THE AUSTRALASIAN

Radio World

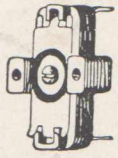
Registered at the G.P.O. Sydney, for transmission by post as a periodical

1/-

VOL. 13 . . . . . NO. 7

DECEMBER 15, 1948

DEMAND CROWN COMPONENTS



P.12. STANDARD 5-PLATE PADDER CONDENSER

455 Kc. using Polystyrene base. For use in conjunction with H. gang condenser. Price 2/6.

D.C. 2A TUNING UNIT

(13 to 42 metres), 1600 to 550 Kc/s, for use with H gang condenser. Suitable for compact chassis construction. Price, 36/-.

CROWN PERMATUNE F.M. DISCRIMINATOR TRANSFORMER

PT45. Price, 17/6.
Freq. 10.7 meg.
Cap. 50 mmf.
Wound and tropic treated same as PT44.

NEW COILS CROWN PERMATURE

PC63 Aerial, PC64 R.F., PC65 Oscillator. These are our latest production and are wound on trolitul formers and moisture proofed for tropical conditions with high impedance primary in the Aerial and R.F. Coils. Secondary wound with 7/41 litz for High Q.

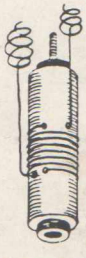
PRICE, 7/6

455 K.C. NEW I.F. TRANSFORMERS

New PT141-42-43 Series I.F. transformers are of revoluntionary design, using silver mica condenser moulded in the trolitul base, making them absolutely moisture proof. I.F. PT42 is required for the 2nd Stage in A.C. sets, this I.F. having 100mmf. condenser, whilst the 1st I.F. has 70mmf.

PT41 1st stage
PT42 2nd stage } 13/- each
PT43 Low Gain

IRON CORED SHORT WAVE COILS



I.C. 62 aerial,
I.C. 63 R.F.,
I.C. 64 oscillator,
13 to 42 metres, for use on standard H. gang. Price 4/9.

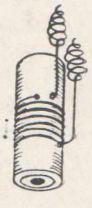
M.E.B. TRIMMER CONDENSERS

2 to 35 mmfd. on Polystyrene base. Price, 1/1.

R.F. CHOKE

Standard general purpose honeycomb winding, will carry up to 50 M/a. Price, 1/10.

AIR CORE S/W COILS



13 to 42 metres, Z.C.59 aerial, ZC.60 R.F., ZC61 oscillator, for use with H gang. Price, 2/10 Each.

IF YOUR LOCAL DEALER CANNOT SUPPLY, WRITE DIRECT TO

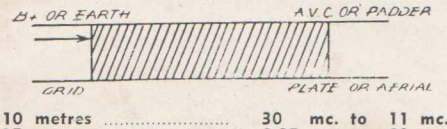
D.P. 3A Tuning Unit: 3 Stage, range 13 to 42 metres, 1,600 to 550 Kc/s. Price, £4/17/-.

B.F.O. 455 Kc/s. Oscillator Coils. Price, 12/-.

R.F. Coil with reaction in aluminium can. Price, 9/10.

Reinartz Coil in aluminium can. Price, 7/6.

5-BAND COILS



10 metres	30 mc. to	11 mc.
15 metres	8.25 mc. to	23 mc.
20 metres	16 mc. to	5.5 mc.
40 metres	8 mc. to	3.0 mc.
80 metres	4 mc. to	1.5 mc.
Broadcast	1600 kc. to	550 kc.

Crown

RADIO PRODUCTS PTY. LTD.

51-53 MURRAY ST.
PYRMONT, SYDNEY. TELEPHONE: MW 2628

THE AUSTRALASIAN
RADIO WORLD

Devoted entirely to Technical Radio

and incorporating

ALL-WAVE ALL-WORLD DX NEWS

Vol. 14 **DECEMBER, 1948** **No. 7**

PUBLISHED BY THE PROPRIETOR—
A. G. HULL,
Balcombe St., Mornington, Vic.
Phone M'ton 344.

Technical Editor—
PAUL STEVENS
21 Fletcher's Av., Bondi, N.S.W.
Phone FW 6157.

Short-wave Editor—
L. J. KEAST
7 Fitzgerald Rd., Ermington, N.S.W.
Phone WL 1101.

Ham Notes by—
DON B. KNOCK (VK2NO)
43 Yanko Av., Waverley, N.S.W.

ADVERTISING REPRESENTATIVES—
In N.S.W.: Amalgamated Publications Pty. Ltd., 83 Pitt St., Sydney. Phone B 1077.

In Victoria: R. I. McKillop, Regency Advertising Contractors, 60 Market St., Melbourne. Phone M 1279.
REPRESENTATIVES
In Queensland: John Bristoe, Box 82, Maryborough, Q.

In New Zealand: H. Barnes & Co., 4 Boulcott Terrace, Wellington.

In England: Anglo Overseas Press Ltd., 168 Regent St., London, W1.

Distributed throughout the World by Gordon & Gotch (A/asia) Ltd.

SUBSCRIPTION RATES—
12 issues 10/6
24 issues £1
To N.Z. and Overseas:
12 issues 12/-
POST FREE

Address for all correspondence—
AUSTRALASIAN RADIO WORLD
Box 13, Mornington, Vic.

CONTENTS

EDITORIAL

In last month's issue I deplored the position into which F.M. has drifted. In response I have had a number of letters from amateur experimenters who want to know why the "hams" cannot be brought to the rescue.

Before broadcasting was either national or commercial it was the amateurs who first started sending out music.

Right up until just before the last war there were a number of amateur stations allowed to broadcast music and programmes after the ordinary stations closed down, and on Sunday mornings before they opened.

Why cannot amateurs be licensed to broadcast with F.M. as freely as possible? They would soon create their own audience and open up a big field for experimenting.

F.M. receivers and adaptors are not difficult to build or get going once you appreciate the special technique necessary. At first they seem a little critical but you soon get used to them. Several firms have F.M. adaptors and kits of parts ready for release, but who would want to be forced to listen to nothing but National programmes which are already being broadcast in the ordinary way?

Let the amateurs have a go at F.M. and I'll bet that within a few years there will be thousands upon thousands of F.M. sets in use, with quite a revival in the radio industry.

Such a plan will not cost the taxpayers a penny, either.

—A. G. HULL.

R.C.S. COILS WERE USED . . .

R.C.S. coils were used by the Technical Editor in the F.M. Tuner and the R. & H. ECONOMY FIVE featured in the November issue of Radio and Hobbies. If you want the same top-class results, follow the example of this expert, who uses R.C.S. components!

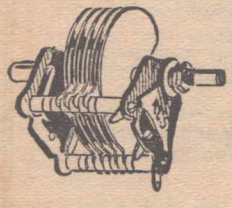
HERE'S THE KIT!

Identical Coil Kit for the Economy Five consisting of aerial, R.F., Oscillator, 2 I.F.'s and a padder. (Kit type No. K122. £2/11/- retail.

F.M. 10.7 MEG. INTERMEDIATE TRANSFORMER

Type No. IF180. Price . . . . . 13/- ea.
Wound on Polystyrene Formers, moisture proofed with high frequency lacquer. Can size 1⅜" dia. x 2½" High. 50 mmf silver mica condenser moulded in base necessary at these high frequencies.

MIDGET VARIABLE CONDENSERS



M.C. Type with Face and Back Supports.

Type	mmfd.	Plates	Price
CV41	10	2	7 3
CV42	15	3	7 9
CV43	25	4	8 4
CV44	35	5	9 0
CV45	50	7	9 6
CV46	70	9	10 0
CV47	100	14	11 3

F.M. DISCRIMINATOR TRANSFORMER RATIO DETECTOR

Type No. IF181. Price . . 17/6 ea.
Freq. 10.7 megs. Cap. 50 mmf. Wound on Polystyrene Formers, moisture proofed with High Frequency Lacquer. Can size 1⅜" dia. x 2½" High. 50 mmf silver mica Condenser moulded in base necessary at these high frequencies.

IF YOUR LOCAL DEALER CANNOT SUPPLY

write us and, whilst we cannot supply you direct, we will arrange for your retailer to receive supplies immediately or advise you where supplies can be obtained.

F.M. COILS 2/6 each

These coils are machine wound from No. 12 gauge copper wire heavily silver plated, and are accurately spaced to cover the F.M. band 88-110 M/C.

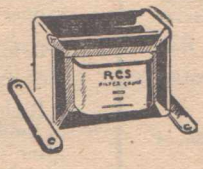
NEW STANDARD MOISTURE-PROOF INTERMEDIATES

455 K.C. I.F.'s—with shunt silver mica Condenser Moulded in Base.
IF170—1st IF171—2nd, 13/- ea. IF174 Low Gain, 13/- each.

NEW PERMEABILITY TUNED COILS

1. Wound on Polystyrene formers.
2. Engraved with number and letters for easy identification.
3. 7/41 2 pie litz High Q Secondary.
4. Extra High Impedance Primary.
5. Fitted in round shield 2" high x 1⅜" dia. with 2 mounting feet, ⅛" Whitworth thread.
6. The can being printed with all technical specifications, etc.
7. Polystyrene sealed coils.
8. Special sealing channel for iron core screw.
9. Cores adjustable from top of chassis

E356 Aerial
E357 R.F.
E358 Osc.
7/6 each retail.



VIBRATOR CHOKES

TC58 Low Tension 3 Amps 50 M/H .5 ohm D.C. Res. 15 0
TC70 High Tension 50 Henries 450 ohm D.C. Res. 75 M/A 15 0

FILTER CHOKES

TC60 100 M/A 30 Henries 250 ohms D.C. Res. 13 6
TC65 50 M/A 30 Henries 400 ohms D.C. Res. 13 6
TC39 125 M/A 30 Henries 13 6

RADIO FREQUENCY

RF81 Silk Honeycomb R.F 1 9
RF82 3 pie 1.7 M/H R.F 4 6
RF83 4 pie 2.5 M/H R.F 4 6
RF84 5 pie 4.0 M/H R.F 4 6
R.F. 85 6 pie 7.0 M/H R.F 4 6
RF86 Cotton Honeycomb R.F 1 6
RF106 Vibrator Low Tension R.F 3

R. C. S. RADIO PTY. LTD.

174 CANTERBURY ROAD, CANTERBURY, N.S.W.

FEATURE BY STEVENS

CAR-LECTRIC

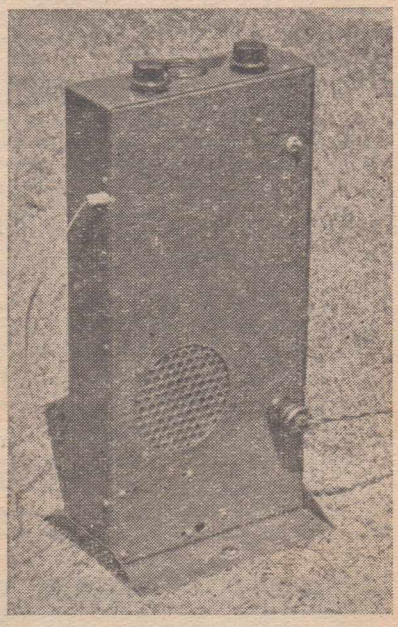
Here are the details of a handy receiver which operates equally well from either a 6-volt accumulator or the power mains. It can be used as a car radio or as a chairside set at home. Performance is exceptional, with such range and selectivity that over a hundred stations were played comfortably when the original receiver was tested at Mornington.

THE Car-lectric is a 6V.DC-240V.AC universal long range receiver of novel design, which can be quickly fitted into almost any type of car, while it makes an ideal chair side floor radio for hotel or home. With a current consumption of just on 3 amps, it can also be used in tent, caravan or picnic ground, being connected to the car battery by a long lead. As it takes less than one minute to fit or disconnect from the car, it can always be left behind if not required and is thus protected from the now very abundant car radio thefts, while at the same time providing entertainment for people at home.

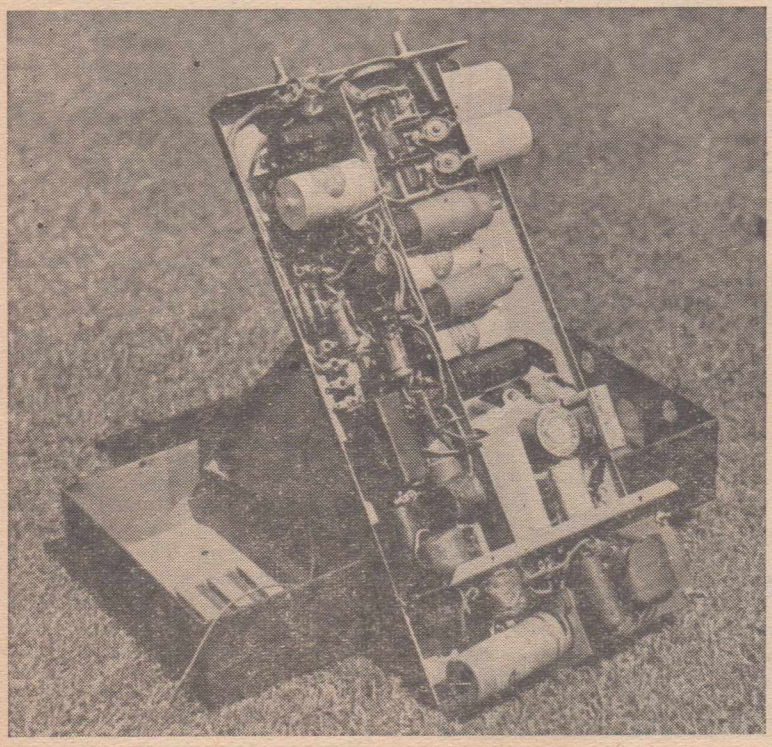
Outwardly the shape is radically different from the conventional car radio. It is oblong and flat as a board, intended to be mounted between bulkhead and dash board of the average car (fig 1). Its 2¾" x 8" front with dial and knobs protrudes from under the instrument board, being fitted to it by two rubber cushioned screws. More details of the mounting will be given later on.

When used outside the car it stands on a foot plate, upright, with dial and knobs on top and is thus ideally suited as a floor "consolettee" of about 16½" height. There is no switching necessary to convert from 240 to

(Continued on next page)



As a home set.



When the chassis is slipped out of the steel case it is easy to service with all components well laid out in accessible positions.

CAR-LECTRIC

(Continued)

6V, the mere fitting of a different cord does the trick.

The inside of the set is just as revolutionary as the ouside. There is none of the "compact" mounting of parts, which makes the standard car radio a service man's nightmare, no lavers of resistors and condensers making valve sockets inaccessible. You find there wide open spaces, "enough room for two rats and their families" as a friend of mine put it. Although the physical volume of the set is about equal to that of a small mantel model of 10" x 6½" x 5½", it contains a 5 valve reflex circuit plus all the necessary paraphernalia of a vibrator power supply and filters, while one side of the set is kept free for an FM adaptor of the Fre-Modyne type, which can be added later.

Fig. 2 shows the chassis lay out of the main parts. Chassis and cabinet are actually one intergral unit, most of the components being mounted on angle brackets welded to the bottom of the case. To achieve the flat shape of the receiver, valves and coils are in "laying down" position parallel to the bottom. The lay out is completely linear, starting with the RF stage at the front and ending up with the shielded power and vibrator, resulting in absolutely hash free operation without special precautions. This, apart from the ease of fitting the set into cars was the main consideration leading to the peculiar shape of the receiver.

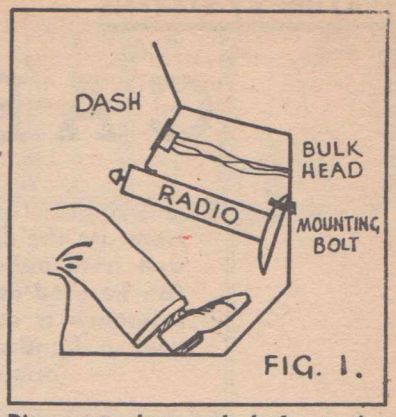
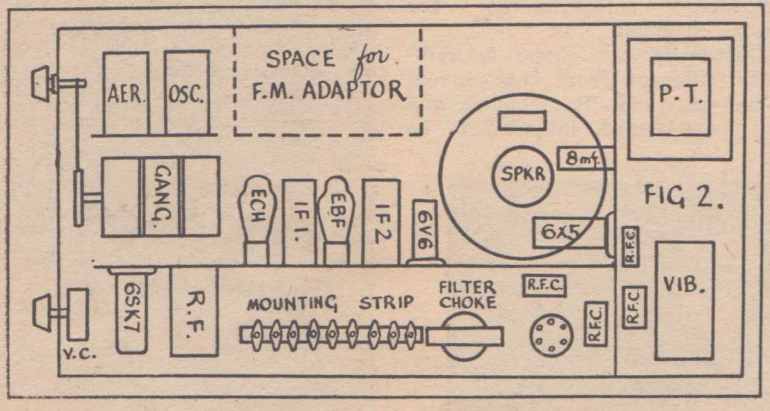
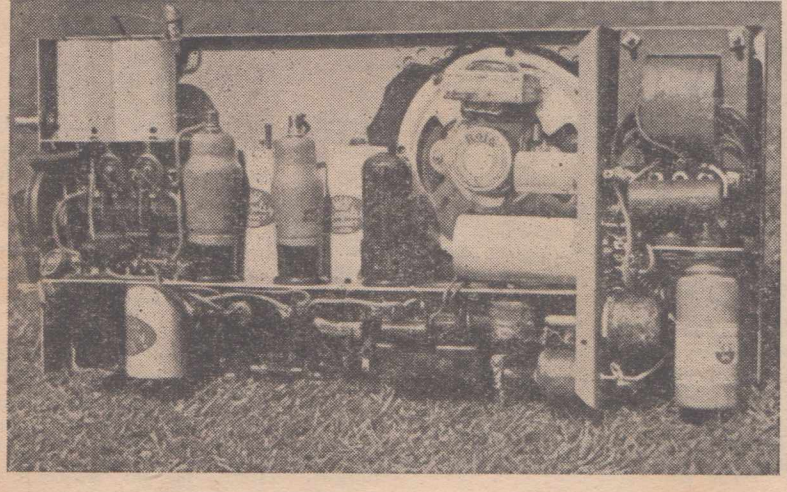


Diagram to show method of mounting in car.





By comparing this photograph with the diagram above you will be able to follow the rather unusual component layout.

The parts themselves have been purposely kept to standard size with the exception of the gang, as midget coils and IF's naturally are of inferior preformance and the necessity of saving more space did not arise. The only midget part is the 3 gang tuning condenser, which proved to be completely satisfactory under severe road tests. With the entire set floating in rubber, it is not subject to the sharpe vibrations suffered by other car radios, but merely to comparatively slow, harmless rocking which, in spite of the sharp selectivity, has never put the set in the least out of tune.

As for the many special parts of the Car-lectric, they are not available in the trade at present and probably will not be for a long time, if ever. Those who want to build the set need not despair; I will out if you will get in touch with me.

The 5" permag speaker is mounted in the bottom; (between power supply and tuner), which becomes the front when the set is used standing up. The lid of the case behind the speaker and on one side should be covered with felt to avoid boominess. Slots must be cut into the felt for the louvres.

The Circuit

Now to the circuit, which is shown in fig. 3. It is a 4 valve plus rectifier reflex affair, except

for the RF stage being very much like the Teleconda 2. It uses 175 KC IF for sufficient selectivity on long range reception. Full, undelayed AVC is supplied to the first two valves, while the reflex valve receives only ⅛ for reasons discussed later.

The aerial feeds into a special car radio input coil with low impedance primary. If an ordinary aerial coil was used, the losses due to the capacity of the shielded lead in wire would be excessive. Low impedance input however still does not allow the use of any standard braided hook-up wire as lead in, as is often done. The set run on 6ft. of ordinary wire as aerial should give the same long range reception as on an equal length of car radio aerial with shielded lead-in. If it does not, losses are due to capacity in the braided portion, and lower capacity material, such as coaxial cable, should be used.

An Improvement

To improve receiver response on the high frequency end of the dial, a 50 mmf condenser connects the aerial to a tapping of the grid coil. The RF valve is the 6SK7 metal type, which is the only pentode with less than 2⅜ in. height, being the maximum available space for it. A single ended peanut AC type will later replace it, as soon as it becomes available. The American 6SK7GT could also be used, as it is smaller than the Australian version. Although all other valve sockets in the set are of the Amphenol clip-in type, a Carr

(Continued on next page)

Parts list for the Car-Lectric

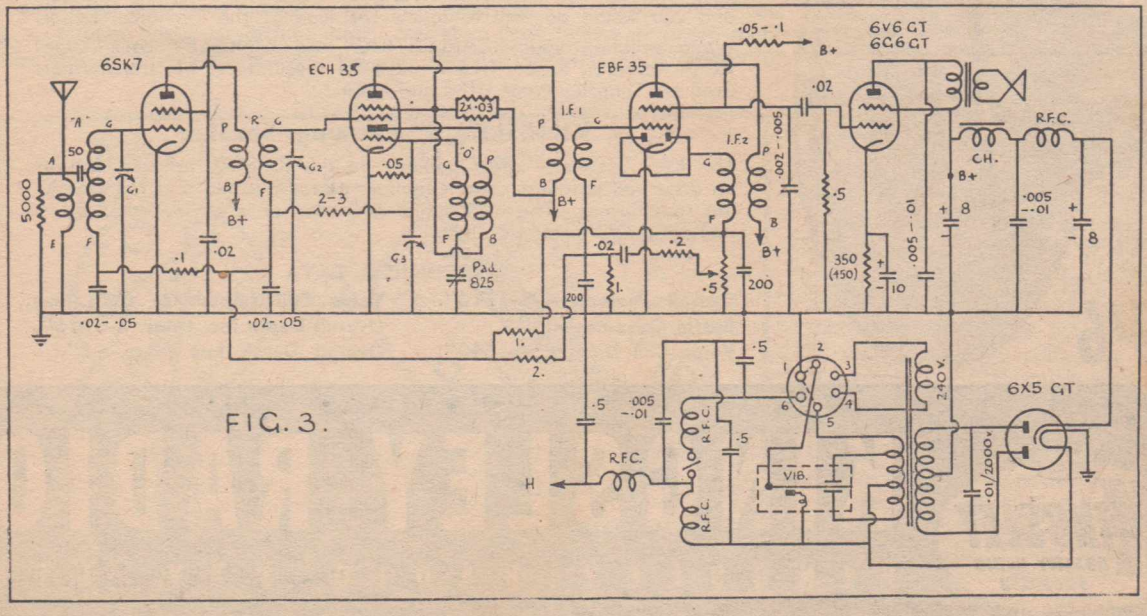
1—Spec. metal case.
1—5" speaker.
1—Spec. power transformer.
1—Non-synch. vibrator cartridge.
1—Filter choke.
3—L.T. RF chokes.
1—HT RF choke.
1—3 gang condenser.
3—Coils (car aerial, RF, osc.).
2—IF transformers 175KC.
1—.5 v.c. with switch.
3—Trimmers.
5—Octal sockets.
1—4 pin socket.
1—6 pin socket, male type.
2—6 pin socket with cover, female.
1—Dial with light and knobs.
1—10 lug fishbone strip.

CONDENSERS:
3—.5 MF.
5—.02.
4—.005.
1—.01/2000.
2—200 mmf.
1—50 mmf.
1—825 mmf (padder).
3—Electrolytics 8MF (one pig tail, one chassis mounting type).
1—Electrolytic 10 MF, low voltage.

RESISTORS:
2—2 Meg.
2—1 Meg.
1—.5 Meg.
2—.2 Meg.
2—.05 Meg.
2—.03 Meg.
1—5000 ohm.
1—350 (450) ohm.

VALVES:
1—6SK7.
1—ECH33.
1—EBF35.
1—6V6GT (6G6G).
1—6X5GT.

SUNDRIES:
Shield for 6X5, nuts bolts, rubber grommets, hook up wire, bus bar, braided twin wire, lugs 3 core flex, heavy shielded wire, bayonet aerial terminal, fuse holder with 10 amp fuse (extra) grid clips.



The circuit, which is also ideally suited for use by those wanting a long-range vibrator-powered set for country use.

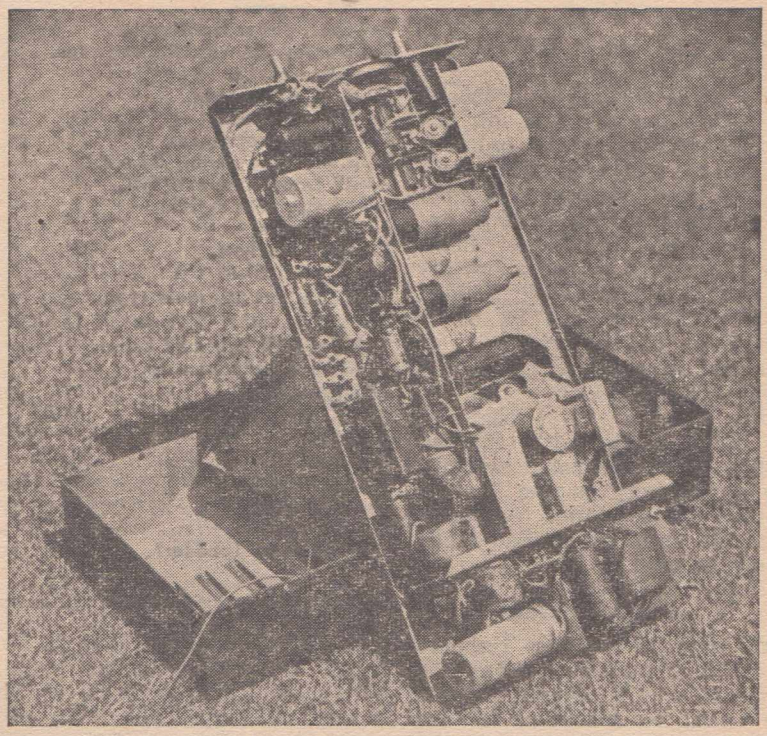
THIS *MUST* BE A GOOD SET!

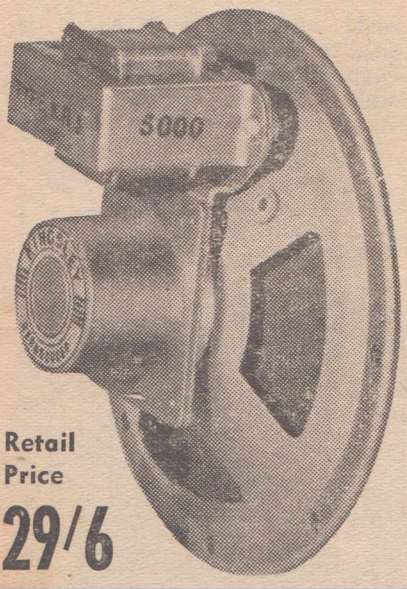
The "CARLECTRIC" Combination Car and Chairside Radio

When Mr. Paul Stevens, Technical Editor of this journal, designed the "Carlectric" receiver (described in this issue) he left nothing to chance—he

chose and specifies
KINGSLEY COILS
and
KINGSLEY I.F.'s

from the extensive range of Kingsley coils and I.F. Transformers, to give him the best results.





Retail Price
29/6

Look closely at the above picture

You will see the well-known Kingsley trade mark on the products and you would do well to follow the lead of the Technical Editor.

When building your "CARLECTRIC" use KINGSLEY coils—types KC14 (aerial); KC2A (R.F.) and KC8 (oscillator). I.F. transformers used are Kingsley types KIF2 and KIF4.

KINGSLEY 5" Per-mag. Speaker

The KR5 Speaker—latest addition to the Kingsley range—features an improved seamless cone, cadmium plated housing and full matching transformer. The imported British magnet is of "Alcomax 2"—highest grade magnetic alloy.

TECHNICAL DATA

Overall Diameter—5-1/16".
Baffle Opening—4¼".
Voice Coil Diameter—.640".
Voice Coil Impedance 2.5 ohms
Overall Depth inc. trans. 2-3/16".
Overall Depth less trans.—2".

KINGSLEY QUALITY RADIO PRODUCTS

KINGSLEY RADIO

KINGSLEY RADIO PTY. LTD.

380 St. Kilda Road, Melbourne, Victoria . Phones: MX 1159, MX 3653

CAR-LECTRIC

(Continued)

Fastener socket had to be used for the RF valve to save space. The springs in these sockets are not very strong and to prevent the valve from gradually working loose and falling out, a rubber buffer is stuck with rubber cement to the inside of the lid, so that in assembled condition it will just clear the valve top.

Dial Tracking

The Roblan gang condenser used has a max. capacity of 370 mmf, which is about 50 mmf less than the H-gang. It will however track with the H-dial, as it has the same shape of plates. The RF coils, also an H-type, tracks preas there are made for the lower capacity F-gang and therefore have higher inductance. H-coils will only track, if stations on the low frequency end of the dial are made to tune slightly below their proper markings. The oscillator coils however should be F types, as these are made for the lower coil, also an H-type, tracks perfectly.

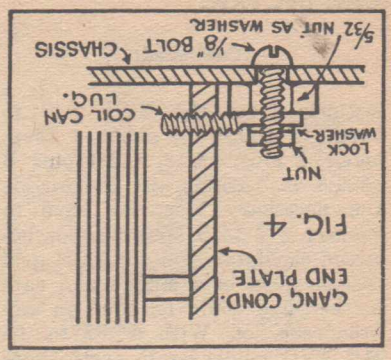
For current saving and stability reasons, the set is working with a maximum B-voltage of around 150 volts, 70 V being the screen and oscillator plate voltages. Under these conditions and with the grid condenser left out, the oscillator grid current of the ECH33 converter is exactly .2 mA, as it should be. This means a voltage of 10 V across the usual 50,000 ohm resistor, which will be of great importance to us later.

The Padder

A fixed padder of 825 to 840 mmf is used in conjunction with the 175kC/s oscillator coil. The 2 IF transformers are both Permaclad types of terrific selectivity and gain. With both iron cores on the outer setting, the tuning is that sharp, that broadcasting stations become as hard to tune as short waves, and high notes are badly attenuated. It is therefore necessary to screw one of the cores on both IF's right through to the inner setting, increasing the coupling, and broadening the band.

Off-tuning Alignment

After the IF alignment is finished, the iron cores on both IFs in the outer setting should be screwed in about ¼ of a turn or less, which slight detuning further broadens the band. The nett result is a sort of flat top, with quite good high note response, but selectivity still sharp enough to separate stations 10 kC/s apart. Tests on a bumpy road showed that there was no difficulty in tuning in stations exactly. Our set, whether used in car or hotel room is chiefly intended as a travelling receiver, therefore has to have distance getting ability, which is only of any use in conjunction with good selectivity. Both is provided by 175 kC/s IF and results with 450 kC/s are very poor in comparison; one reason, why the low IF is so extensively used in car radios.

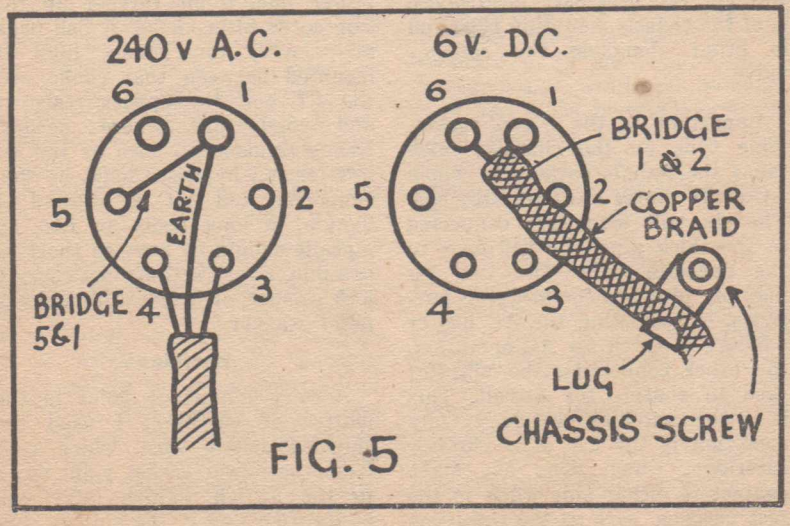


Gang mounting detail.

Reflex Arrangement

An EBF35 is used as a reflex valve. As in other Teleconda receivers the audio voltage is again taken off the screen, leaving the plate on full voltage and using the screen resistor as audio load. This reduces minimum volume effect and distortion, improves the voltage handling capability of the valve and makes audio hum filtering unnecessary. The volume control acts as diode load and audio frequencies are fed back to the grid return of the EBF via a .02 blocking condenser and .2 filter resister. The AVC and bias arrangement for the first three valves is quite unorthodox and warrants special discussion:

As can be seen, none of the first three valves has a cathode bias resistor, nor is there any back bias arrangement in the set. However a bias of 2 to 3 volts has to be provided for RF valve and converter, while the EBF gets away with less. Well, the only negative voltage in the set is at the oscillator grid, just on minus ten volts. Of this we want about ⅓ to ¼, being 3 to 2.5V. Our AVC network consists of the .5 Meg diode load, a 1 Meg resistor from there to the ECH33 grid return, thence 2 Meg to the EBF grid and from there 1 Meg to chassis. The total re-



Power plug wiring arrangement.

(Continued)

sistance from the ECH grid to earth is therefore about 1 Meg, being: 2 plus 1 = 3, and 1 plus .5 = 1.5 in parallel. So to provide the necessary bias, we have to connect a 2 to 3 Meg resistor between oscillator grid and ECH grid return. This is a simple and safe method and could be done on any broadcast set. With a .02 to .05 MF AVC condenser to earth there is no filtering necessary.

The EBF grid, being electrically at the junction of a 2 Meg resistor from AVC and a 1 Meg to earth, gets only ⅓ of both bias and AVC. Originally the Teleconda 4841 (Oct., 1948) AVC circuit was used, with the volume control in the output grid and the EBF getting full AVC all the time. But it was found, that on soft modulation the maximum volume was insufficient for the noise level in a motor car under bad conditions. So AVC at the EBF was cut back, which involved the addition of two resistors and one condenser, but was unavoidable. The result is very loud volume, if required, and still pretty good AVC action.

Output Valve

The output valve in this particular set is the 6V6GT, but by using the 6G6G we could save about .3 amps battery drain. The bias resistor in this case would have to be increased to 450 to 500 ohms, gain and output would be about the same. However the supply position of the 6G6G is uncertain, being an imported valve; but I am going to use it whenever available.

Power Supply

The power supply is the problem child of every car radio design, the problem being to keep the vibrator hash out of the RF. To achieve this, both vibrator cartridge and transformer have to be in a separate all enclosed compartment. Further precautions are: RF chokes with the necessary bypass in both high and low tension leads leaving the compartment, also in the main power lead to prevent radiation from there to the aerial and in the heater circuit for the same reason. This may seem a lot but it is not much compared with the precautions that have to be observed for other car sets of the "compact" variety. Insulate the entire vibrator box from the rest of the set and connect it only on one point to chassis; do the same with the gang condenser; and return all bypass condensers to the same earthing point, etc. etc. All these extra precautions are not necessary in our case, maybe I could even omit a few of the present ones without causing any harm.

The power supply itself uses a non sycnhronous type of vibrator in conjunction with a 6X5 rectifier, which sticks out of the compartment below the speaker and is shielded by an IF can. The cartridge itself is mounted on rubber and is prevented from falling out by a felt pad on the lid next to its top, which keeps the cartridge in its 4 pin socket. The transformer is a special type for vibrator or 240 AC operation, which uses half of the extended vibrator winding as 6.3V heater winding on AC. The only other components in the enclosure are the low and high tension choke plus bypass condensers and the .01 buffer condenser, which must be of 2,000V working as it lies across double high tension voltage. The first 8MF electrolytic is of the chassis mounting type and is fitted alongside the rectifier valve.

Important is the 6 pin socket, male type on the chassis which takes the female sockets to which AC or 6V power lines are attached. The six volt leads are connected to the thick pins, the 240 ones to the opposite pair. The two remaining pins are for bridging purposes, one shorting the AC heater winding to earth for AC operation, the other connecting the vibrator reed to chassis for 6 volt. This is all the switching necessary. Only condition is the use of a vibrator cartridge, which does not make contact to either side when in the rest position, such as the Oak type used.

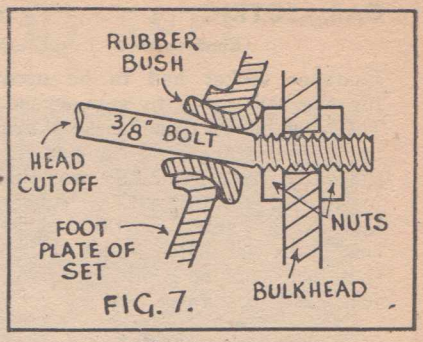


FIG. 7.

The Layout

The bypass condensers of the low tension chokes must all be connected to the same point at the chassis, which in our case, is a lug at the edge of the partition.

The position of the various parts is shown on the wiring diagram. Starting again at the RF end we find the gang condenser in the middle, which is tightened down to the chassis by means of two coil can screw lugs as shown in Fig. 4. The bracket to the left carries the RF and oscillator coils, the one on the right RF valve and coil. The middle section of the gang condenser is used for the oscillator. All other valves and IFs are mounted on the long bracket extending down to the partition. Right at the end near the power supply box we find the low tension chokes for heater and power line, a bit further up the iron cored filter choke. A fish bone strip with ten solder lugs is mounted between that choke and the RF coil to support resistors and condensers where needed. Heavy condensers, such as the 3.5 low tension bypasses must be well supported and not be allowed to dangle on long leads, in fact all pigtails should be kept as short as possible. Every screw must carry a lock washer, or better still, a shake proof washer.

Earthing

A very important point is the matter of earthing. I used the shielded double wire, which runs from the power socket right down to the switch (which later will be incorporated in the volume control) as main earth, soldering it

to the chassis on 2 or three spots. Earthing points for the tuner valves should be connected together with 18 gauge busbar and bypass condensers connected to it. Never rely on the chassis for conduction except for the earth return of resistors. The .002 screen bypass of the EBF35, for instance, was at first connected to the edge of the bracket at the same point as the grid condenser of the 6V6; the set was hopelessly unstable until I earthed the screen condenser at the EFB itself, then everything was ok. Also don't forget to run your earth wire over to the Aerial-oscillator coil bracket, soldering it to the gang frame on the way. There is a .5mF heater bypass tucked away under the RF coil; earth it to the same point as the heaters of the tuner valves.

Bridging of Plug

As important as the wiring of the set itself is the proper bridging of the connector cord plugs. Fig. 5 shows the details of these plugs, which are actually amphenol 6 pin valve sockets with covers. The 240 voltflex, which, according to regulation for metal radios, must be 3 core, is connected to pins 3 and 4, the earth wire going to the chassis connected pin 1. A bridge between pins 1 and 5 puts the AC heater winding to earth. At the same time the vibrator earth return on pin 2 remains disconnected, thus putting the cartridge out of action.

For connection as car radio serves a single, copper braided cord, the braid being the earth connection of the otherwise rubber insulated receiver. The braid is soldered to contacts 1 and 2, thus forming the earth bridge for the vibrator, while the core goes to 6, the hot A terminal. The braid, which is also soldered to the metal plug cover, carries an open solder lug, which fits under a thumb screw at the side of the set. This is very important and serves two purposes: Firstly it prevents the plug from falling out eventually due to vibration, and secondly it forms another earth connection, which completely eliminates vibrator hash, still apparent between stations without this extra precaution. The thumb screw takes the place of one of the self tapping screws holding the lid to the base.

The Dial

Now a few words about the dial: contrary to the usual style, it is of the revolving type, with the pointer standing still. The celluloid face is stuck to the EFCO MK17 dial drum, which revolves behind a winged escutcheon usually intended for "magic eye" tuning indicators. The escutcheon carries a transparent celluloid with a vertical pointer line. With a total height of only 2¾" for the front of the set, this escutcheon was the only available one of small enough dimensions and at the same time looks very attractive. Unfortunately it has a rather deep collar extending inwards and intended to hold the top of the magic eye in place. This has to be cut off to about $\frac{1}{16}$-in., which is flat with the inside of the lid, where the celluloid with the pointer line is stuck on. The drive is the usual cord and spring affair, with this particular make only friction holding the spring in place on the dial drum. This may cause gradual slipping with the spring finally catching on the small driving spindle and thus blocking tuning, at least in one direction. It is therefore a good idea to tie one end of the cord, after connecting it to the spring, around the screw holding the drum to the shaft, which effectively limits spring slipping to a very short range. As the dial drum is made for the standard gang shaft of ⅜-in., a commercially available reducing bush has to be inserted to fit the ¼-in. shaft of the Roblan gang. The dial lamp clips with a special holder onto one of the side brackets near the gang.

Alignment Details

Alignment of the receiver warrants a more detailed description: An oscillator is needed to set the 175 kC/s IF/s to the correct frequency. This should be done by clipping the terminals onto converter grid and chassis, with the grid cap removed to disconnect the tuning circuit. As the output of oscillators is usually DC blocked

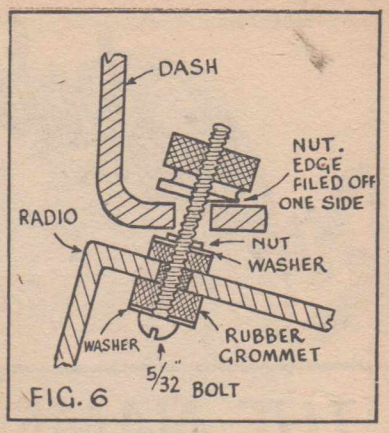


FIG. 6

by a condenser, a one Meg resister must be inserted between grid cap (connected to the AVC line via the tuning coil) and the converter grid, where it can be easily held in place by the alligator clip of the oscillator terminal. The alignment should then be done with one core of each transformer on the inner setting, as mentioned before, and, after the peaking is finished, the outer cores of both IF/s should be screwed in about ⅛ to ¼ turn to broaden the top.

The next step is to track the oscillator section to the stations on the dial, then peak both RF and earial section trimmers on a station around 1300 kC/s. When tuning the coil slugs to peak stations at the low frequency end of the dial, we may find, that they screw right into the coil without reaching a maximum. This will especially apply to the car aerial coil, which is only available for H gang, while the F-gang RF coil will just peak. The only remedy is to shift stations below 700 kC/s slightly below their markings on the dial, do the same with stations on the high frequency end, then set the dial right on the condenser shaft and tracking should now be perfectly o.k.

Slug Adjustment

When aligning the RF and aerial coil slugs beware of a bogus peak, which will occur, when the slug, after passing the maximum position in the centre of the coil will

(Continued on next page)

CAR-LECTRIC

(Continued)

start screwing out the other side (like the inner setting of our IF transformers). When a "peak" is reached by screwing in the iron cores, but tightening of the trimmer gives further improvement, the maximum inductance of the coil is too small and extra capacity has to be provided by putting the gang further in mesh, in other words shifting the stations down the dial, as described before.

Due to the very efficient AVC action there is, of course, no hope of properly aligning the coils by ear. A tuning indicator, far simpler than a V.T.V.M. on the AVC line, or an output meter, is a voltmeter between screens of the first two valves and earth. The screen voltage, obtained by a dropping resistor, will be strongly influenced by AVC, the peak being indicated by maximum meter deflection.

Alignment should be done with a 6ft. wire connected to the bayonet type aerial terminal soldered to the chassis below the oscillator oo il. A .00005 mf (50 mmf) should be temporarily connected between aerial and chassis to simulate the capacity of the shielded aerial lead-in of the car.

Installation

The radio is fitted into the car by rubber cushioned 3 point suspension. Gang condenser mounting grommets in 2⅜-in. holes near the front of the set take the $\frac{5}{32}$-in. metal thread screws, which hold the receiver against the bent over bottom rim of the instrument board. The heads of the screws are on the inside, while the nuts on the outside must not be tight. Large washers are on either side of the rubber block. (fig. 6.) The bolts fit through holes drilled into the bottom of the dash or a suitable bracket and are held in by knurled or wing nuts, which are only finger tight. To prevent them from working loose, their bottom has been filed off at a slant, so that the oblique fitting screw will automatically hold the nut in position. This can best be understood by carefully looking at fig. 6.

This Car-lectric receiver was designed and described by PAUL STEVENS, of 21 Fletchers Avenue, Bondi, N.S.W., who will be pleased to handle all enquiries about it. Queries should be addressed direct to Mr. Stevens at this address.

An extruded ⅝-in. hole in the footplate of the set carries the dial lamp rubber grommet, which serves as back support for our set. It can be used in various ways. I did it as shown in fig. 7: A headless ⅜-in. bolt was firmly held by two nuts in a hole in the bulkhead and the rubber grommet simply slipped over the unthreaded shaft of the bolt, which thus supports the rear portion of the set.

There are of course a variety of mounting methods, according to the design of the car and the ingenuity of the user. Generally spoken, the set can be fitted in the described position into any car with 16-in. or more distance between bulkhead and dash, which is the vast majority. Some small cars have separate front seats and as long as they are 2¾ or more inches apart, the set can find its place there, standing on its 4 soft-rubber cushioned feet.

Avoiding Noise

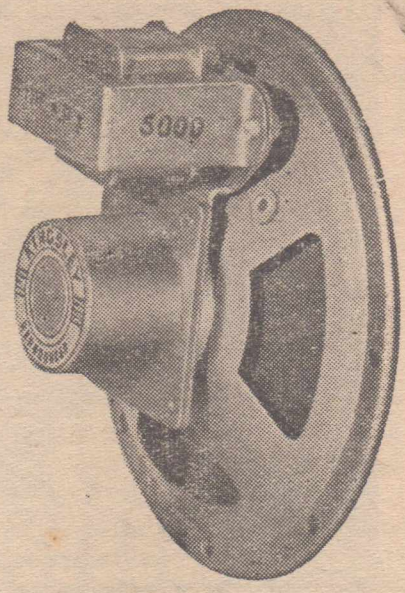
The earthing point of the set was found to be rather critical from the ignitions noise point of view. With the hot end of the battery lead connected up via a fuse to the ammeter terminal, I held the braiding against various earthed points, till I found a certain spot on the bulkhead, which almost completely suppressed ignition interference even between stations and volume full on! During these tests the earthing of the aerial lead-in shield on both car and set closed the battery circuit and kept the set going. I

do not want to claim, that by finding the right earthing spot all ignition, generator and other noises can be stopped on any car, but it was the case with my little Ford Prefect, which does not need suppressors anywhere for completely quiet operation. There are however two little tricks in my circuit, which may have helped a great deal to achieve the desired result: The first is a 5000 ohm resistor in the set between aerial and earth. This seems to dampen out the shock exitation of the input circuit through the ultra short ignition waves, while not harming sensitivity to legitimate signals. The other is a commercially available ignition suppressor, consisting of 10 turns of enamel wire on a ⅜ in. former in a metal can, wired into the aerial lead in. Then there is something else too, but you have to find that out for yourself; it is right in the circuit.

★

Another speaker which is suitable for Car-lectric is this Kingsley speaker, Model KR5, a permagnetic type, with bright cadmium plating finish, listing at 29/6 retail.

★



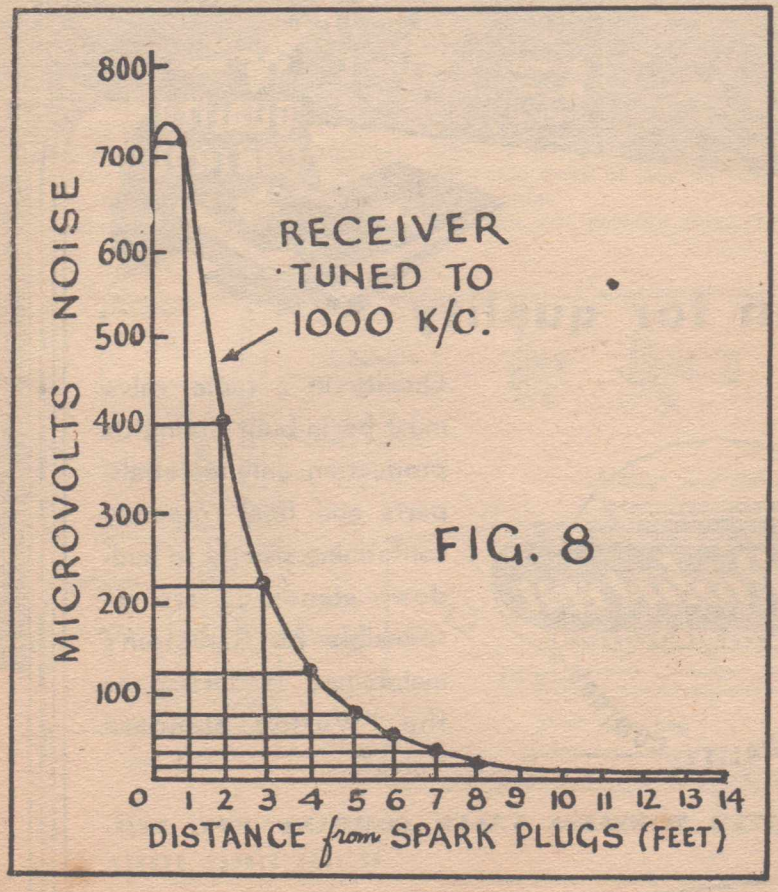
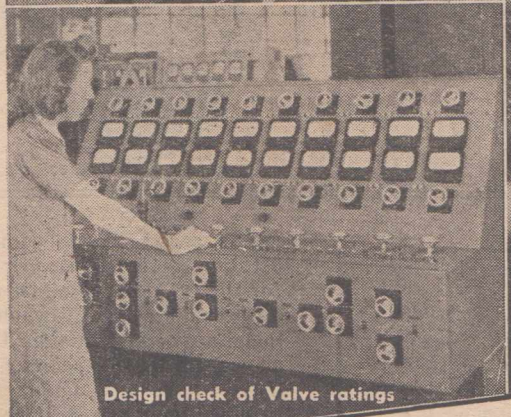


FIG. 8

The aerial I was using was a 5ft. two section telescopic type, but for the sake of valve hiss reduction on weak stations I would recommend a 6 or 8ft. version. The graph shown in fig 8 speaks for itself, if you have any doubts of where to place your aerial. It shows, how rapidly interference noise decreases with distance in a matter of a few feet. In a noisy car the logical place for the aerial is the rear bumper, but the now rather long lead-in wire has to be of very low capacity, such as coaxial cable, to keep losses to a minimum.

Much has already been written about "delousing" motor cars by car radio specialists, who know all the tricks of noise suppression. To them I refer you for further information on this subject, if you strike trouble. I am no particular authority there.

Valve examination and test



Design check of Valve ratings

Branding, Packing and Sealing

Design for quality

AWV Radiotron VALVES MADE IN AUSTRALIA
COMPLETE QUALITY CONTROL

Quality in a radio valve must be in-built during its production; only materials, parts and final assembly conforming strictly to laid-down standards, are responsible for Radiotron's maintained leadership as the "World's standard Valve".

AMALGAMATED WIRELESS VALVE COMPANY PTY. LTD.
47 YORK STREET, SYDNEY.

DIALS AND CABINETS

An article in the August issue covered the actual construction and assembly of a dial to suit the set. This article has been acclaimed by a large number of readers and in response to many requests here is a further article from the same author in which he tells of his home-made dials and cabinets, the construction of which is not beyond the scope of the average handyman.

By

W. S. LONDEY

8a Barkly Street

Sale, Vic.

THE radio dial, being the only part of a set visible outside should not be merely the first type that comes to hand, but should be selected or designed to blend satisfactorily into the cabinet front. It should not be too large or too small, it should be legible, visible from a comfortable position, and, last but not least, it should be accurate.

Manufactured dials are available in a good range of sizes and types for the larger sets. The small set constructor is at a disadvantage, however, firstly because very few small dials are available, and secondly any packaged dial must, of necessity occupy more space than one made more or less as part of the chassis.

I have, for several years, been building sets and, in nearly every case in the last few years, I have built the cabinet and dial to suit. In consequence I thought a few ideas might be acceptable to readers of Radio World. Most of these have been tried out and used, but some I offer as suggestions.

If one is prepared to take some pains to design and build the cabinet and dial for a set there should be no need for fear that the work will be too difficult as the cabinet work is all of a simple nature and

(Continued on next page)

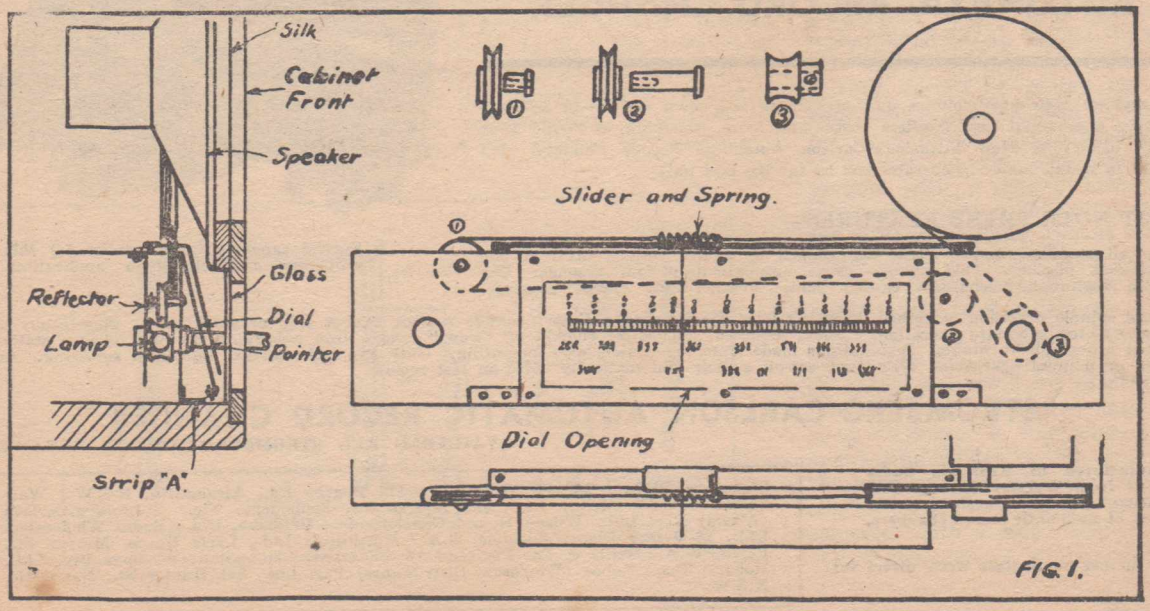


FIG. 1.

DIALS

(Continued)

no special veneering or the like is necessary. The possibilities of cabinet form and dial type are almost limitless.

A very effective arrangement for a small set is to have a narrow strip dial under the speaker. This is neater, being symmetrical, and occupies less space than a dial alongside the speaker. The central placement of one speaker is particularly important if an attempt is made to keep the valves to the rear to reduce heating. In this case, the power transformer must be near the front of the chassis and is best set to one side with the speaker to the centre.

Fig. 1 shows an arrangement I have used several times with success. The front of the chassis is cut out for about 4½-in. to about ⅜-in. from the top. The bottom edge is stiffened by a channel shaped strip "A" which, in addition to stiffening the chassis, provides an effective fixing for the bottom edge of the dial card. The channel is ½-in. to ⅝-in. wide so that the lower edge of the dial card is about ⅝-in. forward. Two pulleys are required, one at the end of the slider strip, inserted in a cut out opening in the chassis top, and the other on a short shaft near the knob shaft. This second pulley is necessary to keep the cord clear of the dial lamps. The pointer is carried on a slider made of sheet metal running on a ¼ x $\frac{1}{16}$-in. steel strip spaced clear of the chassis top along the front edge. An alternative arrangement is to use two parallel ⅛-in. diameter rods in place of the flat slider bar. The dial lamp or lamps are mounted on a white painted reflector fixed about ½-in. behind the chassis front.

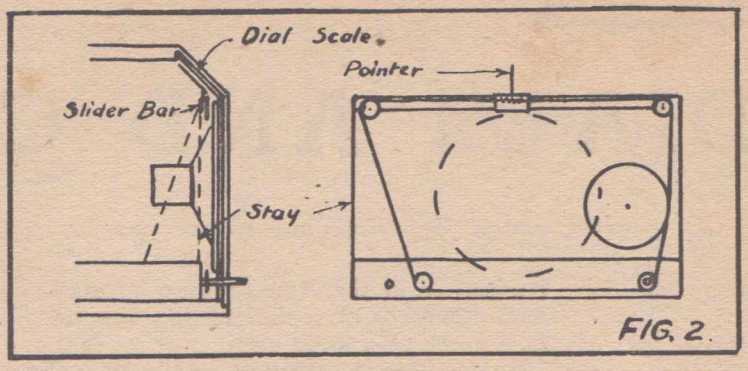


FIG. 2.

The Dial Card

The dial card itself is made by marking the principal frequencies using a service oscillator, subdividing the spaces between them and then marking the principal stations. Usually only a few easily received stations need be shown as the dial area is quite small and should not be crowded with a mass of call signs. A suitable layout is shown in the sketch, kilocycle scale on top and two rows of call signs below. Narrow dials may only have room for one row of call signs. The lettering should be done on good quality drawing paper—poor paper is yellow and does not take a clean ink line—using indian ink, and when completed the whole should be cemented to a celluloid sheet (.015-in. to .020-in. thick). To do this wet the front of the paper with amyl acetate or duco thinners and quickly press the celluloid in place—working from one end to the other. It might be a good idea to experiment with a spare piece first. This gives a stiff translucent dial having black lettering on a white ground and a glazed finish.

Using Photo Paper

If white lettering on a black ground is desired to draw the dial with indian ink on tracing paper and make a photographc print using heavy weight glossy paper. This paper would not require a celluloid sheet over it but its transparency may be improved by lacquering the back. As a variation, a blue print could be made or obtained for a few pence from one of the firms doing this work (use a tracing as above) and this could be cemented to celluloid as in the first type.

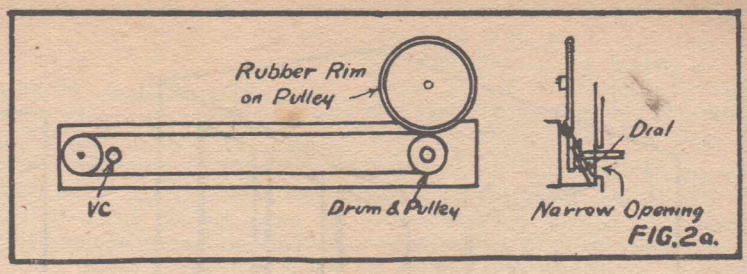


FIG. 2a.

The dial sheet is cut to size and rivetted to the front edge of the stiffening channel at the bottom and the top edge bolted to the strip left along the top of the opening. (The strip should be bent outwards slightly to keep the sheet flat.) I have found small eyelets make the best rivets for dial work. This sloping dial is not only easier to read—the rows of call signs can be read easily from a standing position with the set on a table—but it allows the speaker to be brought lower in the cabinet, thus decreasing the overall height of the set. If it is preferred to have the pointer behind the scale a description of this type of construction was given in the article on the "Bedside Five" in Radio World, August, 1948.

With a little ingenuity it should not be very difficult to arrange the dial along the top edge of the cabinet above the speaker, instead of below it. In this case it would be simpler, although not essential, to have the pointer behind the dial scale as the latter could then be fixed in the cabinet and would not interfere with the removal of the chassis and dial movement. Fig. 2 shows a possible arrangement. The slider bar, which runs the full length of the chassis, is supported by two brackets and carries the upper pulleys in addition to the slider. The cord from the knob shaft runs across the front of the chassis to a pulley near the volume control before going up the side of the speaker to one of the upper guide pulleys. By fitting the volume control outside the chassis in front—use a small bracket—and setting the speaker low in the cabinet the maximum possible use can be made of the space in front of the chassis. At the same time the amount to be cut out to clear the speaker is reduced or eliminated. The dial lamp could be mounted on any convenient part of the set on a small bracket.

For a Midget

For the very small set using a midget type tuning condenser a suggestion which may be worth trying is shown in fig. 2a. In this case the pointer is not driven by a cord from the pulley on the gang shaft, but the cord is operated by a friction drive consisting of a drum on the knob shaft in contact with a pulley having a rubber rim. The rubber rings used for fruit preserving (small sizes) would probably work well in this service. This arrangement uses small parts and a simple drive but may have a tendency to get out of line due to slip. This would be easily corrected by turning in the appropriate direction until the gang condenser is fully closed (or open). The condenser will stop and the knob spindle, with the pointer, can be turned on until the pointer coincides with a stop mark at the end of the scale. A similar method

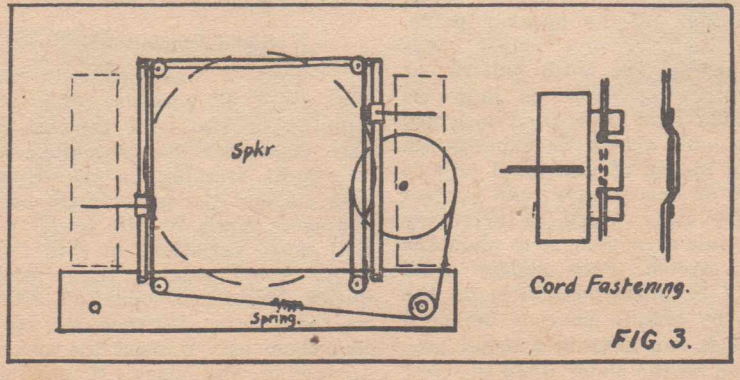


FIG 3.

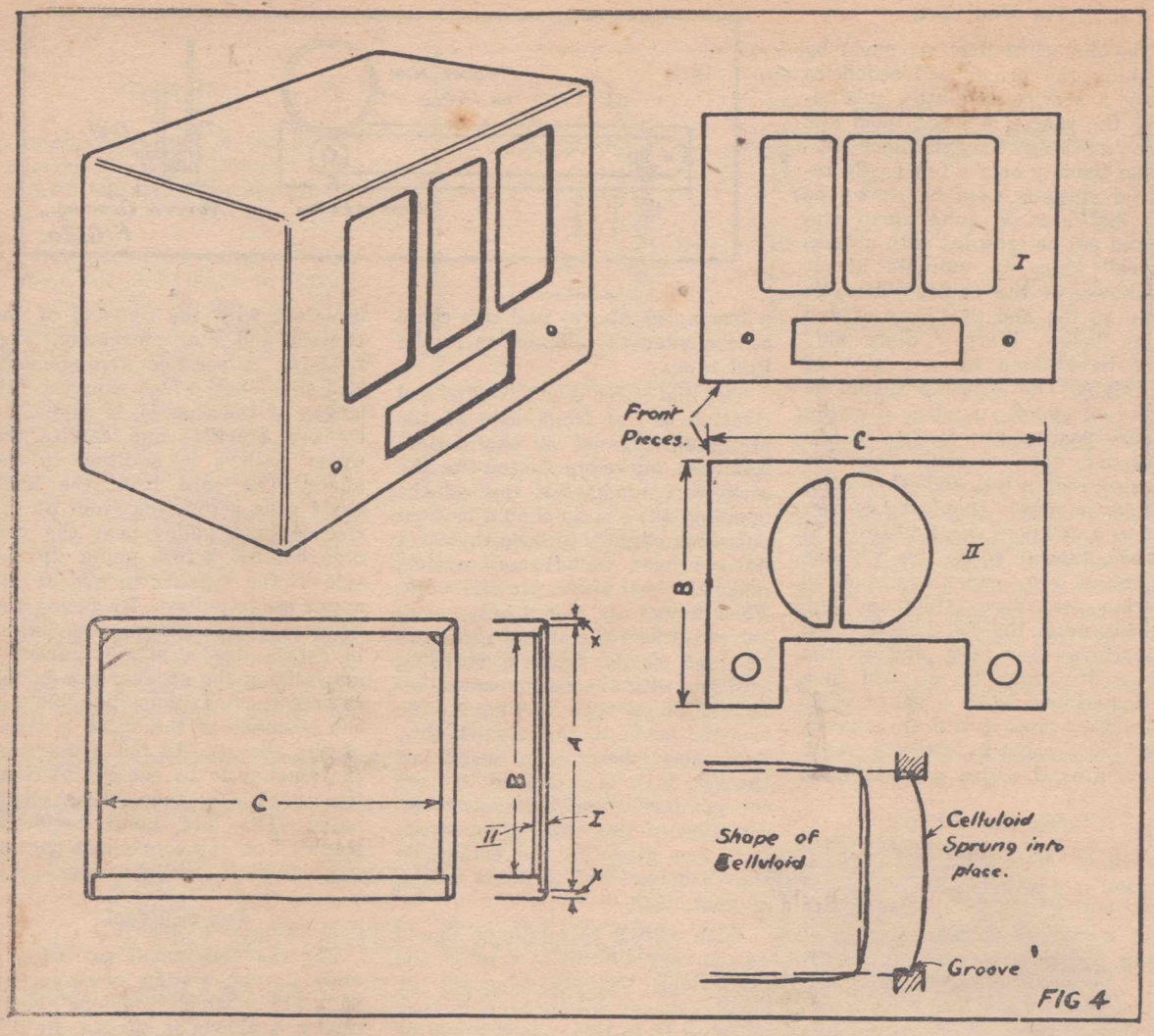


FIG 4

DIALS

(Continued)

of correction is used on some makes of auto. radios. A better drive would be obtained if one of the all metal friction drives used in some small radios a few years ago could be procured. These would have less thrust than the rubber drive.

A Vertical Strip

If it is desired to have the dial alongside the speaker either a commercial unit having a 180° movement or a vertical strip dial could be used. To make a vertical strip dial the slider bar is placed vertically with a guide pulley at the top. A symmetrical arrangement which would give an unusual cabinet front could be obtained by making two vertical dials, one on each side of the speaker grille. This would involve longer cords and one or two extra pulleys but if these are made as large as possible and have good bearings no trouble should be experienced. Some means of individual adjustment of one pointer with respect to the other would be necessary with this arrangement to allow for cord stretch. Both sliders could easily be made adjustable on the cord by simply passing the cord through two slots in a metal projection on the slider when the cord tension will effectively lock it to the slider. This arrangement of dial would be effective on a dual-wave receiver. It could allow the use of a large speaker in a small set.

Some Precautions

A word of warning about the dial drum. If possible make the drum with two cord grooves as this eliminates the possibility of the cords crossing on the drum, and see that the grooves are both the same depth. Failure to do this will cause variations in cord tension. Avoid placing the tension spring inside the condenser drum as the friction between the cord and drum may prevent the spring taking in any slack. If possible

use a short, fairly direct cord from drum to slider, and place the spring somewhere in the remaining cord. One or two turns round the knob spindle pulley will give a good drive but this pulley must have either a broad face or a hollowed groove. For the cord good fishing line is satisfactory, but woven metal cord if obtainable could be used from the drum to the pointer. (Not round the knob pulley.) Dial lamps of any type can be used but I have found bayonet based lamps best. The screw type tend to loosen with vibration. Either six volt car type lamps or bayonet type pilot lamps can be used for larger sets but the small bayonet type 6v. pilot lamps are the only ones for small sets. Suitable sockets are available, or the female part of a connector can be used with a screw or lug soldered on to fix it.

CABINETS. Modern practice seems to be tending towards the elimination of dial escutcheons as separate and visible items. This makes the task easier for the home cabinet builder. The cabinet front is left with an opening of the correct size and a glass or celluloid sheet is clamped behind this. Glass has the advantage over celluloid that it only needs to be clamped in two or three places to be secure, while celluloid must be clamped all round to prevent rattles.

A suitable cabinet construction is shown in fig. 4. The main frame is simply a rectangular box made of about ⅝-in. timber. The front edges are rebated to take the plywood front. This is formed of two pieces of ⅜-in. plywood or masonite—the front piece figured if desired. (or if obtainable) Heavier ply could be used with advantage, particularly for the rear piece.

The front piece of plywood—marked I in the sketch—should be cut to give the desired appearance—the grille form in the sketch is an example, and fitted into the rebated opening in the cabinet frame. The cabinet should be polished before the speaker baffle is fitted. This is cut as shown in the sketch — marked II — having a round hole to suit the speaker and a rectangular one somewhat larger than the dial opening. After the cabinet exterior is finished this baffle is glued in place with the speaker silk sandwiched between it

(Continued on page 24)

HOW TO TAME THE

Infinite Impedance Detector

By

WM. DARRAGH

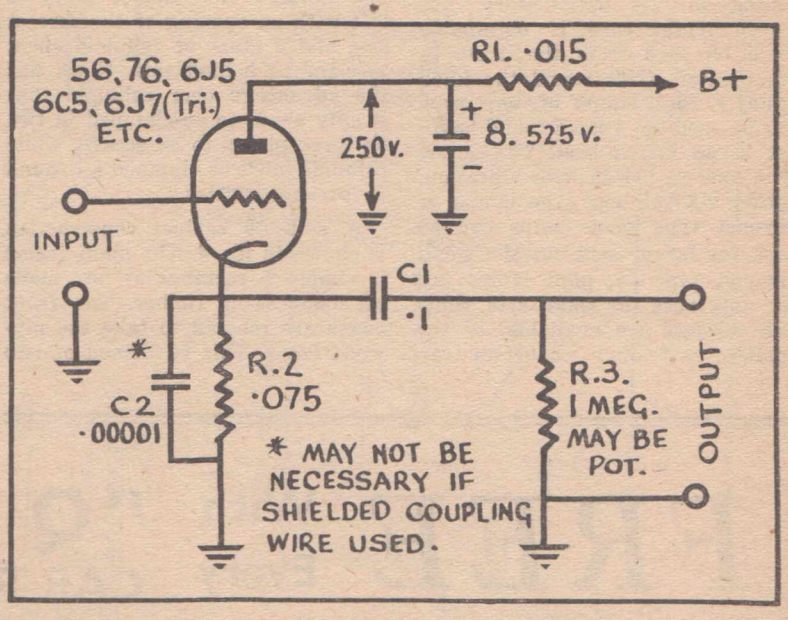
129 Empress Avenue

Footscray West, Vic.

ALTHOUGH diode detectors are used in the great majority of cases in rectifying modulated waves, other mehods of detection are possible, and have a limited use. The most used of these, particularly by the high fidelity enthusiast, is the Infinite input impedance detector. Over the past few years, a great deal of publicity has been given this type of detector, stressing mainly its absolute freedom from distortion, due to its inherent degenerative characteristics. It is my intention to point out the fallacies in this claim, as no doubt a great number of readers have, on observing the miraculous results claimed, speedily whipped out their old method of detection, and substituted an Infinite type. Now mark you, I'm not stating that an Infinite type of detector is a lemon, but, if not handled carefully, can introduce as much as 20% harmonic distortion!

This type of detector employs the circuit as shown, briefly, its operation is as follows:—

When a RF voltage is applied between its grid and earth, on positive cycles, a rectified anode current flows, that builds up a signal voltage across the cathode resistor R2, a voltage that is very slightly less than the applied envelope amplitude. The peak voltage output is quite large and is generally in the vicinity of ½ the supply voltage. I am referring to maximum voltage output of course. It will no doubt be observed, that, in operation, it is much the same as the diode detector, except perhaps, for degeneration in its operation.



Now, our "perfect" detector, like its brother diode, is most certainly subject to what is known as negative peak clipping, which causes very distressing distortion indeed, this clipping will only occur when the modulation depth of the applied signal exceeds the AC-DC impedance ratio of the load R2. All the degeneration in the world would not effect a cure of distortion produced in this manner. In other words, so keep this type of distortion to a minumum, our following resistor R3, must be a great deal higher in resistance than R2, as R3, in series with C1, constituted AC shunting on the load resistor R2, and which we desire to keep to a minimum.

The bypass condenser C2 will also introduce negative peak clipping at high frequencies, due to its shunting effect at high audio frequencies. This capacity of C2 should be kept to a minimum, in fact, if a length of shielded wire is used to couple the detector output to external apparatus, quite often the capacity existing between the inside conductor and its shield is sufficient for sufficient RF bypassing.

Cut-off Adjustment

Also, for correct operation, this type of detector should be adjusted so that it operates very close to plate current cut off, an adjustment of R2 will care for this, and, under correct operating conditions, plate current should (for medium mi-triodes) read about 750 microamps, if the plate voltage is at its recommended 250v maximum.

Last, but certainly not least, it is necessary that a fairly large RF input signal voltage be applied, if distortion is to be minimised, this means that a RF gain control is definitely OUT! A circuit employing AVC is satisfactory, or, a

(Continued on page 24)

Communications Receivers

Here is a really helpful article from the pen of a technician who was a regular contributor to our columns a few years ago, but who wishes to cover his identity, as he is now associated with one of Sydney's leading radio factories.

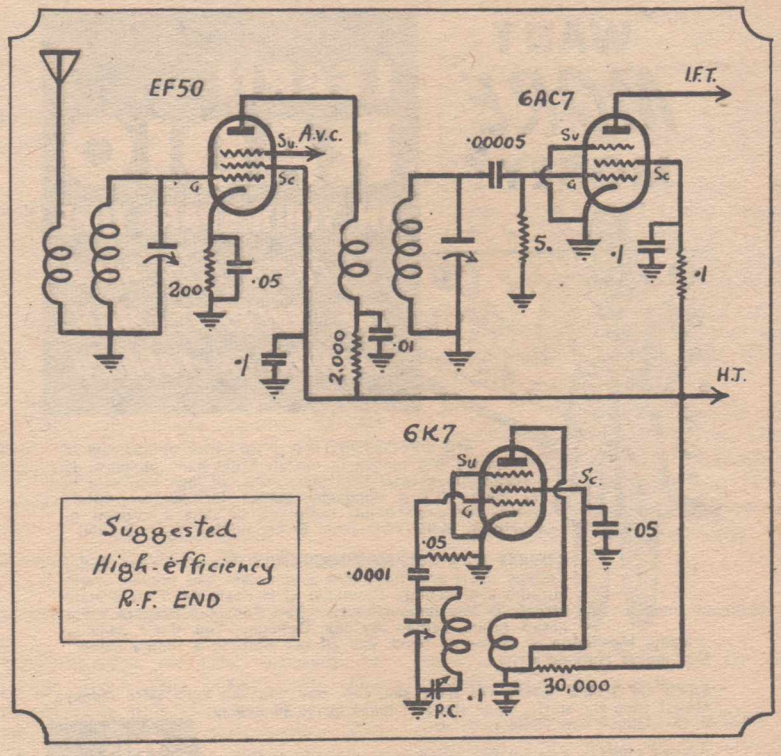
THE design of a communications receiver produces a host of problems and there are many factors to be considered and compromises to be made and difficulties to be overcome.

The best way to do any job is in a systematic manner, so the first thing to decide is how much money one can afford to spend and how to put it to best advantage. These days it is not easy to make a definite plan of a receiver until you have been around the disposal shops and bought the basic parts, then see what is left over to buy the luxuries.

First and foremost the receiver cannot be any better than the converter and pre-converter stages. Here you are fortunate, an EF50 and 6AC7 provide an excellent R.F. amplifier and converter combination at a reasonable price, while a 6K7, 6U7, EF39 can be used with equal success as an oscillator. The next obvious thing to do is to find out all the data you can about these valves. The EF50 is a sharp cut-off pentode and use a gain control in the cathode circuit. By applying an AVC voltage to the suppressor grid will give a control of 15 times or 23.5 db., which is ample for effective AVC when two or more stages are controlled when optimum results are aimed at.

The 6AC7 is recommended by the R.C.A. for use as a high gain converter with very low noise level; so a circuit along the lines they suggested was used.

The oscillator valve I used for a start was an ECH35, using the triode section as the usual oscillator but using the other section of the valve as an isolator stage. This was done by connecting the control grid to earth, the screen to 100v. with the usual by-pass condenser, and the plate to the H.T. through a 25,000-ohm resistor. The output from the local oscillator was then being picked off the plate of the hexode through a suitable condenser. The capacity between the oscillator section and the plate is low and is reduced further by earthing the control grid. However, I found that the conversion gain did not alter when the oscillator and converter operated with stray coupling only. So the ECH35 was replaced by a 6K7, with no direct coupling between it and the converter, so there was no evidence of pulling.



The next problem is the ranges or bands to be covered. As I had a suitable switch and managed to pick up cheaply some damaged Kingsley short-wave coils, I decided to use them instead of the plug-in coils for these reasons, together with the convenience. None

(Continued on next page)

DESIGN

(Continued)

of the commercial short-wave receivers use plug-in coils by plugging in one coil at a time and the switching system is easier to construct than a plug-in box containing coils covering tuning ranges. The slugs used in Kingsley coils are pretty good and produce an improved Q all other things being equal and used in conjunction with high-gain valves work out nicely.

As I am interested in radio generally, I decided to use four sets of coils in conjunction with a cut-down gang condenser to cover from 35 mC/s to 1500 kC/s, so the amateur bands covered fall at the low capacity setting of the tuning condenser, providing good efficiency. I was fortunate enough to have a dial from a high-class American receiver with a particularly good movement, so an electrical bandspread was not considered necessary. It seems to me to be a waste to build a first-class receiver to be so designed that it covers the amateur bands only, but this can only be decided by the designer himself for his individual requirements. By using an M.S.P. dial, in conjunction with the cut-down gang, bandspread should not be really necessary, but if it is, I suggest using suitable midget condensers and mounting them directly on top of the gang condenser over their respective sections, putting a small dial drum on the driving spindle; at the dial end use a drive from a USL 46, Efco, dial which usually has the knob put on it. Remove the flywheel and use another dial drum exactly the same size as the other in its place. The drive from the dial can easily be mounted on a bracket or front panel of the receiver in any convenient position and when the two dial drums are joined with dial cord and a spring a one-to-one remote control is available onto which can be connected another M.S.P. dial without increasing the minimum capacity of the tuning unit unduly.

An Assembly Tip

The American receiver I got the dial from used another excellent idea. The gang condenser, switch, coils, dial and R.F. amplifier, converter and oscillator valves were mounted on their own little chassis, which in turn was mounted on rubber on the main chassis. So I decided to use the same idea, as it made it possible to get this section dead right before mounting it on the chassis of the receiver. I used a five-valve b.c. radio, removed the converter valve and connected the plate of the 6AC7 to the first I.F. transformer and also used the power supply for the tuning unit. Use a good earth connection between the unit and the set.

The gang condenser is operated on so that only eleven dielectrics remain in each section which means that all but five inside and one outside moving plates were removed with the aid of a pair of pliers and a file. And do not forget to provide direct earth connections between the gang and the coils. This is most important.

Sweat the brass wipers onto the gang and from each of these points run a copper braid directly to the lug onto which the earth return of the coils are connected. The gang was mounted on gang mounting grommets, a good policy in any short-wave set.

Now another problem is available time. If you are not in any hurry, do as I did: roll your own; it is a long job to get them right on the dot and a lot of patience is required, but I can assure you when you have finished you will have learnt a lot and get a great deal of satisfaction. There are two manufacturers to my knowledge who are now making complete sets of coils for such a unit as this and, as I have not used either, will not pass an opinion but as they are wound on formers of much smaller diameter and the ones that use the slugs use what appear to be an inferior grade of slugs, I should imagine that the Q would not be as great as those for which data is given.

Slugs For Adjustment

While on the subject of slugs, another method that is used for aligning coils at the L.F. end of the band is to use standard winding data and finish off the coil in the usual manner, but so as the secondary is close to the top end of the former, the secondary is then continued in the form of an inverted "U" over the top end of the former and is again finished on the other side of the former in the usual manner; so that there is now a half turn added to the coil but at right angles to it. This half turn loop is sufficiently large so it may turn on its axis to each side of the coil; when it is swung in one direction the inductance of the coil will be increased by half a turn and, when in the opposite direction, decreased by half a turn, and at intermediate positions will alter the coil inductance varying amounts and is really a variometer. This system is handy on the higher frequency range coils. In the lower coil frequency ranges the primary coil is wound all except three or four turns, then doped in place; the other turns are then added, but are not wound so tightly that they cannot be slid towards or away from the main coil. The closer it is moved to the main coil the greater the inductance and vice-versa.

The data I arrived at for the coils was by the hit-and-miss method and I will not guarantee that the Q could not be improved upon, but those I did check on a comparator were well up to standard.

Take time and trouble in getting your coils to track and your efforts will be well rewarded in the beginnings of a really fine short-wave receiver.

Aluminium shields are used between each section and the unused coils are shorted to earth by the switch when not in use.

If sufficient interest is taken in this unit a drawing of the chassis will be published later, but should not prove difficult for anyone building such a unit to construct to suit his own peculiar requirements.

A point I nearly forgot was the trimmers. For the two high frequency ranges air-trimmers are the "shot," while for the other ranges any high grade of trimmer is suitable but the air-trimmers are the best.

Finally, if you have plenty of time and patience and radio ability, get cracking and you will be

(Continued on Page 24).

COIL WINDING DATA

10 Metre Band

Aerial Coil: Secondary 4½ turns wound in grooves. Primary 1½ turns interwound.

R.F. Coil: Secondary 4½ turns wound in grooves. Primary 3 turns wound $\frac{1}{16}$ in. below secondary.

Oscillator Coil: Secondary 5 turns wound in grooves. Primary 2¾ turns, 1 turn interwound, 1¾ turns below secondary.

These three coils are wound on standard Kingsley short-wave coil formers, the existing grooves being used. The secondaries are wound with 18 B & S and the primaries with 38 SWG, both enamel.

20 Metre Band

Aerial Coil: Secondary 11¾ turns. Primary 3½ turns wound $\frac{1}{32}$ in. below secondary.

R.F. Coil: Secondary 11¾ turns. Primary 5¾ turns turns wound $\frac{1}{16}$ in. below secondary.

Oscillator Coil: Secondary 11 turns. Primary 4½ turns wound $\frac{1}{32}$ in. below secondary.

These three coils are close wound on Kingsley short-wave coil formers with the secondaries wound with 38 SWG, both enamel.

40 Metre Band

Aerial Coil: Secondary 23 turns. Primary 9 turns wound $\frac{1}{32}$ in. below secondary.

R.F. Coil: Secondary 23 turns. Secondary 10¼ turns wound $\frac{1}{16}$ in. below secondary.

Oscillator Coil: Secondary 21 turns. Primary 6 turns wound $\frac{1}{32}$ in. below secondary.

These three coils are close wound on standard Kingsley short-wave formers. Secondaries are wound with 25 B & S enamel and the primaries 38 SWG enamel.

80 Metre Band

Aerial Coil: Secondary 44 turns. Primary 18 turns wound $\frac{1}{16}$ in. below secondary.

R.F. Coil: Secondary 44 turns. Primary 6 turns wound $\frac{1}{16}$ in. below secondary.

Oscillator Coil: Secondary 40 turns. Primary 22 turns wound $\frac{1}{16}$ in. below secondary.

These three coils are close wound on Kingsley short-wave formers; the secondaries are wound with 28 B. & S. enamel and the primaries with 38 SWG enamel.

Note. If the grooves in the coil formers are too deep to close wind coils satisfactorily, the formers may be covered with two or three layers of brown paper well covered with coil dope before winding the coil.

DIALS

(Continued)

and the front. It can be screwed instead of glued but there is not much thickness to screw to and glue is better. This gives a solid front panel and the glass is cemented or clipped in place. If clips are to be used bind the edges of the glass with a narrow strip of adhesive tape and use a clip at each end.

An alternative to clipping the celluloid is to cut a shallow groove round the inside of the dial opening about halfway through the panel. A piece of celluloid, cut slightly larger than the opening, is sprung into the groove. Some experimenting will be necessary at the corners, the actual shape being as shown in fig. 4. This gives a curved window free from rattles. This method works well with a masonite panel as this material takes the groove very readily.

The cabinet finish may be enamel or polish, the former being somewhat easier to apply. In both cases, however, all cracks and joints must be filled and sanded off thoroughly. An enamel finish will require an undercoat, and at least two finish coats for best results. Each priming coat should be well sand-papered. For polished finish the surface marks should be filled with a stained filler—plaster of paris works well for this as it may be stained after it has set. After staining the cabinet may be finished with dissolved shellac—french polished, or a quicker job may be done using clear lacquer.

The inside of the cabinet should be given a light coat of stain to cover the raw look of the wood.

If a black cabinet is desired spirit nigrosine, a dye obtainable from any chemist for a few pence, will, when dissolved in methylated spirit, give a perfectly black stain which may be french polished to a good finish.

I may be old-fashioned but I still prefer to screw a speaker firmly into a wooden cabinet as I believe this gives the best reproduction. The practice of fixing the speaker to the chassis and merely pushing it into the cabinet cannot give satisfactory results unless a screw is used at the top edge of the speaker and the chassis held firmly forward.

In conclusion I will say that there is a certain additional satisfaction in having built, not only the set, but its cabinet, and if any reader has any query I will be pleased to hear from him and will assist him as far as I can.

DESIGN

(Continued)

well rewarded for your efforts; if not buy an Aegis unit.

And, do not forget, radio circuits follow certain laws and principles and there may be two or more ways to go about getting the same object; the result is the same. Valves cannot be made to operate better than at maximum ratings and if the best coils and I.F.'s are used in conjunction with such valves you would have to be mighty clever to make a radio work any better, and it has been my experience to stick to a circuit that follows sound principles and get it to operate at maximum than to play around with half-a-dozen circuits which when analysed will only be capable of producing the same results whatever a contemporary publication may imply.

DETECTOR

(Continued)

TRF employing a single stage of RF amplification, preferably a high gain RF amplifier such as the EF50 or 6AC7 operating at full gain, will be found to be quite satisfactory regarding gain, selectivity, and minimum distortion.

Circuit values proven to give optimum operation are shown, and, if these, with the afore mentioned pitfalls are observed, then one can state that he possesses a detector containing less than 1.50% total distortion.

NEXT ISSUE—

Special Christmas number, on sale before the holidays, featuring several special articles.

ORDER NOW!

We quote from the S.A.R.L. Rag Chew: "A Cape Town ham, being troubled by buzzing noises in his SX-28, took his courage in both hands and decided to investigate. Between the chassis and the cabinet he found a heap of approximately 2½ million ants; they had been entering via the earth lead and due to a faulty connection were neatly electrocuted as they bridged the gap to the terminal."

HOME RECORDING HINTS

Details Which Make for Complete Success

Before you can proceed to cut records you will require the following equipment and in addition a little patience.

A recording turntable and motor
Traversing gear
Cutting heads
Cutting stylus
A few blanks
Pick-up and playback needles
Amplifier (10 watt or thereabouts)
Tuner for cutting direct from broadcasts
Crystal or velocity microphone for all other cuts

SETTING UP THE RECORDER

Assuming that you have the above requirements you can go ahead setting up the recorder.

The cabinet should be solidly constructed and prefectly level. The turntable well balanced and level. The motor mounted on rubber to damp out any vibrations and the traversing gear kept well lubricated with light machine or paraffin oil. All parts must be kept free from dirt.

If there is no noise or vibration a trial cut can be made, but first you must check the angle of the cutting stylus. It is just as well to start with a steel cutter until the "butchering" stage has passed, and unless you are very lucky there will be one. A sapphire cutter is a luxury that can be used later.

With the turntable stationary, lower the cutting head so that the stylus rests on the record, adjusting the cutting angle by watching the reflection of the stylus on the blank. The stylus and its reflection should appear as a straight line for the correct cutting position but if anything it is best to keep the point a little forward.

Set the turntable in motion and lower the cutting head onto the blank. This first test being made without any modulation fed to the cutter. The acetate should peel off the blank in a continuous thread similar in appearance to a human hair and there should be no noise, a whistle or screech indicating a wrong cutting angle or a blank stylus. This cut need only be about ½" wide to enable you to see that everything is in order and if the thread comes off abright and the grooves look nice and shiny you can assume that all is well.

If your equipment is designed to cut at both 78 and 33½ revs. per. minute use the latter speed for your first modulated cut as you will be able to make more tests per record and also have the satisfaction of knowing that if you are cutting abright at 33½ you will be able to cut abright at 78. The reason being that at the lower speed the high frequencies are jammed out as they are bunched closer together, this becomes more apparent than ever when cutting near the centre of the record as here its velocity is slowest.

We will assume that you have made a satisfactory unmodulated cut at both speeds and are now ready to try to modulate the groove.

The modulation should be cut at a high setting of the volume control so that when the recording is played back the volume control can be retarded thus allowing the modulation to play back at a good level while at the same time needle scratch is attenuated. The modulation should not be heavy enough to cut from one groove into the next, however.

THE AMPLIFIER

This can be any audio amplifier provided that it is rated at about 10 watts, The only special requirements are a preamplifier for the microphone, if it is intended to use one, a three position switch to switch in microphone tuner or pick-up as required, and an output transformer matched to both a monitor speaker and the cutting head, and a switch breaking each so that cuts at high volume can be made without the speaker operating which would cause vibrations to both the recorder and the ear drums. At the same time see that the amplifier is not straining to the point of distortion.

In addition to its use for playbacks the speaker is used in the first place to obtain a suitable volume setting and also to check the amplifier from time to time for if the sound from the speaker is satisfactory any electrical fault must be in either the cutting head or its output transformer winding.

Other advantages of switching out the speaker when cutting are

(Continued on next page)

RECORDING

(Continued)

that the audio can be heard from the cutting stylus telling that it is doing its job, and feedback from the speaker to the microphone is eliminated.

The output transformer can easily be constructed if one happens to have an old power transformer on hand and know a little about impedance matching. In my own case I had to match a 550 ohm cutting head and a 2.3 ohm voice coil to a pair of push-pull 2A3's (5,000 ohms plate to plate). I had a power transformer on hand with the following windings—H.T. secondary 385 volts per side, two 6.3 volt and one 5 volt filament windings and mains tappings at 220, 240 and 260 volts.

As the turns ratio is equal to the voltage ratio as well as the square root of the impedance ratio. I based my calculations on the voltage ratios and calculated thus:—

$$\sqrt{\frac{5000}{2.3}} = 46$$

$$\text{Therefore } X = \frac{770}{46} = 16.75$$

volt winding required for voice coil.

$$\sqrt{\frac{5000}{500}} = 3$$

$$\text{Therefore } X = \frac{770}{3} = 257$$

volt winding required for cutting head.

The ends of the original H.T. winding were hooked to each 2A3 plate and the centre tap went to B+. The three filament windings were then hooked in series giving 6.3+6.3+5 volts=17.6 volts, which was near enough for the 16.75 required and did nicely for the voice coil winding. The 260 volt mains tapping was near enough to the 257 required for the cutting head.

If you wish to be precise or cannot use the existing windings. Count the turns on one of the filament windings finding out the turns per volt and wind on enough turns to give the required voltage ratio or turns ratio.

As a matter of fact since utilising this converted transformer I paid out something like £3/3/- for a so-called high fidelity output transformer but could not notice any difference except as regards appearance. This happened during my early stage of recording, I was experiencing a certain amount of distortion on playback and thought that perhaps the output transformer could be improved upon. The fault was, however, later proved to be due to a blunt cutting stylus, the point of which, under a microscope, looked flatter than the curve claimed of my three guinea "tranny." Don't reach for the axe, go to additional expense or strip the amplifier down until you have checked on the cutting needle! The stylus point does a good job standing up to a pressure of something like 25 tons to the square inch so give it a fair go and treat it with respect.

CAUSE AND LOCATION OF FAULTS CHATTER

Chatter is caused by oscillations from some harmonic or continued mechanical resonance and continues after the original cause of the trouble has ceased. This is a bad fault as the cutting head has to be lifted to remove it, thus breaking the continuity of the track and the modulation and spoiling the recording. The original fault may be due to gear grind, a faulty lead screw, binding of the traversing gear, vibration from the motor transmitted to the turntable, a blunt cutting stylus or an incorrect angle of the stylus.

Arrows, swirls and patterns on on the disc are due to turntable tremor.

WOWS AND WHINES

Wows are readily apparent on a sustained note and show up in a form of change in pitch. They are due to a change of playing speed which may be caused by a slipping belt from the motor to the turntable or a warped disc.

DISTORTION is often caused by the cutter poling. That is the "exciter" or soft iron portion that vibrates in the intense magnetic field between the pole tips becomes jammed over to one side, resting on one pole piece instead of coming back to rest in a central position.

ECHOES

If an echo is heard ahead of the actual note, the modulation is too high causing one track to cut into the next. A decibel meter can be used to cut out over-modulation, but it is doubtful whether it is worth the extra expense. Even with the meter you will have to watch the peaks closely so that you can cut your volume before they reach their height.

Mechanical Faults

Faults of a mechanical nature can usually be located by looking for irregularities on the disc and noting the number of grooves or revolutions of the turntable between one irregularity and the next. It is a simple matter then to calculate back along the gearing and locate the particular spot where the trouble is originating.

I would not advise anyone to try to make up either the cutting head or the traversing gear unless they specialise in such work, as the movements of these must be such that they are free from backlash and side play and at the same time must not be tight. This leaves no margin of error at all, and you will strike plenty of snags without introducing any additional ones, but with a little patience and a few failures there is no reason why you should not make some really good cuts.

Recoating Blanks

You may recoat your own blanks which you will find much cheaper; recoating about fifteen records for the price of one new one. All that is required is an old spring-driven gramophone motor and turntable. The disc is placed on the turntable which is set to revolve at about 20 rpm, and the acetate poured on directly from its bottle, starting from the centre of the disc and working out towards the edge. This is all simple enough, the most difficult part of the process being to see that no particles of dust find their way onto the disc before it dries out. It is advisable to place a cover over the disc while it is drying out, as in addition to the dust, insects are liable to settle on it. The acetate takes abou six hours to dry.

Progress In British Radio

A Report from the Acos Laboratories

BY far the largest field of application for piezo-electric crystal devices is in the reproduction and amplification of sound. It is for this reason that crystal devices are generally thought of as electrical and radio components, such as microphones and pick-ups, etc. The basis of the piezo-electric principle is the conversion of mechanical energy into electrical energy and vice versa. Invariably one has to deal with vibratory movements and design problems become overwhelmingly mechanical. The electrical side of the problem is usually confined to such things as capacity values and resultant requirements for equalisation circuits, matching conditions, low capacity transmission lines, etc., all subjects which do not present any great difficulties. The mechanical side, on the other hand, is extremely complex. One has to deal with mass, inertia, velocity, static and dynamic conditions, resonances, frictional and other losses, temperatures, humidity, specific properties of materials, insulation, etc., etc.

It will be seen from the foregoing that the successful design and manufacture of piezo-electric crystal devices is conditional upon a thorough knowledge of mechanics, and the physical and chemical structure of materials. The mechanical laws of physics are well known in principle. The application to vibratory system employing piezo-electric crystals is but one subject of research. Beyond that it was felt for some time that commonly known materials do not always answer requirements peculiar to crystal devices. The innumerable variations which can be achieved in the properties of synthetic materials (commonly known as plastics) have opened up enormous possibilities.

Crystals Protected Against Humidity

One of the greatest difficulties experienced with Rochelle Salt Crystal Elements was their apparent lack of reliability. Theoretically, Rochelle salt should stand up to temperatures up to 55 C. In practice it was sometimes found to break down at as low as 35 C. Through a series of experiments at the ACOS laboratories it was established that the trouble was due to varying and excessive moisture content in the crystalline structure. Crystal elements now go through a process of conditioning, which assures a correct moisture content and they are then completely sealed in a three-ply coating specially developed at the laboratories. The inner and outer layers of the coating consist of a plasticised Polyvinyl Butyral resin which is a complete vapour barrier. The intermediate layer consists of a combination of two different synthetic resins, suitably plasticised and forms a perfect water barrier. In addition there is a primer coat between the three-ply coating and the actual crystal element, which serves as a waterproof adhesive. The latter is important, as perfect adhesive is essential.

Cements

Crystal assemblies rely more often on cements than on mechanical clamping. It is therefore not surprising that upward of fifteen different cements have been developed in the ACOS laboratories and are being used in production. Designers never hesitate to specify the sticking of anything to anything. The problems are many and varied. There are $\frac{1}{16}$" dia. pads of polyvinyl-chloride, or other very often specialized materials, to be cemented to aluminum or a moulded thermosetting resin surface or a coated crystal element. Or it may be desirable to increase the adhesive surface—there are priming cements for metal and other surfaces. More often than not the joint surfaces have to withstand continuous vibratory loads, sometimes at supersonic frequencies. The adhesive properties

VOICE COIL IMPEDANCES

In last month's issue we gave a list of voice coil impedances. Amplion have now pointed out that our data applied more to the earlier Amplion models, those made in the 1930's. Following is a list of impedances of current Amplion models:

CURRENT AMPLION SPEAKER TYPES, TRANSFORMERS, ETC.

Size	Field	PM	Transformer	Code	Voice Coil Impedance
5"	1,500	—	7,000 ohms	AB18	3 ohms
5"	—	PM	5,000 ohms	AD21	3 ohms
5"	—	PM	7,000 ohms	AD19	3 ohms
5"	—	PM	10,000 ohms	AD20	3 ohms
5"	—	PM	15,000 ohms	AD23	3 ohms
7"	—	PM	5,000 ohms	AZ8	3 ohms
7"	—	PM	7,000 ohms	AZ11	3 ohms
7"	—	PM	7,000 ohms	AZ9	3 ohms
7"	—	PM	15,000 ohms	AZ10	3 ohms
7"	—	PM	10,000 ohms	AZ11	3 ohms
12"	—	PM	5,000 ohms	AV38	6.5 ohms
12"	—	PM	12,000 ohms C.T.	AV39	6.5 ohms

PROGRESS

(Continued)

of ACOS cements have to be of a very high order, and they are. But they are more than that. They are waterproof, stable under all working conditions, non-ageing.

Damping Materials

When one is dealing with vibratory mechanical assemblies, and crystal devices usually are, one comes up against mechanical resonance. Unless this resonance is desirable, as for instance in tuned relays, means must be found to reduce or suppress it. The usual method is the application to the vibratory member of a material with a high friction to elasticity ratio. One such material, in common use in connection with crystal devices, is highly plasticized cellulose nitrate (60% Tricresy phosphate). The character of this material varies, however, badly with temperature and is for this reason highly unsatisfactory. Polyvinyl-chloride is somewhat less dependent on temperature but is less effective as a damping material. The need for a stable damping material was very urgent indeed and ACOS Laboratories produced one which is now used in all ACOS crystal devices. It is a compound of a synthetic elastomer, synthetic thermoplastic material, anti-blocking agent and stabiliser. This material, known as "Compound C" is stable between—15 C. and +70 C. in respect of elastic modulus, recovery factor, and cold flow. It is furthermore impervious to ultra-violet light, does not absorb moisture, and is non-ageing.

Twin Cord for Miniature Ear-Pieces

In certain crystal applications the construction is required to be extremely small. In connection with miniature ear-pieces for hearing-aids, a thin, very flexible twin cord is required. No such cord is available in the usual way. It fell to provide the answer. Difficulties to the ACOS research engineers, proved to be considerable and it took the best part of three years to find the answer. The first problem was the actual wire. Finally, multi-stranded tinsel on a pure silk core was found most suitable.

Concurrently with the development of the plastic covering material, two special automatic machines were built in the engineering department to apply the covering to the wire. As in the course of development the covering underwent a number of changes, so the machines had to be altered to suit changing requirements. The finally adopted covering is a vinyl resin compound with non-volatile plasticiser partly filled and pigmented. Eight layers of covering are applied to each single conductor and a further two layers go over the complete twin cord, and yet the cord is surprisingly thin, flexible and non-kinking.

Conductive Cements

When extremely delicate electrical connections have to be made, as it often happens with miniature crystal devices, it is inadvisable to use solder. The alternative is a conductive cement. There are two different types used in ACOS devices. One is a cold setting cement, which sets very hard and the other is an air drying solvent cement, which is somewhat easier to apply but does not give the same amount of mechanical strength. Both cements provide a contact resistance of less than .01 Ohm.

Anti-Corrosive Protection

ACOS Plastic research is not confined to problems directly connected with crystal devices but covers any subject that is in any way connected with the manufacture of ACOS devices. There is, for instance, a process for treatment of metal parts against corrosion. The parts are simply dipped in a solution of an intercondensate of several thermosetting resins, plasticised with unsaturated polyesters. After stoving at a suitable temperature the parts are ready for use. Any metal can be subjected to this treatment. In some

(Continued on page 34)

MULLARD RECEIVERS

For our catalogue section this month we give the following details of the new Mullard models which have just been released. As will be noticed, they feature attractive new cabinet styling and high-efficiency circuits.

MULLARD PORTABLE RECEIVER — MODEL MBS 1050

Main Technical Features

5 valve; portable receiver for operation from either self-contained or external dry batteries.

Frequency Range

530 to 1620 kC/c per second.

Valve Equipment

Mullard type 1T4 RF amplifier.
„ „ 1R5 converter.
„ „ 1T4 IF amplifier.
„ „ 1S5 detector AVC audio amplifier.
„ „ 1Q5GT power amplifier.

Speaker

6-in. anistropic per mag.

Case

Aluminium case, size: 13-in. long; 9½-in. wide and 5½-in. deep.

Aerial

Inbuilt loop with provision for external aerial and earth.

Dial

Universal frequency scale with local station indicators. The dial-shutter covers the dial whilst the receiver is in transit and also acts as the main battery switch.

External Batteries

Extension leads are contained within the case so that external batteries may be used when required.

Weight

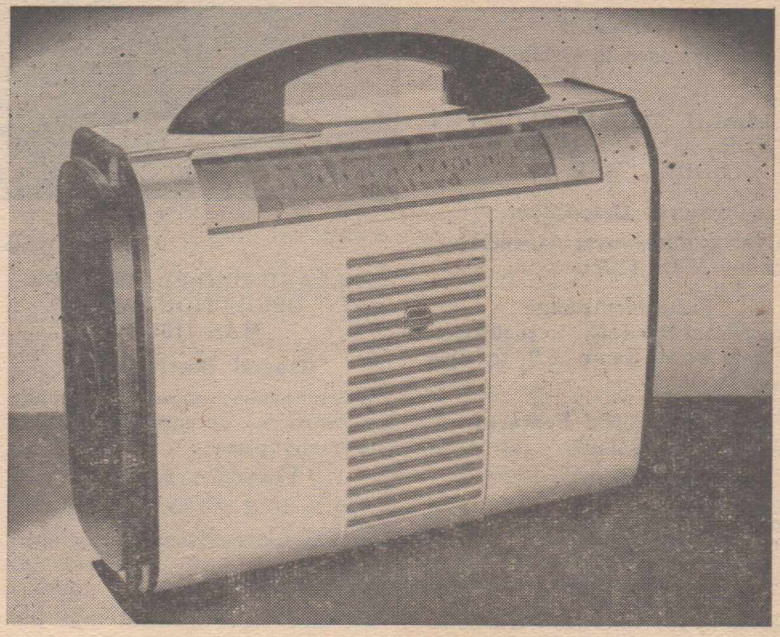
15 lb., including batteries.

Service Features

Quick release type hinge permits ready changing of batteries and service attention.

Retail Price

£29/19/6.



Mullard portable, Model MBS1050.

MULLARD TABLE RECEIVER FOR AC OPERATION—MODEL MAS1107

General Description

5 valve; table model receiver for AC operation on a broadcast band.

Frequency Range

530 to 1620 kC/s per second.

Valve Equipment

Mullard type ECH35 converter.
„ „ 6SK7GT IF amplifier.
„ „ 6SQ7GT detector AVC and audio amplifier.
„ „ 6V6GT power amplifier.
„ „ 5Y3GT rectifier.

Speaker

8-in. anistropic per mag.

Cabinet

Moulded bakelite, size: 16-in. long; 11-in. high; 8-in. deep.

Dial

Mullard fixed eye-line dial—scale in plate glass with capital city stations zoned separately.

Controls

End controls for volume, tone and tuning.

Switch

From double pole power switch incorporated in controls.

(Continued on next page)

MULLARD

(Continued)

Aerial

Plate aerial built in with provision for external aerial if required.

Service Features

Removable base-plate enabling service to be carried out without removal of the chassis from the cabinet.

Retail Price

£25/10/-.

Availability

To be released in October.

MULLARD TABLE RECEIVER FOR AC OPERATION—MODEL MAS 1103

General Description

5 valve; dual-wave; AC receiver; (similar MAS 1107).

Frequency Range

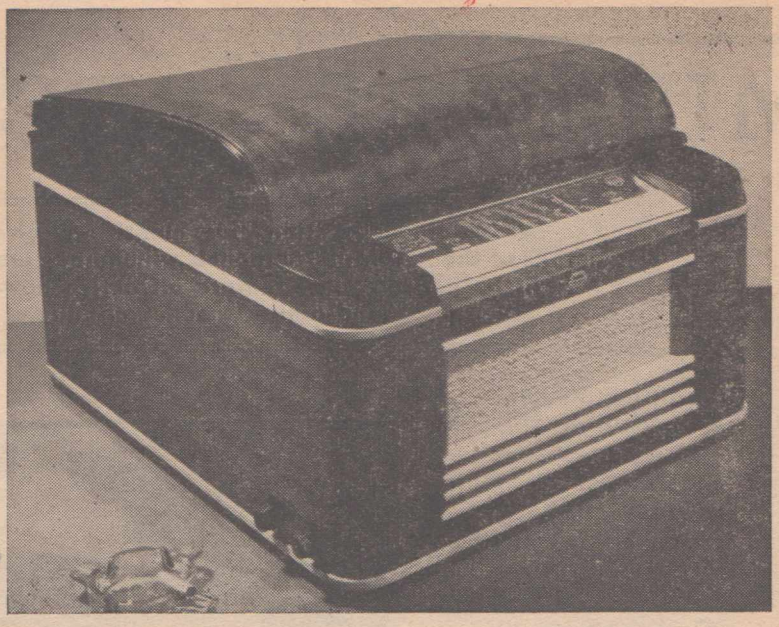
Broadcast Band: 530 to 1620 kC/s.
Short-wave Band: 5.9 to 18.4 mags.

Other Technical Features

Same as MAS 1107.

Retail Price

£29/15/-.



Mullard table radiogram.

MULLARD DUO-PLAYER FOR AC OPERATION—MODEL MAS 1104

General Description

5 valve; table radio-gramophone; for broadcast operation from AC power supplies.

Frequency Range

530 to 1620 kC/s.

Valve Equipment

Mullard Type ECH35 converter.
„ „ 6SK7GT IF amplifier.
„ „ 6SQ7GT detector AVC audio amplifier.
„ „ 6V6GT power amplifier.
„ „ 6X5GT rectifier.

Speaker

6-in. anistropic per mag.

Cabinet

Wooden veneered cabinet in walnut and rosewood tonings with silver ash relief treatment.

Size

Width: 18-in.
Height: 12½-in.
Depth: 20-in.

Controls

End controls for volume, tone and tuning with separate positions for tone control of gramophone. Power switch incorporated in end controls.

Record Player

Garrard record player for 10-in. and 12-in. records—spring suspension.

Service Features

Removable base-plate for service of chassis without removal from cabinet.

Retail Price

48 Guineas.

THE TELEVISION POSITION

Tenders for television transmitters for the State capital cities will close with the Deputy Director, Posts and Telegraphs, Melbourne, C.1, at 3 p.m. on the 20th January, 1949, instead of on the 25th November, 1948, as was originally proposed.

This statement was made by the Postmaster-General (Senator Cameron) who said that the decision to extend the period for tenders had been reached following representations that the preparation of tenders would involve consideration of many technical features and that a longer period should be allowed in the interests of all concerned.

Senator Cameron said that the deferment of the closing date did not alter the conditions of tendering and tenderers would not be restricted to any specific standards. The Government hoped that offers would be submitted for equipment embodying technical standards consistent with the present state of development of television systems and which incorporate all features that have been found to be desirable as the result of research and experience.

Senator Cameron concluded by saying that the calling of tenders must not be regarded as committing the Government in any way to the adoption of television.

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

ONE MAN BAND

If you are running over the 16 metre band and come across HCJB, Quito, this Ecuadorian station will on receipt of a correct report mail you a pocket size harmonica. Anyhow that is what they have promised Swedish listeners and I guess they have a continental outlook.

"The Voice of the Andes" are to be found on 17.89 m.c., 16.77 met. from 6-7 a.m. If reception turns out O.K. according to Kenneth Boord, S.W. Editor of 'Radio News' they will seek permission to use this channel regularly for broadcasts to Europe. At present they have a provisional permit from the Ecuador Government to transmit as follows: Tuesdays in Swedish; Wednesdays in French; Thursdays in English and Fridays in Spanish.

Well I'll bet I know two chaps that will be after the Larry Adler instrument and you guessed right when you say I was thinking of Rex Gillett and Arthur Cushen.

BROADCASTING IN SWEDEN

I have received a very attractive publication from Radiojanst, Stockholm. It is profusely illustrated and gives some surprising statistics regarding broadcasting in Sweden.

With a population of 6.7 millions, the number of licenses reached 1,980,785 last April. This is a very good figure when it is remembered in Sweden only one licence fee is paid by each household even if there are several receiving sets. However, an extra fee is payable for a car set.

Aktiebolaget Radiotjanst (literally, The Radio Service Company—the official title in English is The Swedish Broadcasting Organisation) obtained a concession to carry on broadcasting programme activities as from January 1, 1925, and has the sole rights to broadcast programmes in Sweden.

There are 33 Long and Medium wave transmitters and 2 Short-wave. The Short-wave transmitters are *Motala* 1, 6.065 m.c. 49.46 m.; 11.705 m.c. 25.63 met.; and 10.78 m.c. 27.83 met. *Motala* 11, 9.535 m.c. 31.46 met. and 15.155 m.c. 19.80 met. All these transmitters have an aerial effect of 12 kW. The Riksdag has decided that two new transmitters of 100 kW each shall be set up at Horby, in South Sweden.

DX session from Stockholm at time of going to press is:

Saturdays 5.15 p.m. on 6.065 and 9.535 m.c.
Sundays 1.00 a.m. on 10.78 and 15.155 m.c.
Sundays 11.00 a.m. on 6.065 and 9.535 m.c.

New Stations

VLC-8, Shepparton 7.24 m.c. 41.44 m: Listeners doubtless heard it announced over the ABC 'that special broadcasts would be made to Europe in German commencing on October 2.'

This is the transmitter used. It is a new frequency for VLC-8 as it is shewn on 'Radio Australia' official list as 7.28 m.c. Schedule 3 — 4.05 a.m. in parallel with VLB-2 (9.65 m.c.) and VLA-8 (11.76 m.c.)

HORT, Balboa, Panama, 6.06 m.c. 49.50 m: This is a new one from Central America reported by "Universalite" as being heard till closing at 2.15 p.m. Reports asked for.

RADIO MUNDIAL, Panama 6.46 m.c. 46.40 m: According to URDXC is a new station using only Spanish . . . closes at 2 p.m. . . . suffers from interference.

XNNR, Harbin, Manchuria 7.098 m.c. 42.31 m: Announcing as 'Liberated Manchuria' are on the air from 8 p.m. till 12.15 a.m. News in English is given at 11 o'clock. Reported by R & T News.

XNNR, Harbin, Manchuria, 10.258 m.c. 29.25 m: Is in parallel with above.

THE SHAKY ISLES SHAKES 'EM UP

I think it is a long time since I heard a better signal from a station outside of Australia than that transmitted by 'Radio New Zealand.' There is a choice of two transmitters, ZL3 on 11.78 m.c. and ZL4 on 15.28 m.c. and both are delightful; if any difference, I find ZL3 perhaps a little clearer. From 7-9 p.m. nightly there is always a fine programme.

WHEN NO NEWS IS BAD NEWS

Listeners to the ABC 4 o'clock relay of the BBC news were told on Monday, October 25, 'that conditions prevented a relay of the BBC news.' It is a little surprising as although daylight reception has been waning fast for quite a while the BBC generally manage to get through on one of the many frequencies they provide for the Pacific Service.

OH! "HOWE" THEY GET THEM IN N.Z.

Arthur Cushen in an air-mail letter tells me with justifiable pride that he has verifications from 110 countries. Well he is certainly getting along nicely. Incidentally just to rile me I think, he says he has reported many new broadcast stations in the U.S.A. a number of which are only 250 watters. He gets them around dusk just before the Aussies get through.

AND IN BRADMAN LAND

The South Australian short-wave champion, Rex Gillett like our Don is after centuries and by logging Korea and receiving a confirmation of his report he has verified 98

countries. Actually he has heard and identified 112 but veries take a long time and unfortunately, as I know only too well particularly a few years ago a number of stations do not even acknowledge reports.

But Rex "keeps at 'em" and just in case he tires of DX-ing another hobby in which he indulges is Philately. Even in this he does things in a big way and a letter from China the other day, stamps to the value of 1,100,000 dollars were needed on the envelope.

RADIO NEW ZEALAND

And if you send a correct report to Radio New Zealand they will send a new and attractive card. As mentioned elsewhere in this issue they come in at tremendous strength from 5-7 p.m. daily on 11.78 and 15.28 m.c.

QUESTION OF DATES

Mr. C. R. Woolsey of Terrigal, N.S.W. writes: "You say in your S/W notes in the 'A.R.W.' that 'Radio New Zealand' opened at 5 p.m. (EAST) September 27, 1948. Well I have 2 QSL cards for ZL-2 and 3 in their Official programmes dated 22/9/48. Well how come the two different dates?"

(The answer is: Mr. Woolsey heard a TEST broadcast on 22nd., the official opening of 'Radio New Zealand was as stated in ARW, November issue on September 27, and the transmitters used were ZL-3, 11.78 m.c., 25.47 met. and ZL-4, 15.28 m.c., 19.63 met. They had prior to September 27 been testing also on ZL-2, 9.54 m.c., 31.45 met. 'Radio New Zealand' also has three other transmitters which will doubtless be used as found necessary and they are: ZL-1 6.08 m.c., 49.34 met., ZL-5 17.77 m.c. 16.88 met. and ZL-6 25.8 m.c. 11.64 met.—L.J.K.)

Mr. C. R. Woolsey writes: "I hear a S/Wave Station in the 19 Metre Band around 4.30 to 5.15 p.m. every day. They say "This is Switzerland Calling." It has an English session and then goes on into a French session, but has no call sign. Can you give me the call sign and wave length, also do they need an I.R. Coupon?"

(The station that Mr. Woolsey is hearing is HEU-6, 15.315 m.c., 19.59 metres).

HERE ARE SOME NEW SCHEDULES

YDC, Batavia 15.15 m.c. 19.80 m. broadcasts to Australia, New Zealand and Malaya in English from 9-10 p.m.

XGOY, Chungking 15.17 m.c. 19.77m. directed to Australia, New Zealand and East Asia from 6.55-8.35 p.m.

XGOY, Chungking 15.17 m.c. 41.95 m. to East Asia and the South Seas from 8.35-10.35 p.m. To North America and Europe 10.45 p.m.-1 a.m.

XGOY, Chungking 11.913 m.c., 25.18 m to North America and Europe, from 10.45 p.m.-1.50 a.m. News at 9 and 11 p.m. and 1 a.m.

CHOL, Sackville (Canada) 11.72 mc, 25.6 m, special programme on Sundays to Australia from 4.45-10.30 p.m. Can also be heard on CHLS, 9.61 mc, 31.28 m.

The British Far Eastern Service station on Singapore is on the air from 7.15 p.m. till 2.45 a.m. on the following frequencies: 6.77 mc, 11.73 mc and 15.30 mc, but from 9 o'clock an additional transmitter on 9.69 mc is used.

News can be heard at 7.20, 9 and 11 p.m. and a special Singapore News summary at 12.15 a.m.

SHORTS

The Danish Brigade Radio, Germany, who verified a report from Arthur Cushen said they were using 400 watts on 6.22 mc, and ceased operations on July 27 because "of special reasons."

CS2MA, Lisbon, Portugal, 6.375 mc, 47.07 m, has a special programme to North America daily from 5.30-6.30 a.m. Also on CS2MF, 9.724 mc, 30.85 m.

—URDXC

"The Arab Voice of Lebanon" 8.035 mc, 37.34 m: Has an English transmission on Tuesdays, 4.30-4.45 a.m. also reported on 6.03 mc, 49.73 m.—S.W. News.

"Radio Gambia," Bathurst, Gambia, 9.53 mc, 31.48 m: Reported by S.W. News as having tested from 7.15-8.40 a.m., but have now closed down . . . will return to the air again shortly.

(Gambia is a British Protectorate in West Africa with a population of 215,000. Capital is Bathurst. L.J.K.)

Arthur Cushen advises that the address for "The Voice of America" Munich on 9.54 mc, 31.45 m, is Foreign Service of U.S.A. c/o Consulate General, APO 407-A, c/o Post Master, New York.

ONE GOOD TURN—

If you would like bigger and better issues, make a point of supporting those firms who advertise with us.

VERIFICATIONS

Arthur Cushen advises:

CQMA, Bissau, Portugese Guinea, Africa verified with a nice folding card giving schedule as 7.30-9 a.m. on 7.945 mc.

CP15, La Paz, Bolivia in an air-mail letter gave address as: "Radio El Condor" Ave. C. Camache 72. Using 300 watts they can be found on 5.84 mc.

YV3RN, "Radio Barquisimeto" Avenida Bellevista 491 Barquisimeto, Venezuela list their new frequency as 4.94 mc; they were formerely on 4.99 mc.

Other veries are: VLT5 (1st from N.Z.), JKC, JFK2, JVW2, CBRX, VUD8 (21.51 mc), Algiers (9.57 mc).

And just before going to press another batch from Arthur:

HOLA, Colon, Panama, 9.5 mc. (1st from N. Z.); Danish Brigade, Germany 6.22 mc, 400 watts (1st from N.Z.); CR6RB; CR6RF; Munich (11.87 mc); Singapore (4.895 mc); GSN-GSO (Veri from UN in Paris); Monte Carlo (6.035 mc) and CFVP.

Mr. C. R. Woolsey, Terrigal, advises that he has received QSL Cards from:

ZL2: 9.54 mc.
ZL3: 11.78 mc.
HCJB: 15.095 mc.

Speedy Query Service

Conducted under the personal supervision of A. G. Hull

G.P. (Maitland) doesn't like kit-sets.

A.—No, afraid we cannot see your point at all. The circuit is designed for use with standard components and is the best thing of its kind that we can develop. You can use it with any components you have on hand. The offer of a complete kit of parts at a low price is for the convenience of those who appreciate it. If you don't want to buy the kit you can simply disregard the offer. There is no question of forcing advertising ballyhoo down your throat. We have given the matter lots of thought and still can't see that there is the slightest difference between describing a circuit and offering a kit of parts for it and simply describing a circuit and leaving it to half-a-dozen different advertisers to offer collections of parts which may or may not be matched and suited for the job. We have no thought of trying to create a monopoly.

* * *

H.P. (Maroubra) says the old 1933 Standard was the best set ever described and asked what has happened to the new Standard mentioned recently.

A.—Owing to pressure of work on account of the reaction to the improved September and October issues there has not been time to go much further with the new Standard yet, but everything is well in hand and a couple of prototypes are being tested exhaustively and all alternatives being tried out in practice. Probably January issue.

* * *

J.H. (Tumut) wants specification data for the Amplion speaker type AV33..

A.—This is a 12" permag speaker, normally fitted with a 5,000 ohm input transformer. The voice coil impedance is 2.2 ohms at 400 c.p.s., the cone resonance averages 70 cycles, but there is a tolerance of 65 to 90 c.p.s. Power handling ability is rated at 10 to 15 watts, but the 15-watt rating only applies when the cone is loaded by having the speaker operating in a properly designed and built box baffle or vented enclosure.

* * *

A.A. (Natimuk) is keen on a superhet with 175 Kc. i.f. channel.

A.—Yes, we must agree that for long-range performance and the utmost in selectivity it is hard to beat the 175 Kc. i.f. channel. An r.f. stage ahead of the converter is essential to stop second spot interference, and the alignment becomes more difficult, but the performance is there. Coils to suit 175 Kc. as well as the i.f. transformers themselves are still available in most brands, many of them even more efficient than they were fifteen years ago when all supers used 175 Kc. We have a couple of sets in hand using 175 Kc., including a combination car-home radio which gives exceptional long-range performance when used with normal aerial; ideal for long-distance daylight reception in country towns, either from a.c. or wet battery through the vibrator.

PROGRESS

(Continued)

applications, where a particularly high corrosion resistance is required, the preparation is compounded with metal phosphates. Such composite preparations provide the metal parts with a phosphate coating.

BACK NUMBERS

The following issues are available from our Back Dates Dept. at 6d. each or 5/- per dozen, post free:

1940—Only November.
1943—Only December.
1944—All except Jan., Oct., Nov. and Dec.
1945—All except Jan., Feb., Mar., Apr. and Nov.
1946—All except Jan., Mar., and May.
1947—All issues.

Please send your remittance in 1½d. stamps or postal notes. Address:

Australasian Radio World, Box 13, Mornington, Vic.

BARGAIN CORNER

Advertisements for insertion in this column are accepted free of charge from readers who are direct subscribers or who have a regular order placed with a newsagent. Only one advertisement per issue is allowed to any subscriber. Maximum 16 words. When sending in your advertisement be sure to mention the name of the agent with whom you have your order placed, or your receipt number if you are a direct subscriber.

FOR SALE: Back numbers, Volume 7, September, 1942, to May, 1943, and complete sets of Volume 8, 9, 10 and 11. Price 1/- per copy, carriage or postage extra. Write to "Miss D," C/- Box 13, Mornington, Vic.

FOR SALE: Complete set-up AR8 11-valve communications receiver, 50-watt transmitter, AT5, 20-40-80 metre bands, aerial tuning unit, cables, manual, meters, a.c. power supply, all perfect condition. £30 or better. Luis Rocella, 454 Brunswick Street, Valley, Brisbane.

WANTED TO BUY: "Radiocraft" (U.S.A.) magazine, for June, 1945. William Dohrmann, 181 Victoria Street, Brunswick East, Vic.

B.V.M. (Ascot Vale) asks about payment for contributions.

A.—Not all of the contributions are paid for. A large number of enthusiasts retain a sort of amateur standing and contribute their articles gratis for the benefit of fellow readers. However, we are always prepared to pay for articles if so required and an invoice should accompany your article if you expect payment. Generally it is only a matter for two to four guineas, but we are at all times open to negotiate for anything special. Circuits need be sketched in pencil only as they are re-drawn to our own particular style. Photographs need to be good and this is often difficult with radio sets on account of reflections and shiny surfaces. We prefer to do our own and test the set in operation if at all possible. Will gladly pay air freight both ways if interstate, or call and do the job on the spot in a case such as yours.

Summer time is PORTABLE TIME

The hits of the season! Aegis-designed Portables which bring you extra fun on your holidays and added interest in assembling! For they're simply designed, complete to the last nut and bolt, and supplied in the famous Aegis sealed carton. Every feature of an Aegis portable kit is a quality feature which means that the finished job will have that professional touch and that reliable performance common to every Aegis product. And don't forget that every Aegis kit is fully protected with A.R.T.S. and P. Licence! Full constructional details included in pack.

AEGIS "PERSONAL"

Weighs only 4½ lbs., yet the Aegis PP4 is a powerful 4-valve battery-operated portable only 4in. x 4½in. x 9in. Features include lightweight leatherette-covered case in choice of colours with pencil-case slide back for easy battery change, self-contained loop aerial, midget 2-Gang by A.W.A., 3in. Rola Speaker, Super-Het Circuit, Minimax Battery, Adjustable Plastic Strap. Note the new low price, which includes batteries, but excludes valves. **£12/12/-**

AEGIS "VOYAGER"

As illustrated at left, this compact 4-valve battery-operated portable is only 8in. x 6⅛in. x 7in. Weight assembled is only 12lbs., yet it includes 2 Minimax 45V Batteries, Long Life, Super-Het Circuit, Rola 3" Permag Speaker, Aegis special loop aerial, Aegis J10 I.F.'s, durable leatherette-covered cabinet. Model KP4. Note the new low price which includes batteries but excludes vales. **£12/12/-**

AEGIS
MANUFACTURING COMPANY
208 Lt. Lonsdale St., Melbourne

DISTRIBUTORS IN ALL STATES

MELBOURNE—
Lawrence & Hanson Electrical Pty. Ltd.
Replacement Parts Pty. Ltd.
Vealls Electrical and Radio Pty. Ltd.
Homecrafts Pty. Ltd.
J. H. Magrath & Co.

SYDNEY—
John Martin Pty. Ltd.
George Brown & Co. Pty. Ltd.
Fox & Macgillycuddy Ltd.
Cook Bros. Pty. Ltd.

ADELAIDE—
George Proctor (Factory Representative)
Newton, McLaren Ltd.
A. G. Healing Ltd.
Harris, Scarfe Ltd.
Gerard & Goodman Ltd.
Oliver J. Nilsen & Co.

BRISBANE—
Chandlers Pty. Ltd.
A. E. Harrold Pty. Ltd.
B. Martin Pty. Ltd.

PERTH—
Nicholsons Ltd.

TASMANIA—
Lawrence & Hanson Electrical Pty. Ltd.
Lawrence & Hanson Electrical Pty. Ltd.

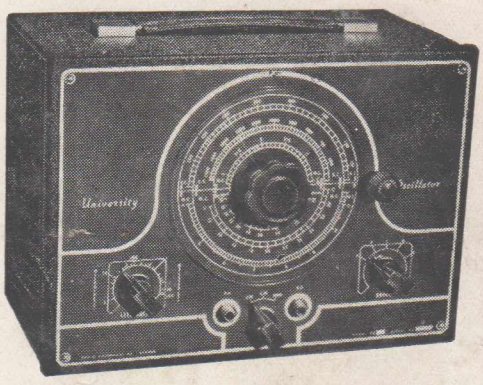
TRY THESE FOR

SPEED

AND ACCURACY!

Two "MUSTS" for the Progressive Serviceman . . .

University

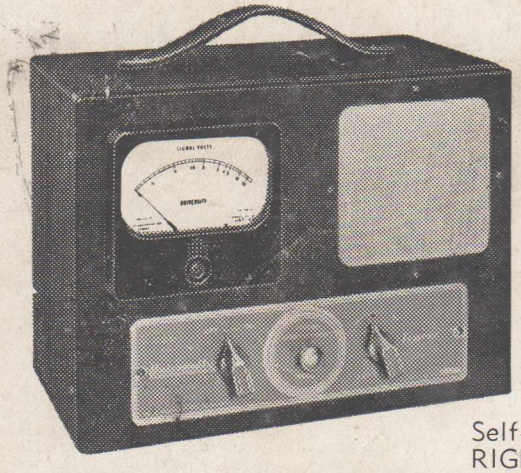


MODEL XOA & XOB

OSCILLATOR

Model XOA (A.C. operated) or Model XOB (operated from internal batteries) service oscillator is an instrument designed with the needs of the average radio serviceman in mind. The price is right, too—yet it's a marvellously comprehensive instrument with frequency coverage of 160 K.C.—32 megacycles in five bands. Unmodulated, modulated or audio output. Fixed modulation, 400 cycles at 30% modulation. Calibrated capacity type piston attenuator.

Price, £19/19/-, plus Sales Tax



MODEL STB

SIGNAL TRACER

Self-contained, battery-operated—the STB traces the signal RIGHT THROUGH the radio receiver from start to finish. Fault-finding is quick and easy! When the probe strikes a faulty section, indications are given on both meter and speaker. Portable, light, sturdily constructed . . . the STB is a versatile, post-war, service instrument.

Price, £[illegible]/-/-, plus Sales Tax

★ WRITE FOR COMPLETE DETAILS OF THE LARGE RANGE OF

University

RADIO KIT SETS • RADIO & ELECTRICAL TEST EQUIPMENT

MANUFACTURED BY RADIO EQUIPMENT PTY. LTD. · 5 NTH. YORK ST., SYDNEY · B 3678 · B 1960

Printed by the Bridge Printery Pty. Ltd., 117 Reservoir Street, Sydney, N.S.W., for the Proprietor of the "Australasian Radio World," Balcombe Street, Mornington, Victoria.