

# "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.

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**MR. BASIL ORR, at the Annual Meeting of the Chamber of Manufactures of N.S.W., made some sound, commonsense statements.**

" . . . We have six years of war wastage to make up. Let us have the highest possible standard of living the country can afford. Manufacturers want it that way. To put it on a purely commercial basis, if you like—it is good for business. By all means let us have all the social amenities that are within the capacity of a soundly financed, sanely and intelligently governed community: That, too, suits manufacturing industry. By all means, let us spend millions of pounds on these things. But let us never forget that, first of all, we must earn the millions before we can spend them. That means work—production. And because of the welter of destruction and the pain and misery of the last half-dozen years, it will mean hard work, and plenty of it. . . ."

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SEPTEMBER, 1945

## WHAT TO LOOK FOR IN THIS ISSUE

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# HOW TO GET A RADIO JOB

**T**HERE'S a big re-shuffle going on in employment. With the sudden switch over from war to peace many people are thinking of changing their war-time occupations for peace-time jobs of a permanent nature. Apart from civilian activities in job change-over, in the Fighting Forces alone, there are some hundreds of thousands of men who, keenly anticipating their discharges, are in many cases wondering what their chances might be of getting into the employment of their desire. Although a big percentage of men to be discharged will have their old jobs to go back to, nevertheless many fellows will wish to make an attempt to get into something new before finally settling down.

All told, quite a big slice of the population of this continent is made up of people who, at the moment, are wanting to change over their occupations for one reason or another.

From letters we receive at the College, it is apparent that quite a number of A.R.C. students find themselves in this category, particularly those in the Fighting Forces. You all know that the College sets out to give whatever assistance is possible towards obtaining suitable employment for students, and it is with this sentiment in mind that we offer the following suggestions:

First and foremost it must be remembered that the direction of people to employment still remains in the hands of the Manpower Authorities, with the exception of those under 18, over 45 years of age, and discharged Service personnel. However, it is anticipated that Manpower Controls will be relaxed in the very near future, and your National Service Office will then operate in an advisory capacity.

Another point, the College does not guarantee positions for students. Whilst the College Employment Service is approached many times by reputable firms for suitable employees, we act strictly in an advisory capacity. It is our aim and our pleasure to assist a student to obtain the position he requires by telling him of those firms

where we know positions might be available, the name, if possible, of the correct person to contact, and also, at the same time, we can assist by suggesting to the student the proper manner in which he should approach his prospective employer.

Under existing circumstances, with so many students wishing to change over to radio employment, both in civilian life and in the Fighting Forces, and also with still a great deal of employment control in the hands of the Manpower Authorities, we feel that the best way we can assist you is to make suggestions as to how you can locate positions. A number of manufacturing and servicing firms require the services of trained men, and our main suggestion is that you contact these firms direct. In the case of radio manufacturers, you can obtain a comprehensive list of these organisations by referring to the Classified Section in the Telephone Directory. Pick out the names of the people who are handiest to you and whom you know to be go-ahead organisations. Take each one in turn and write each firm a letter setting out your previous experience, your age, whether you are married or single, mention that you are training in radio with the College, and indeed set out any points that you feel would carry weight when making an enquiry for a position or seek-

ing an interview with your employment in mind. Perhaps at this stage a suggestion in the form of a sample letter will help.

To the Employment Officer,  
X.Y.Z. Radio Company,  
Sydney, N.S.W.

Dear Sir:

I am taking the liberty of sending this letter to you because I am seeking a position as a radio tester with a reputable firm. The high quality of your products impresses me very much, and the X.Y.Z. Radio Company's policy appears to be a progressive one. I feel that if I can become placed with a firm that is going ahead, I too will go ahead with it.

Briefly, my qualifications are as follows:—

**Training:**

At the moment I am studying the A.R.C. Radio Engineer's and Serviceman's Course, and to date have completed approximately two-thirds of this course. A full report of same may be obtained from the Australian Radio College, 206, Broadway, Sydney.

**Radio Experience:**

For the past twelve months I have been carrying out part-time radio service work in my district. During that period I have repaired approximately 100 receivers of all types. I also possess my own testing gear.

**Present Employment:**

For the past three years I have been working as a machinist at the Government Aircraft Factory. I have sound knowledge of factory and workshop routine, together with an appreciation of the necessity to do a job thoroughly.

**Married, with One Child:**

At the moment I am purchasing my own home through a building society and, conse-

quently, am in a settled position.

**References:**

Excellent references can be supplied as to character and ability to carry out any work I undertake. These could be brought along with me should you be kind enough to grant me an interview.

Due to early termination of defence contracts, my employers would be willing to grant me a release immediately, if required. Furthermore, they have kindly offered to raise no objection my taking time off for an interview if necessary. Consequently, if you have a position as a radio tester or another position of a similar nature available, and if you would be kind enough to grant me an interview, I can call at any time convenient to you. A telephone message may be left, if necessary, at this number—101314.

Yours faithfully,

This letter is offered as a suggestion, and should be altered to suit your individual circumstances. Portions can be deleted, additions made, but bear in mind that it is essential to incorporate in a letter, when you are seeking an interview with employment the object, enough information about yourself to make a prospective employer interested enough to call you in for an interview.

Another good plan to adopt when seeking a position for yourself is to advertise in the "Positions Wanted" column of your daily newspaper. Radio trade publications can also be used to good effect, because a publication of this nature is distributed specifically to the very people you wish to contact.

**MEN IN UNIFORM**

Now that the Pacific War is over, we know how you feel. You know that before very long you will obtain your discharge, and you are

(Continued on page 8)

## RADIO SERVICE HINTS

### Visual Fault Finding

When servicing radio receivers it is surprising the number of faults that can be located by visual means. For instance if the plates of the rectifier become red hot when the receiver is switched on, it is probably due to the first filter condenser being shorted or broken down, or a short from the rectifier filament to earth. Another common indication that you will come across, is the screen of the output tube becoming red hot. This indicates that the plate circuit is open due to the input transformer burning out, this will result in no sound from the speaker.

If the rectifier has a bright purple glow inside the glass bulb, accompanied by sparks and flashes this indicates that the tube has become gassy, due to air leaking into the tube. The tube should be replaced otherwise it will damage the power transformer.

By listening to the receiver it is also possible to form an idea as to the cause of certain faults. If the reproduction is very distorted the trouble is almost certain to lie in the audio section of the receiver, and could be caused by any of the following defects. Plate load of the detector being open. Leaky coupling condenser between the detector and output tubes. Weak detector or output tube. Cathode bypass condensers of the electrolytic type dried up. Grid leak on output tube open or gone up in value causing the tube to block. Bias resistors on power or detector tubes which are open or have altered their value. The speaker should also be inspected to see that the voice coil is not rubbing on the pole piece.

Another quick test that can be made is to place the finger on the cap of the detector tube. If a loud hum or squeal is heard you may assume that the receiver is working from that point. This test only applied to diode detector, with the grid bias type it is sometimes necessary to remove the grid cap first.

### Any Faulty Power Transformers

If you have any on hand do not discard them, they may be useful.

If the high voltage secondary is open the transformer is still useful as a filament supply source.

If only half the high voltage secondary is open the other half may be used in a half wave rectifier circuit.

If the high voltage winding is shorted it is usually possible to burn out the short by connecting the affected winding to the 240 V. A.C. mains with a low resistance approximately 1 ohm across one of the filament windings. Of course make sure the transformer is entirely disconnected from the set when doing this.

If the primary of the power transformer is open, the high voltage secondary can be used as a filter choke.

Service (U.S.A.) — June 1945.

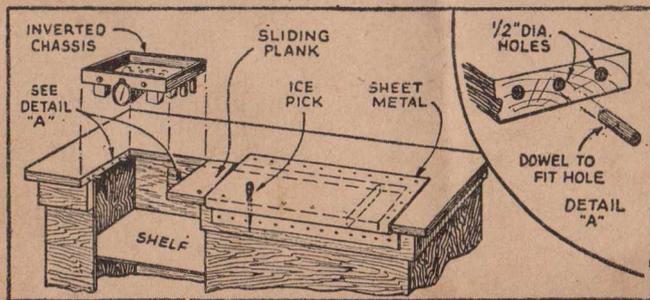
### Time Saving Hint

Make use of the home radio set in your service work. If you do not possess an oscillator and you want to check the I.F. stages of a faulty receiver, connect the two chassis together, then a wire taken through a paper condenser from the grid lead of the first or second I.F. transformer of the home receiver will carry the intermediate frequency output. Naturally the receiver undergoing repairs will have to operate at the same I.F. as that of the home receiver.

### INVERTED-CHASSIS HOLDER

This chassis holding scheme is very handy, and it may be converted into a substantial part of the bench when not in use. The essentials are shown in the diagram, the shelf under the bench being unused for support of speaker or midget cabinet, leaving the top of the table entirely clear for the test equipment. A series of holes is drilled along the edge of the sliding member to coincide with holes in the sheet metal section, so that the ice pick, when

placed through the two, will prevent the sliding piece from moving out of place. The dowelpins are moved into such holes as are most convenient for the particular chassis under repair. It is preferable to cover the metal portion of the bench with insulating material, such as linoleum.—“Radiocraft.”



# A Student Offers Some Sound Advice

Dear Fellow-students:

Before I begin this narrative, I want to ask you a straightforward question, though you may think it pertinent—"Have you ever been up against it?" For if you have not, maybe you will be unable to appreciate to the full what I am about to tell you.

In the first place, let me state, I am a married man with a family of three young scallywags. My age is now 43 years. After a great deal of sickness in the home, including the deaths of children, about four years ago, I stood with the grand sum of £4/10/- to my credit, after selling my Dodge truck to pay my hospital debts. That was my position.

One day I received a letter of enquiry from a gentleman named L. B. Graham, of the A. R. College, asking me if I had ever thought of a career in the radio world. Well, I hadn't, and if I had I couldn't afford it.

I didn't answer that letter, but I didn't destroy it; I tucked it away in a drawer. Later came another, and over a period several, all of which shared the same fate. The seed had been sown.

One day, while toiling out in the sun with a pick and shovel, the thought came to me: "He is a persistent chap this Graham; I wonder if I can make it?" I had nothing, and knew even less of radio, yet I had read of others who had made good. I spoke to the wife that night about it. "You're too old to start anything like that now; and, besides, how are you going to pay for it?" said the wife. "Mum," I said. "I've £4/10/- and have you ever known me to start anything yet without seeing it through to a finish?" "No," said the wife; "you're too mulish to give in, but this is different; you're too old!"

I wrote that night to this Mr. Graham, explaining my position—in fact, told him my story complete—asking for his advice and candid opinion. On his reply depended my £4/10/- and my future.

Mr. Graham's reply was sympathetic and kindly; his advice, that he felt positive I could make it; his terms, £1 per month—more if I could or felt like it at any time. The wife's warning note came in here: "If you spend that £4/10/-, see that you don't waste it." Well, reader, you can be the judge of that!

Within the first six months I had paid the price of my course. Did I study? One o'clock in the morning was early to bed at times, but it was worth it. At the end of twelve months I had bought myself a multitester, and every penny I could get hold of went into old, obsolete sets to practise on.

Well, I remember my first set: It seemed a maze of wires and strange parts. I'd have the lesson sheets on one side and the meter on the other, mother and children standing round ever watching dad. It was a short-circuited condenser from the screen of the detector. No voltage passed there and only 5 volts on the meter. That's it; I wonder if I've got one; no only a .5. I'll try that. The wife, anxiously: "Do you think it will go?" "It should," I said. "Voltages O.K., condenser might upset it a bit." Then the trial—everyone standing around with bated breath, including myself and a visitor. Click, she was on, and a rushing sound from the speaker. Around went the pointer—and lo and behold, music!

I bought more sets and studied as I never had before. Jobs started to roll in, and so did the cash. I wrote to Mr. Graham and told him about it. He encouraged me, he published an extract from my letter, after a while gave me FREE advertising matter, and now he is going to publish this—I hope to benefit you.

At the present time I stand minus my starting £4/10/-, but let me give you my list of advantages:—I stand a trained man, thanks to the efficiency and simpleness of the A.R. College training course . . . I have my own business in town . . . I have part of a shop owned by the agent of a well-known radio firm and I have 'all their repair work . . . My stock of valves would make your mouth water, over 150 . . .

Three test meters and spares . . . I have paid £250 cash on a home . . . I have a runabout for my work . . . My workroom at home here has 10 sets in at present for repairs, and I have more to collect.

Any of you fellows can do the same if you care to do it. Put your nose to the grindstone of study and effort, and don't give up; there's tons of room in the radio world for you. If you want advice or help, write to that very persistent gentleman—bless him!—Mr. L. B. Graham, of the A.R.C.

I only wish there were more adequate words for saying "Thank you." It seems so little to say for receiving so much. I am more than grateful. If you can help the College in any way at all, I will always consider it my duty to do so, for it is only through their efforts that I am where I am to-day. If my success will give any fellow-student the desire to carry on and stick to the College, I'll consider myself repaid for the time I have snatched from my work to write this.

Good luck and very best wishes to you all.

Your Fellow-student, H. E. BOOTH.

# TELEVISION NEWS

## J. L. BAIRD'S ADVANCE

As yet few people have realised the remarkable extent to which television has advanced, and, as he did in the beginning, so still does James Logie Baird claim prior success.

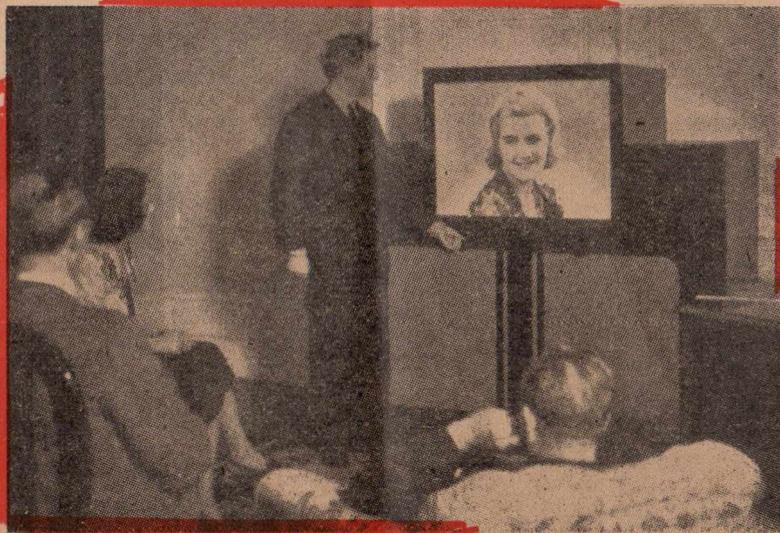
As late as 1926 there had been no practical success, the televised image being nothing more than a mere shadowgraph. On January 27, 1926, however, for the first time, true living pictures—that is images modelled by light and shade—were shown by a system of television invented by J. L. Baird.

Little has been heard of the “fly-

ing spot” during the war years, but the accompanying photograph taken in 1940 gives some idea of the high definition attained by Baird.

Employing a cathode ray tube featuring three electron guns, and colour sensitive fluorescent screens, together with optical light amplification has resulted in the “impossible” — Perfect definition — natural colours — and stereoscopic reproduction.

JOURNAL OF THE TELEVISION SOCIETY (LONDON)



*Mr. Baird's 600 line colour teletisor. The screen receives either 600 line colour pictures or by pressing a button the B.B.C., 405 line monochrome pictures. It measures 2' 6" × 2' 0". The set includes an automatic record-changing radiogram and an all-wave wireless receiver*

# T E L E V I S I O N N E W S

## Frequency Modulation and Television in Australia

In welcoming the enquiries made recently into broadcasting by a special Parliamentary Committee, the Australian Federation of Commercial Broadcasting Stations, through its President, Mr. A. C. Paddison, presented a 92 page report covering its views on Frequency Modulation and Television during the post war period. Some of the main features of this report are presented here.

### Frequency Modulation

Should F.M., asks the report, be adopted in Australia, and if so, what are the soundest practical steps that should be taken to ensure the smooth transition from A.M. to F.M.? These questions it is pointed out affect the entire future trend of broadcasting in this country. Frequency Modulation is not a cult or a cure all, but a technical system which provides very definite alteration to the existing A.M. system. It has definite advantages, but definite disadvantages when applied to Australian conditions.

Several pages are devoted to the technical considerations of F.M. in the United States, the conclusion being drawn that the advantages of noiseless and staticless reception with F.M. are counteracted by limitation of range.

Tone fidelity of F.M. is discussed exhaustively, one important matter stressed being the line facilities provided by the Post Office for transmitter and for relays between stations provide only for a range of 5000 c/s, and unless those facilities were improved, it would be necessary to broadcast direct from the transmitter to obtain a 15,000 cycle reading.

In consideration of tone fidelity it is necessary to be realistic. What percentage of the population is actually concerned in high fidelity reproduction? If the average ear could discriminate the differences in tone, then there would be wide-

spread dissatisfaction with existing standard receivers. How many people are able to tell when the valves in their receivers are not providing 100% results in reproduction?

Attention is given to the possibility of radio relay stations if the Post Office is unable to adapt its facilities to provide a 15,000 cycle response, but it is shown that if carried out to its logical conclusion with walkie talkies, it is possible to visualise a completely new system in competition with the telephone and telegraph systems.

In concluding its exhaustive presentation of all angles of F.M., the Federation states that it has a completely open mind, and that it is anxious that the technical advantages of F.M. should be made available as soon as possible to the people of Australia. At the same time it is anxious that the interests of the people be protected.

### Television

This section, as with F.M. is full of valuable and interesting data. To the layman, perhaps the most revealing angle is provided in a paragraph taken from a report on television by Maurice Zolotow (American Coronet 1945). It reads:—

"Tuning a telecast isn't quite the simple matter of snapping on your radio. About 15 minutes of twirling and adjusting are necessary. It takes the neophyte a week or so to get the knack of it. There are six

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## Frequency Modulation and Television in Australia

(Continued from page 7)

knobs on the set, the first two controlling the image. As you tune in your screen suddenly becomes filled with a scramble of what seems like dozens of wiggling, squirming, agitated worms: you calm down the squiggles by playing with the knob marked "horizontal hold", and then you work another knob marked "vertical hold".

"Gradually, the wavy, nervous lines come into focus and become an image. It is like the image on a photograph taken by an amateur on the average camera. Around the edges of the screen the figures are blurry, and in the background, the figures are frequently distorted and dwarfed. But engineers have overcome the flickering jerky quality of pre-war telecasts, and to-day a television programme — if it is at all smoothly produced — is exciting entertainment. You have to sit pretty close to the screen, and you have to darken the room, for best results."

It is inadequate to dispose of this extensive Federation report as it effects television by merely quoting extracts. To be appreciated, of course, it should be published in its entirety, but no journal has that amount of space.

In all, the report prepared by the Australian Federation of Broadcasting Stations sets forth about the most impartial and absorbing coverage of all angles affecting the future of F.M. and television in Australia. Its tremendous scope, immense care in presentation, prolific detail, and wealth of information upon existing facts governing present and possible future broadcasting are amazing.

Sunday school teacher, pointing to elaborate picture of the angel Gabriel—"Now who is this, children?"

"Paratroop," said little Willy.

## How to Get a Radio Job

(Continued from page 3)

wondering whether to go back to your old job or to take up a new one, perhaps in radio. It is the sincere wish of the College to assist you students who are in uniform to become rehabilitated as quickly as possible, but please do not write asking if positions are available, or how you should go about getting a position; if you do not know the date of your discharge. It is an impossibility for any firm to state that they are willing to place a certain individual in a position if they do not know when that person will be available. When you have a definite official date for your discharge, then by all means write to any firm about a position. At that time you will be able to state in a letter the exact day upon which you are available, and the prospective employer will then be in a position to say definitely "yes" or "no." In the meantime, you are advised to prepare yourself as thoroughly as possible to take up civilian life once again.

## RADIO PRODUCTION CONTROLS EASED

At the moment permits to manufacture radio receivers have been issued to manufacturers on a monthly quota, based upon the average of 1937-8-9. It is anticipated that, before long, unrestricted manufacture of radio broadcast receivers will be resumed, which will probably also apply to radiograms, battery-operated portables, etc. Furthermore, there is absolutely no control now on any type of radio set being sold to the public.

Other controls lifted include the manufacture of musical instruments, advertising material, dishwashing machines, vacuum cleaners, and domestic washing machines.—"Radio and Electrical Retailer," Sept. 13.

SORRY—We are late again with this month's "Service." The continuation of the printing strike is the reason. We will do our best to have October and November editions out before the end of November.

# Recording Laboratory

**I**T does not appear to be generally known that one of the most modern and elaborate sound-recording laboratories in the U.S.A. is installed in the library of Congress, Music Division, at Wellington, D.C., under the direction of the Librarian, Archibald MacLeish.

The need for such a laboratory first expressed itself through the popular demand for duplicates of the recordings in the Library's Archive of American Folk Song. For many years the Library of Congress has sponsored a scheme for recording American folk music in the field from the mouths of contemporary singers. A collection of 10,000 songs on discs, cylinders, etc. has been accumulated under the direction of John A. Lomax, Honorary Curator, to form one of the largest collections of its kind in the world. However, only students who were free to come to the library or enthusiasts who could afford to have expensive copies made were able to use the library's vast collection.

The Carnegie Corporation, in 1940, made a grant of over 41,000 dollars for the installation of a complete laboratory for duplicating gramophone recordings of all types, for making master recordings that can be pressed and distributed, for originating broadcasts and for making transcriptions (16-in. 33 $\frac{1}{2}$  r.p.m. discs) for radio transmissions. In addition, a mobile sound unit and a number of portable recorders were purchased for use in the gathering of "on-the-spot" material and other field recording work.

Through the facilities of the laboratory it is now possible for schools, libraries and individuals to obtain recordings for home study of rare American folk music, poetry, etc., and contemporary U.S. history and culture can be recorded for future generations.

## EQUIPMENT

The technical equipment of the laboratory includes RCA 88A and M1-3044 microphones, used in the main studio, and in the recording room a large four-panelled rack houses: (1) Hallicrafters SX-28 receiver and Hallicrafters S-31 FM-AM high-fidelity RF tuner (specially chosen for recording radio transmissions with optimum

quality and low back-ground noise); (2) 3-channel RCA 85B pre-amplifier, dual-channel line equaliser, patch panel, 40D amplifier and 94-D monitor; (3) 3-channel pre-amplifier meter panel, patch panel, duplicate R.C.A. 40-0 amplifier and 94-0 monitor; (4) Presto 55-watt recording amplifier and cutting-head bridging-monitor amplifier. The patching panels permit various possible interconnections of apparatus to be made and allow monitoring at almost any point of the circuits.

Two Scully recording lathes, fitted with RCA M1-4887 heads, with a pair of Presto 6N recording units, comprise the actual cutting apparatus. These precision Scully machines have an automatic run-out spiralling device and many other useful features, including a special relay -- operated change-over circuit to switch the modulation from one cutting-head to the other instantaneously by push-button control.

## "DUBBING" APPARATUS

As the production of duplicate recordings, up to as many as 200 in one week, from the collection on the shelves of the library is an important part of the work of the laboratory, considerable attention has been paid to the re-recording or "dubbing" apparatus. The main dubbing-table has several pick-ups, including Brush PL-20 and RCA models, each adapted to give the best results with certain types of records. Various cut-off, taper filters and equalisers, mostly used in transcription work, are located on this dubbing-table, to which also is connected a variable frequency generator that enables old records, originally recorded at speeds other than normal, to be copied, as the speed of the turntable can be adjusted until the

best quality of reproduction is obtained.

### RESTORING OLD RECORDS

An interesting aspect of the work undertaken in this laboratory has been the repair and restoration of old cylinder and disc recordings, of which some specimens are of unique historical value. Many of the cylinders reach the laboratory in dirty and cracked condition covered with mould, and have to be cleaned before being transcribed on to "cellulose" direct playback discs, but the minimum of treatment is applied as the grooves are sometimes damaged by this operation. Another difficult problem is cracked cylinders and discs, but the laboratory technicians are experimenting with a machine to eliminate the worst effects of such cracks and scratches.

The cylinders are copied on a simple rebuilt "Dictaphone" machine with which can be used several specially designed vertical pick-ups, i.e., a photo-electric model made by the Philco company, a lightweight electro-magnetic model, or a special crystal unit. Four feeds, namely, 100, 150, 160 and 200 tracks per inch, have enabled the machine to handle all the cylinders so far encountered, but the transcription turntable has been made continuously variable to cope with rotational speeds varying between 50 and 225 r.p.m.

The sound level on most of the acoustically-recorded cylinders is very low, and the useful frequency range recorded was usually between about 250 and 3,500 c/s; hence careful application of equalisers is needed to allow a disc transcription of tolerable quality to be made.

The portable or field recording equipment of the laboratory consists of nine complete portable recorders and a fully-equipped mobile sound truck. All the portable units comprising small 12-in. and 16-in. slow-speed models, have self-contained power supplies, operating from storage batteries as well as several with petrol chargers for recharging batteries when commercial power is not available. The sound truck is equipped with two 116-in. Presto turntables. Tele-

phonic communication is provided between the recording location and the engineers in the truck, and a portable four-channel mixer is available. The apparatus is energised from a self-contained 110-volt 60-c/s. supply, which operates from a 32-volt storage battery system. The batteries can be recharged by a generator driven by the truck engine, or from commercial mains. The frequency of the power supply is regulated by a field control connected to the convertor.

### PRESERVING RECORDINGS

Completed reference transcriptions recorded on conventional nitro-cellulose direct discs, are stored on racks in closed metal boxes in air-conditioned vaults, as such discs are not stable. Solid-stock pressings are durable, but this process is too slow and costly for most of the records stored in the library's collection, and so research has been commenced to determine the life expectancy and shelf-life, and the best method of preservation, of direct recordings.

In closing this brief survey of the work and equipment of the Library of Congress recording laboratory it should be mentioned that, since 1941, when the United States of America entered the war, the laboratory has been actively engaged in war work, and has devoted a major portion of its time to the Armed Services in the production of master recordings for processing purposes and the rendering of a technical reference service.

The author wishes to express his thanks to Dr. Arthur D. Semmig, Chief Engineer of the laboratory, for information contained in this article.

Reprinted from *Wireless World* (England) August 1945.

### EXAMINATION WRITING PAPER.

The college sales department is out of stock of your lesson examination writing paper. Due to the printing strike fresh supplies will not be available for some months. In the meantime, we suggest that you submit your examination answers on ordinary writing paper which at all times is quite satisfactory to the college.

## TECHNICAL QUESTIONS AND THEIR ANSWERS

(1) Question. Discuss the characteristics of the screen-grid type of tube as a radio-frequency amplifier. What advantages are obtained by incorporating the variable-mu feature?

A. The screen-grid tube is essentially a 3-electrode tube to which has been added a second grid located between the plate and the normal grid. The potential applied to the screen grid is usually slightly less than that applied to the plate, and this serves to accelerate the electrons flowing from the cathode, thus reducing the space charge and improving the amplification of the tube.

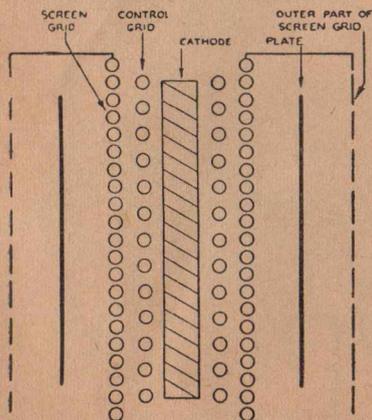


Fig. 1a.  
Section of Screen Grid Tube.

For radio-frequency purposes it is necessary that the grid-plate capacity be small to prevent feedback and self-oscillation, otherwise full use could not be made of the high gain of the tube. The grid-plate capacity of this type of tube is small, due to the reduction of the space charge.

The variable mu-tube is designed so that the lower end of the grid

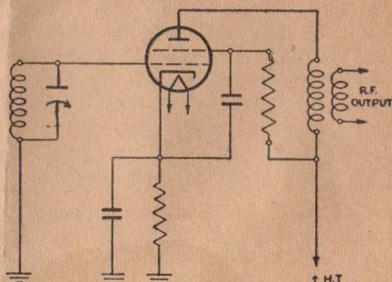


Fig. 1b.  
Typical Circuit of Screen Grid Tube.

voltage plate current characteristic curve tapers off, and cut-off is only reached at a relatively high negative grid voltage. This feature permits the amplification factor ( $\mu$ ) of the tube to be varied over a wide range of values, thus making the application of automatic volume control feasible. Further, when the input voltage falls to a low value, the distortion of the wanted signal is prevented, and cross-modulation from unwanted signals is reduced to a minimum.

(2) Question. What is meant by the terms self inductance and reactance?

Answer :

**Self-inductance** — When a coil of wire carries an electric current the lines of force produced set up a magnetic field. The lines of force of this magnetic field cut these conductors and so produce a E.M.F. generally defined as the back E.M.F. which tends to prevent a change in the value of current flowing. This property of a circuit is known as self induction and the unit of measurement is the Henry.

**Reactance** is the factor opposing the flow of an alternating current by virtue of either inductance or capacity without resistance.

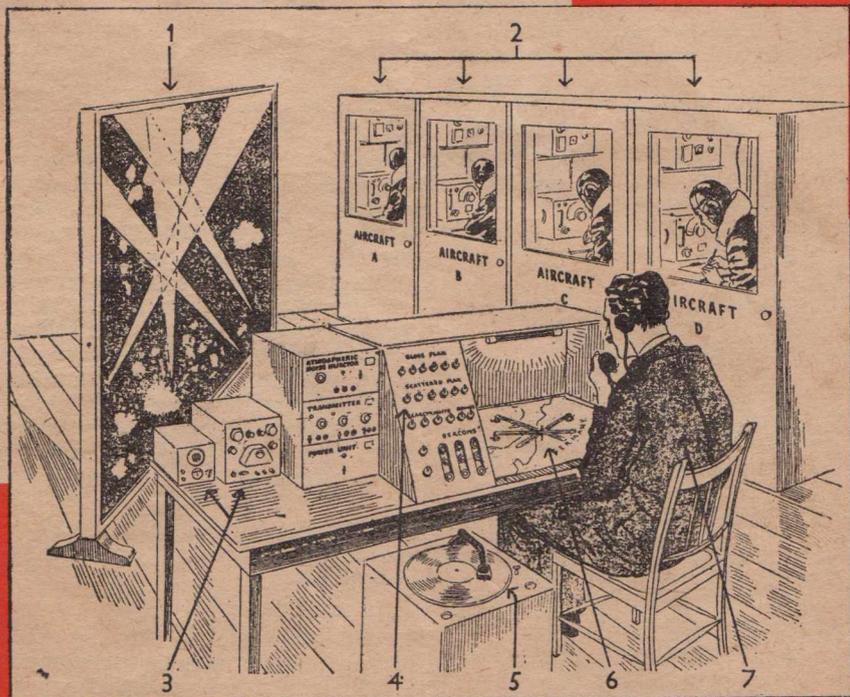
(From the Telecommunication Journal of Australia)

## COLLECTIVE TRAINING OF AIR CREW

The synthetic training of bomb-er crews by a technical device known as the Rediffusion trainer, is an R.A.F. secret that can now be revealed. Developed by Rediffusion Ltd., the device, which is all-British, has been in use since as early as 1940. Some such apparatus was seen to be necessary to

receive radio control from instructor exactly as on actual operation.

3. Regular service radio receiving equipment.
4. Switches which fire magnesium flashes of varying intensity in front of the cubicles, giving effect of near and distant flak



overcome the problem of accustoming air crews in training to the conditions they would meet in operational flying, without having to send them out over an actual target.

### KEY TO ILLUSTRATION.

1. Aerial view as seen on actual flight projected on large screen by epidiascope or cine projector.
2. Each cubicle represents an aeroplane and has separate radio transmitter and receiver. They

explosions, searchlights and bomb flashes.

5. Record of aero engines amplified and relayed to each cubicle.
6. Map of operation on which position of aeroplane is fixed by crossing of radio beams.
7. Instructor transmits and receives signals to and from the cubicles in exactly the same way as the ground radio station controls actual flights.

From "ERDA", September, 1945.