magneto motive force. Electro-statics. Electric fields. Electro-static units. Dielectric materials and dielectric constant.
5. Alternating Current Circuits. Production of A.C. Positive and negative in A.C. work. Rise and fall of voltage. The sine wave. Various values of A.C. Effective value. Phase. Effect of resistance, inductance and capacity on phase relation.
6. Effect of inductance and capacity in A.C. circuits. Series circuits containing resistance and inductance. Resistance and Capacity. Inductance, Capacity, and resistance. Impedance. Power in A.C. circuits. Power factor. Power factor of coils and condensers. D.C. components in A.C. circuits.
7. Oscillatory circuits. Series and parallel resonance. Phase relationship of current and voltage in tuned circuits. Effect of resistance. Dielectric losses, distributed capacity. Eddy currents and skin effect. Damping Factor. Decrement. Selectivity. Coupled circuits.
8. Valves. History, development, construction and application. Thermonic emission. Types of electron emitter. Diode rectifiers. Triodes. Multi-element types. Transmitting valves. Special types for very high frequencies.
9. The valve as a generator of high frequency oscillation. Types of oscillator circuits. Phase relationship between plate and grid circuits. Maintenance of oscillation at very high frequencies. Limitation of power output at very high frequencies.

Self-excited transmitters, advantages and disadvantages. R.F. power amplifiers, Classes A, B and C. Master oscillator-power amplifier systems.

11. Quartz Crystals. Piezo electric effect, and its application to transmitter frequency control. Various types of crystal cut, their characteristics, advantages and disadvantages.
12. Modulation. Telegraphy (C.W. and I.C.W.). Keying methods. Elimination of interference. Telephony. Advantages and disadvantages of grid, plate and cathode modulation.
13. Audio frequency equipment. Amplifiers (A, B, AB1 and AB2). Push-pull voltage and power amplifiers. Phase inverters. Negative voltage and current feedback. Instability and methods of overcoming it. Low impedance lines.
14. Aerials. Inductance and Capacity of the aerial systems. Natural wavelength of the aerial. Current and voltage in the aerial. Fields around the aerial. Effects of the fields on each other. Field strength at a distance. Types and shapes of transmitting aerials. Ohmic resistance and radiation resistance. Feeder methods. Uses and advantages of co-axial cable.
15. Wave propagation. Sky waves and ground waves. Effect of ionospheric layers on radio communications. Relationship between frequency and propagation characteristics of radiated wave. Skip distance and fading. Daily and seasonal changes in ionospheric density. Sunspots. Multiple reflections from earth and ionosphere.
16. Power supplies. A.C. and D.C. generators and motors. Power transformers. Filtering methods. High voltage rectifiers including gas-filled types. Batteries. Vibrator power supply.
17. Typical designs of high frequency transmitters for C.W., I.C.W. and telephony. Self-excited, crystal controlled and MO.PA types. Operation of transmitters. Adjusting frequency and power. Common faults associated with transmitters.
18. Measurements and measuring instruments. Multimeters. Thermo-couples. Frequency meters. Monitors. Audio frequency generator. Cathode ray oscilloscope.
19. High frequency receivers. Typical designs for battery and A.C. operation. T.R.F. and superheterodyne types. Beat oscillators. Super regenerative receivers. Choice of intermediate frequency in superheterodyne receivers.
20. Automatic Volume Control. Tuning indicators. Noise limiters. Single signal selectivity. Crystal gate intermediate frequency stage.
21. Operating technique. Interpreting the regulations. Examination advice.

AMATEUR OPERATOR'S CERTIFICATE OF PROFICIENCY COURSE

A course designed for those who have completed the A.R.C. Radio Service Engineering Course or possess training to that standard, and who wish to obtain the Amateur Operator's Certificate, issued by the P.M.G.'s Department. Correspondence Training only.

Average time taken to complete course——8 months.

FEES SCHEDULE AND ENROLMENT FORM

Please enrol me as a student from ..... 19..... in your Amateur Operator's Certificate of Proficiency Course. I agree to pay for this course of instruction in the following manner. (Mark X against plan you prefer.)

Plan 1.	£1 with this enrolment form, and £1 per month until a total of £8 is paid.
Plan 2.	£7 cash with this enrolment form.
Plan 3.	£2/10/- with this enrolment form. £2/10/- two months from date of enrolment, and a final payment of £2/10/- four months from the date of enrolment.

PLEASE NOTE—All cheques, money orders and postal notes should be made payable to the Australian Radio College Pty. Ltd.

NAME IN FULL .....

Address .....

.....

Date of Birth .....

AUSTRALIAN RADIO COLLEGE PTY. LTD.,
E.S. & A. BANK BUILDINGS,
BROADWAY. SYDNEY.
Phone M6391—M6392

Telegrams: "RADCOLLEGE," Sydney.

KNOW THYSELF

It is a mistake for any man to imagine that he can be successful in every department of life. Such an idea is bound to lead to failure and disappointment.

Human beings are mainly dependent for their qualities on what they have inherited from their ancestors. Our constitutions have been given to us in limited forms, and they restrict all our possibilities. "There is a destiny that shapes our ends, rough hew them how we will," is a quotation that may be interested in terms of heredity.

A man who is born with a club foot can never hope to win sprint races, and a feather-weight can never become a winner amongst the heavies. As it is with our bodies so it is with our minds. Our brains are just as much a part of our physical make-up as any other part of our bodies and they are supplied to us in a certain form over which we have no control but we do have intelligence enough to discover what our potentialities are and to make the best use of them.

The biologists are becoming more and more convinced of the large part that heredity plays for us, and they consider that environment does not influence us as much as was previously thought. We are destined from birth to pursue certain courses and however we may modify them the main lines are laid down for us. The man born with the brain of a poet cannot become a scientist, and the inheritor of a retiring disposition can never become a blustering go-getter.

By the recognition of our limitations we can hope to lead happy and successful lives, although they may be different in kind from those of other people. "Know thyself?" and by knowing thyself and understanding what your qualifications are you not likely to embark on enterprises or projects beyond your powers. As a salesman you may be a success, as an administrator—a horrible failure but the latter would probably be a failure on the sales staff.

If we can understand ourselves, and plan our lives accordingly, we will be enabled to exploit our capabilities to their highest extent, while avoiding those objects whose attainment is beyond our powers.

This may be some consolation to those who feel depressed over their limitations, but these are beyond their control, and if they would only realise that some things are beyond their powers and seek to follow upon lines that suit them they will become more happy and contented. Remember that no man can excel at everything, but we can seek the ways in which we can excel and follow them to success.

By "Carine" in "The Hammer"

LOGARITHMS AND THE SLIDE RULE

(Contd. from page 12)

The foregoing example may be solved with the aid of the slide rule WITHOUT writing anything more than the problem and the answer.

A WORD OF WARNING

If you are contemplating the purchase of a slide rule purchase the book first. Within its covers are many accurate and helpful suggestions which allow the beginner to select a rule which will give accuracy and satisfaction.

Here's wishing you luck with the "old Pi R squared's."

STUDENTS CONTRIBUTION

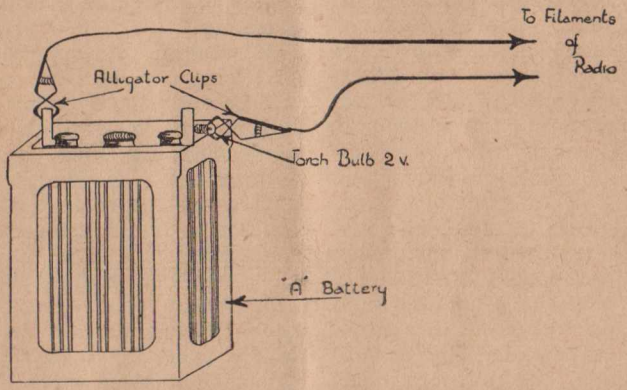
Thanks to student L. Priebbnow of Dalby, Q., who sends two interesting Service hints.

Filament-Wiring Tester

This is an extremely simple tester, but the advantage is that no time is lost in building it. It can be used conveniently to test filaments of 1.4 V and 2 V battery sets.

If you are a constructor of 2 volt battery sets, you will usually have the filament battery leads terminating in alligator clips if a wet battery is used. So all you do is to clip a torch bulb in one alligator clip and touch bottom of bulb to battery terminal.

First, with set switched off, touch bulb to battery. If all is well, bulb should not light. If it does, there is obviously a short. With set switched on, bulb should light. If the filaments are wired in parallel, the tubes may be plugged in one by one, the bulb lighting each time. With no tubes plugged in, the bulb should not light, unless, of course, there is a panel bulb also in parallel with filaments. In this case it should be unscrewed.



A Carbon Soldering Pencil

This idea originally appeared in "Radio and Hobbies," January, 1945.

The novel manner in which I mounted the instrument may be of interest to readers. The construction is simple and cheap, but in use it is very efficient.

First, secure a piece of carbon rod (about 3½ inches) from a torch or "B" battery, and lay it lengthwise in the slightly open jaws of a vice to facilitate cutting it in halves with a hacksaw.

This done, the hacksawed surfaces of the carbon should be filed smooth, and one end of each piece filed to a point, as in diagram.

Next, cut two pieces of tinned, thin copper or tin, about 3/16 inch by ¾ inch and slightly concave, the surface to fit the curvature of the carbon rod. These act as soldering lugs, and as contact points to the halves of carbon rod.

Now cut a piece of mica to fit neatly between the flat surfaces of the bisected carbon rod. Assemble these parts, and place on to their

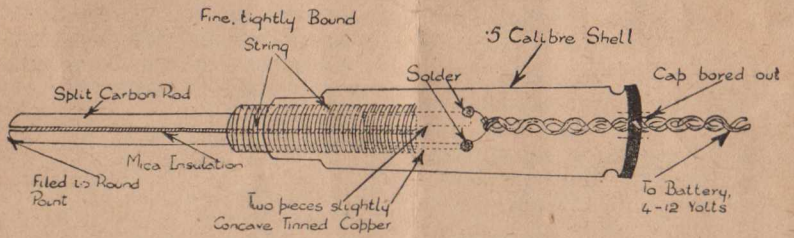
respective ends, the concave copper soldering lugs. Holding these in place, wind on a layer of strong fine card or thread. Add enough layers of tightly wound cord to enable the unit to fit snugly into the nose of a .5 calibre shell, the cap of which must be previously bored out, and the battery leads are brought through the hole thus made, and are soldered to the solder lugs bound on to the insulated halves of carbon rod. (Make sure the cap is dead before you attempt to file it out of the .5 shell.)

If the unit is loose in the shell, the nose of the shell may be slightly pinched inwards.

The soldering pencil operates off a 4-12 Volts storage battery, or from a 240 Volt A.C. transformer delivering 4-12 Volts on the secondary.

To operate the "pencil," press it down firmly onto the joint to be soldered or unsweated, so that good contact is made by the carbon points. Current flows between the points through the joint or wire, heating up the points of the carbon and the joint so that solder (preferably resin-cored) may be run on freely. The mica crumbles back gradually from the carbon points, so that it is not likely to be a hindrance.

The advantages of this soldering pencil are obvious, namely, it requires no pre-heating, uses current only while actually in use, light, compact and above all, cheap.



"A.R.C. TRADING POST" continued from page 16

FOR SALE — One Palec Counter type valve checker. One model 40-36 range avometer. One A.C.-D.C. Multimeter. All good order.

B. HANLEY,
88 Albion Street,
Warwick, Qld.

WANTED — 2,000 ohm Field Speaker, any size.

V. CROZZOLI,
92 Ferris Street,
Annandale, N.S.W.

WANTED — 5 in. speaker, 5,000-7,000 ohms coil, 1,500 ohm field.

V. G. BRUCE,
391 Canterbury Road,
Surrey Hills, 1.10,
Melbourne, Vic.

FOR SALE — Palec valve and circuit tester model V.C.T.V.

WANTED — Vibrator unit for Philips Radio Player, model 3205.
For both items apply:

H. WEST,
Hanley Street,
Carramar, N.S.W.

TECHNICAL BOOK REVIEW

LOGARITHMS AND THE SLIDE RULE

BY L. PARR-SMITH (A.R.C. TECHNICAL STAFF)

There is little doubt that many students appreciate the need for mathematics in the study of radio, and this appreciation is usually firmly established before reaching the end of the first section. Not a few of us find maths. hard to get around, and so a short cut to the many problems which eternally confront us is not to be ignored.

One easy and fast way out of the difficulty is in the use of mathematical tables. These may be purchased for about a shilling, and with reasonable care can give the required accuracy for engineering calculations, including radio.

The study and application of logarithms is not a difficult matter, the average student being able to learn it in a few weeks. Some knowledge of arithmetic is of course a pre-requisite, but most of us can boast the necessary standard.

One particularly complete set of tables is "Abridged Mathematical Tables" by Barraclough and can be obtained anywhere for roughly one and sixpence. There are several books obtainable dealing with logs and the method of applying them and these should not cost more than about five shillings. Angus & Robertson tell us they have such a book by Card and Parkinson for 5/-. The appendix of 14 pages would doubtless contain a set of log and antilog tables.

THE SLIDE RULE

Yet a quicker and easier method of obtaining the answer to difficult problems is in the use of the slide rule. The basis of all processes of the slide rule is logarithmic in character, yet no knowledge of logarithms is necessary for its successful and accurate operation.

Some study is required before a student of the slide rule becomes a master of it. The methods of handling the slide and curser need careful practice and memorising, for the slide rule appears at first to possess an evil volition all its own.

Before any serious work can be undertaken, study of the various scales, their markings and the way they are used, is necessary also.

To become proficient one must possess a slide rule, a reliable book on the Hows and Whys, and a lot of patience, for much practice is the only road to success.

One excellent book for those with no previous slide rule experience is "The Slide Rule Simplified" by C. O. Harris, and the price is less than one pound. This book introduces the slide rule in such a way that anyone can follow through to the final paragraph, and at the same time gives sufficient explanation and examples (with answers) to make one quite proficient in performing multiplication, division, squares, square roots, cubes, cube roots, logs, reciprocals, sines, cosines, tangents, cotangents, secants, cosecants, etc.

The benefit gained in saving time and effort can only be appreciated from an example. Here is a maths problem:—

$$\frac{97642 \times 18765 \times 0.1256}{.000067 \times 37 \times .00167}$$

INSTABILITY IN RECEIVERS

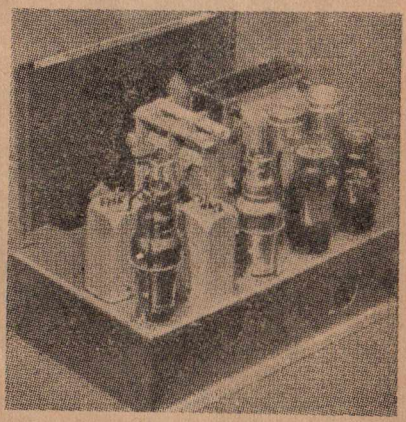
BY P. BESSELL (A.R.C. TECHNICAL STAFF)

In this article we will endeavour to set out some of the causes of instability in receivers, and explain some of the methods, which may be adopted to overcome this fault.

In the modern type of receivers which makes use of iron cored coils and I.F. transformers, together with valves which are capable of extremely high gain, it is necessary to take certain precautions to prevent this trouble. One of the most prolific causes of trouble of this nature is due to bad lay-out. In laying out a receiver it is desirable that you endeavour to keep the components arranged in an orderly manner on the chassis. It is bad practice to lay out the parts in such a way that the signal may have to double back on itself at some section of its journey through the receiver—this will only cause trouble. Instances have been seen where the aerial coil has been placed next to the output tube; under these circumstances it is virtually impossible to make the receiver stable. When deciding on the layout of the receiver, if you study the circuit diagram in conjunction with the layout, you will find that it is possible to arrange the parts in such a manner that you will be able to keep the grid and plate leads as short as possible, and at the same time spaced well apart, so that no coupling can take place between them. The time spent on planning a good layout will be well repaid by the results obtained. If after the receiver is completed it commences to display signs of being unstable, it may be due to a variety of causes. In some cases the only bypass on the B+ line consists of the 8mfd filter condenser; although this condenser is quite an efficient bypass at the low audio frequencies, it does not always make an efficient R.F. bypass. In this case if a paper condenser of about .1 to .5 mfd is placed in parallel with the 8mfd the trouble will clear up.

Another remedy for instability is to place a small fixed condenser of about .005mfd across the primary of the output transformer. A condenser from the plate of the detector to earth will also help—a capacity of about .0001 to .00025 is used here. Most receivers these days use diode detectors with the volume control operating as the diode load. In this case the three leads from the volume control should be made with shieded wire, the shielding of which should be firmly connected to earth. This also applies to any other shielded wire which may be used in the receiver. In receivers where a lead runs from the aerial terminal on the back of

See page 15 for continuation



The above illustration shows a well laid out receiver. Particularly note the compact layout allowing all leads to be kept as short as possible.

HOW MANY LESSONS DO YOU RETURN EACH MONTH?

THREE A MONTH IS

GOOD

TWO A MONTH..
FAIR GOING

ONE A MONTH..TCH..TCH.
NOT TOO GOOD AT ALL

A.R.C. CUP WINNERS FOR 1945

Congratulations to the winners of A.R.C. Cups for 1945.

The "Philips Cup" awarded by the well-known radio and electrical firm of that name was won by student A. H. BROWN, NX130806—*being the best all round Correspondence student for the year.*

The "Graham Cup" awarded by our Principal, Mr. L. B. Graham, for the best all round Night Class student, was won by student R. C. BAXTER.

The students concerned will receive replicas of the cups, and their names will be engraved for all time on the bases of the originals.

THE 'PHILIPS CUP' AND THE 'GRAHAM CUP'

"INSTABILITY IN RECEIVERS"

Contd. from page 13

the receiver chassis over to the aerial coil or wave change switch, which may be placed near the front of the chassis, coupling may take place between this lead and nearby circuits. This can be overcome by drilling a hole near the aerial terminal, and bringing the wire from the terminal out through this hole and taking it around the outside of the chassis. Then drill another hole near the aerial coil or switch and pass the wire through the hole and attach to the coil.

Another form of instability which may occur in the audio section of the receiver is known as "motorboating." This can be cured in most cases by placing a resistor of about 10,000 ohms in the grid circuit of the output tube. The resistor should be placed between the grid of the tube and the junction of the grid leak and coupling condenser. A condenser of about .002 can also be tried between the plate of the output valve and earth.

By means of the various methods outlined above it should be possible to make the majority of receivers stable, and so allow them to perform at their best.

A.R.C. TRADING POST

A free Buy - Exchange - Sell Service for A.R.C. Students

HELP WANTED—An A.R.C. student in Sydney or Melbourne who will help me obtain essential Radio accessories. Please write:

B. BENNETT,
"Felstead,"
Queen Street,
Southport. Qld.

FOR SALE—A.W.A. 10 watt amplifier Ser. G958. 240V-AC. Also 32V. DC. to 240V. AC. rotary converter. Will sell separately or together.

P. L. JOHNCOCK,
Marama. Sth. Aust.

OSCILLATOR FOR SALE—"University" model J.G.A. cost £18. Will accept £16/10/-. As new.

P. J. PARKER,
9 Boundary Street,
Chippendale, N.S.W.

EXCHANGE—3 gang condenser for 2 gang H type. Wanted URGENTLY.

A. A. LAURENZ,
Pinnacle, via Mackay, Qld.

FOR SALE—1 Century Geremotor in good condition; 6 V.2a input; 180V. 40ma. output. £3/10/-. 1 Projector lamp 900 Watts, 32 volt. with socket £2.

C. C. MUELLER,
"Trungley Hall,"
Temora, N.S.W.

WANTED—Radio and Hobbies—May and June, 1940.

V. TESTONI,
16 Elsemere Street,
Kensington, N.S.W.
FX1130.

WANTED BUY—5" speaker 2,500-7,000 ohms; 1 D8GT valve, or will exchange 8" speaker, damaged cone, and 3 gang condenser. Also wanted, ¼ HPAC motor.

R. COLEMAN,
45 Balmoral Street,
Waitara, N.S.W.

WANTED TO BUY OR BORROW—November, December (1942), January (1943) issues of "SERVICE."

BRUCE MACKAY,
Maclean, N.S.W.

WANTED TO SELL—2 valve Calstan Oscillator with output meter, Model 305, less Battery. Also set analyser.

K. FORD,
271 Anzac Highway,
Plympton, Sth. Aust.

WANTED TO BUY OR LOAN—Copy "Radio & Hobbies" for May, 1939.

L. W. ADAMS,
8 Chellaston Street,
Camden, N.S.W.

FOR SALE—3 1425 K.C. I.F. Transformers, American make, air tuned Trimmers. Also "Ghirhardi's Trouble Shooter's "Hand Book." What offers?

E. STENNETT,
125 Bridge Street,
Toowoomba, Qld.

See page 11 for more advertisements

Do you want to buy, sell, or exchange something with a fellow student? If so, the College will gladly insert your advertisements free of charge on his page. Write carefully — or, better still, print your advertisement. Condense it to 30 words or less, and it must be confined to radio subjects. The College of course reserves the right to re-write advertisements as necessary, or to reject those that may not fit in with the spirit of this service.

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