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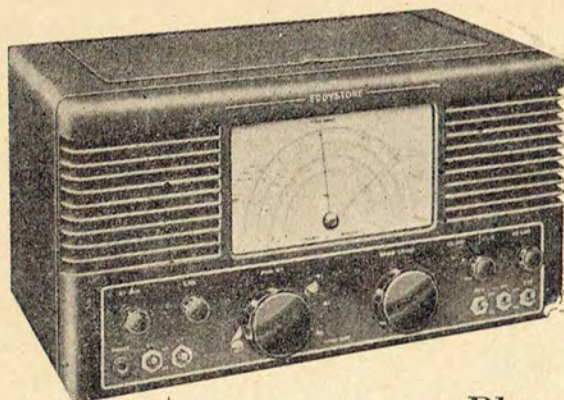
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FOREWORD

In presenting a new publication it seems to be a convention that the Editor should, in his preface or foreword, explain to his readers the aims and objects of the new book, and give a brief indication of the scope of the material. In our case, this is particularly easy to do, and for readers of the monthly periodical *Radio and Electronics* it will hardly be necessary. However, we hope that many who purchase this book will be among the non-readers of the former, and for those a word of explanation might not go amiss.

Radio and Electronics was first published in April, 1946. Since then, over a period of over three years, there have been presented in its pages a wide variety of subject matter, some of which has been of interest to radio hobbyists, some to amateur transmitters, and some to those professionally engaged in the many types of commercial radio activity that exist in this country. Unfortunately, a small country like New Zealand, with a population of less than two million, cannot support a number of technical periodicals, each on the limited field of Radio, and each addressed to only one section of the total number of people interested in working with thermionic valves. Because of this, which is no more than an undeniable economic fact, we, as the only publishers of technical radio and electronic data in the country, are compelled to issue only a single monthly magazine, which must attempt to appeal, through its reader material, to all the classes of person we have detailed above, not to mention others that have not been singled out for classification.

As a result of all these things, the pages of *Radio and Electronics* have, over a three-year period, been graced by practical design information on a very wide variety of topics. For example, in the way of receiver circuits alone, we have covered the field from the simplest crystal and one-valve sets to highly complex superheterodynes, suitable only for building by the more experienced constructors. While from time to time new receivers are published in *Radio and Electronics*, and will continue to be, it is clearly impossible to keep on repeating ourselves except at reasonably long intervals. Thus, for the reader predominantly interested in, say, receivers, there might be a considerable period during which the sort of constructional article in which he is mainly interested is not featured very often.

It is mainly to cater for constructors who would like to have on hand a comprehensive range of circuits for a variety of types of equipment, ranging from simple receivers to complex test equipment, that this collection of circuits is being published, and it is hoped, too, that many who have not hitherto been acquainted with the parent publication, *Radio and Electronics*, will realize from a perusal of the *Digest*, that the former caters for all tastes in radio matters.

The information in this book has been stripped down to what may be termed its bare bones. Circuits, photographs of completed equipment, and working drawings for the necessary metal-work are included, where all these things have been originally featured in complete descriptive articles. The information here is complete in itself, but there is no room in a book of this kind to go into detailed appreciations of the merits of individual circuits, or to give detailed explanations of how the more abstruse of them work. All this has been done, and can be found in the appropriate copy of *Radio and Electronics*, to which reference is made in each title. No doubt many readers of this *Digest* will wish to obtain copies of the original articles, and the references to them have been included because, except for one issue, which is completely out of print, and for a few others, of which only a few copies are left, all back numbers of *Radio and Electronics* are available.

Any reader who wishes to obtain back numbers can do so either by asking any bookseller or radio dealer who stocks the journal to obtain it for him, or if he is too far from one of these, by writing direct to the publishers, "Radio and Electronics" (N.Z.) Ltd., Box 22, Government Buildings P.O. Wellington. As mentioned above, some issues are in rather short supply, so that readers are recommended to place orders for any they might want as soon as possible, in order to avoid disappointment.

We had hoped to have room to include in this volume some commonly used reference material, such as valve socket diagrams for the valve types appearing in the text, but space has unfortunately prevented this. Also, while all the most important featured articles up to December 1948 have been included, space has again compelled us to omit a few of them.

This *Digest* is, in the first instance, by way of being an experiment. We hope it will turn out to be a very useful one as far as our readers are concerned, but we are under no illusions that it could not be improved. As with all new ventures, experience will tell, and we hope after a suitable time interval to publish a second edition, with new material throughout, and possibly amplified by the inclusion of data and material that will be useful for reference purposes. Whether further digests make their appearance will depend mainly upon the response of readers to this one, and in launching this new publication, we would like to assure readers that we are always open to suggestions as to material that they would like included in future books of the same kind, and as to the presentation. After all, the book is being published for our readers' approval, and anything we can do to make succeeding issues of the *Digest* more valuable to them, we will be only too happy to do.



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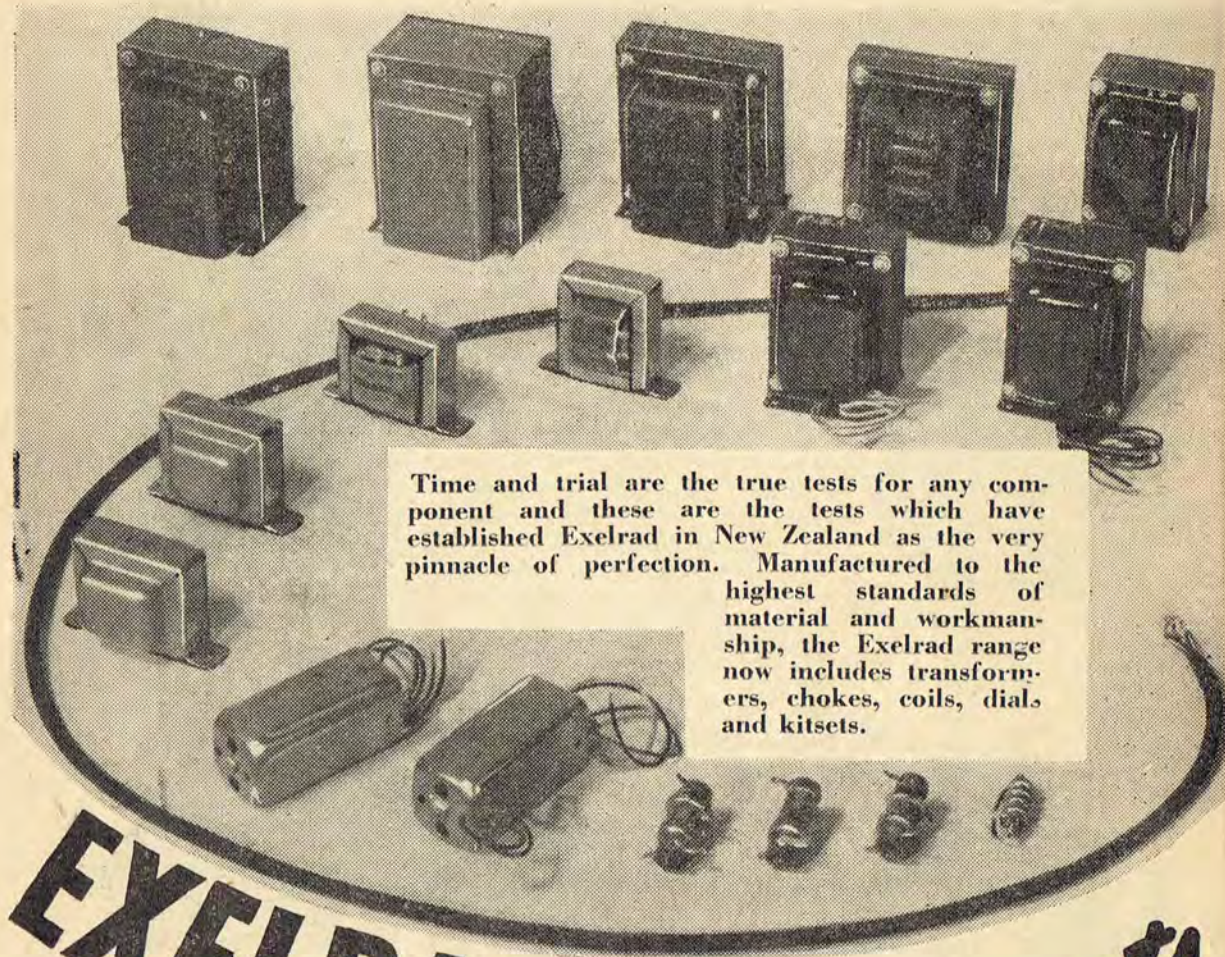
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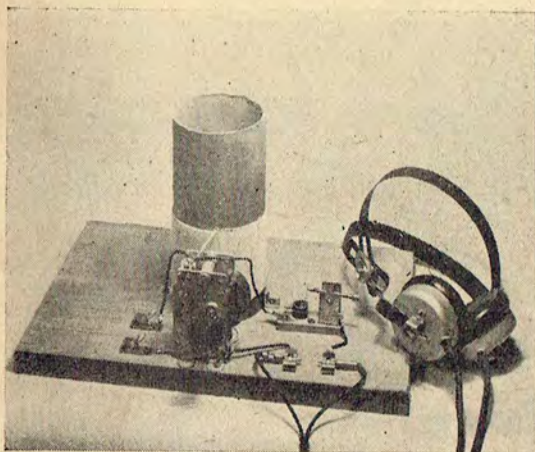
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RECEIVERS — Some Crystal Sets



NOTES ON THESE CIRCUITS

IMPORTANT

All tuning coils can consist of 70 turns of 24 gauge D.C.C. wire, close-wound on a 3 in. former. The tuning condenser can be 0.0003 mfd. or larger. If slightly different sizes of wire are used for the coil it will not matter.

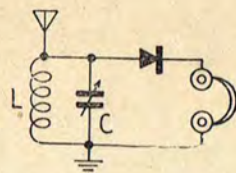
In all cases, the aerial coil can have 30 turns of the same wire, and can be wound above the tuning coil, as shown in the right-hand photo. The taps are made simply by twisting the wire for about half an inch, and proceeding with the winding. After the whole coil is wound, the cotton is stripped from the wire so that connection can be made to the taps with an alligator clip. The photo shows the aerial coil for Circuit No. 2, where the taps are made every 5 turns.

* * *

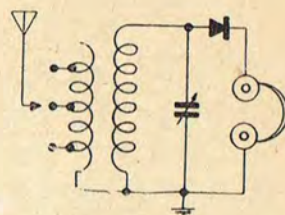
No. 1. This is the simplest of all crystal sets. It gives quite strong signals, but is not selective. Can be used with advantage when only one station can be received, and there is no interference from another. No. 1 also suffers from alteration of the tuning, depending on the length of the aerial. With a long one, some stations might be off the dial. The photo above shows No. 1 built up and ready to go.

* * *

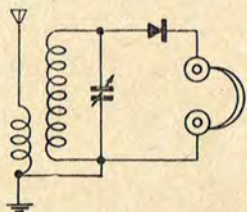
No. 2. This is a simple but good circuit. The tapped aerial coil enables better selectivity to be had with a long aerial. The aerial coil has 30 turns tapped every 5 turns. Where it is difficult to separate two stations, the aerial should be connected to one of the lower taps, but for getting in weak stations, it is better to have the aerial connected to one of the higher taps.



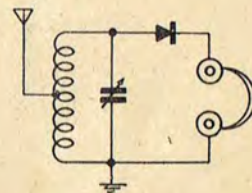
No. 1



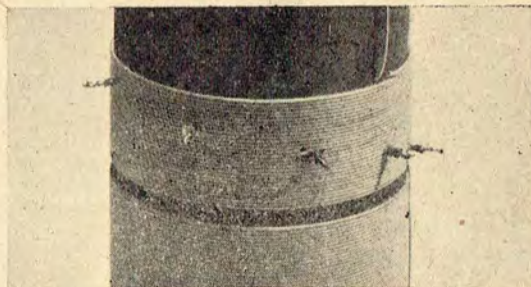
No. 2



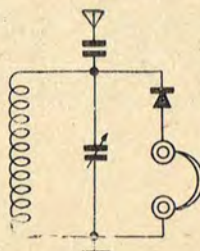
No. 3



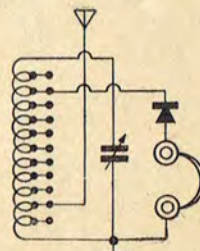
No. 4



This picture shows the tapped aerial coil at the top of the tuning coil. Note how the tappings are spaced round the former so that they do not come too close to each other. This is done simply by allowing about an inch extra after each five turns has been wound on, before the twist is made in the wire.



No. 5



No. 6

USING A WAVE-TRAP WITH A CRYSTAL SET

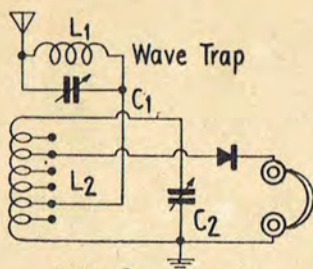


FIG. 8

No. 3. This is simply the circuit for No. 2, with the taps left out. It will be quite good for most locations, but where more selectivity is needed, No. 2 should be used.

* * *

No. 4. Another way of getting the same results as with No. 3. Here a single tap is put on the tuning coil, and no aerial coil is used.

* * *

No. 5. Still another way of getting better selectivity than No. 1 will give. The condenser in series with the aerial should be about 0.0001 or less, and should be smaller the longer the aerial.

* * *

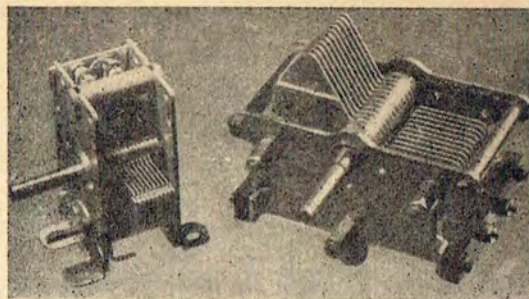
No. 6. A very flexible arrangement, which is much more selective than any of the others on this page. No aerial coil is used, but the tuning coil is tapped every 5 turns. The more the crystal and aerial are tapped down towards the earthed end, the more selective the set will be, but the weaker the signal becomes. For best signal strength combined with the best selectivity, this circuit is hard to beat, especially when a long, high aerial is used.

* * *

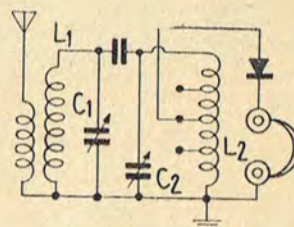
The wave-trap is a device for helping to weaken the signal from a strong station, which is interfering with a weak station. Circuit No. 7 shows a wave-trap, L_1 C_1 , connected to the set of Circuit No. 6, but the trap can be placed in the aerial lead of any of the other sets on page 7. C_1 should be identical with the tuning condenser, while L_1 can be a coil exactly similar to the tuning coil. To work the trap, the interfering station is tuned in with the tuning condenser, until it is loudest. Then the wave-trap condenser is tuned until the station is as weak as possible. After this, the trap is left alone, and the set is tuned in the usual way as though the trap were not there at all.

* * *

No. 8 is another selective circuit. L_1 and L_2 are identical, and so are C_1 and C_2 . The same sizes are used as in all the other crystal sets. The unmarked condenser should be very small—no bigger than 50 mmfd. Both condensers are tuned to make the station as loud as possible.



Two types of tuning condenser that can be used to build any of these crystal sets.



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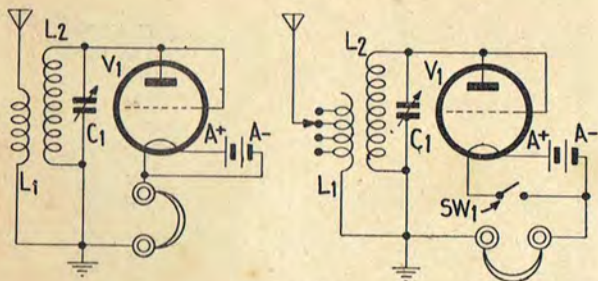
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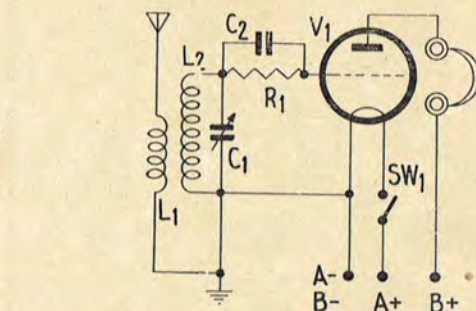
"WORLD RADIO HANDBOOK"

10 KORAHIA STREET, REMUERA, AUCKLAND, S.E.2

Improving 'Crystal' Sets by using a Valve Instead of the Crystal



These two circuits show how a crystal detector can be replaced by a triode valve connected as a diode. All that is needed is a battery to light the filament, and a valve socket. For old-fashioned 2-volt valves a $1\frac{1}{2}$ volt torch cell can be used, and for 4-volt valves a $4\frac{1}{2}$ -volt torch battery. The left-hand circuit shows Crystal set No. 3 altered to use the valve, and the right-hand one, crystal set No. 2. In the latter a switch has been added to turn the valve filament on and off. V_1 can be any of the valves shown in the table



The above circuit shows a more sensitive one-valve arrangement, which uses a B battery as well as the filament or A battery. The former can be a 45-volt B battery, or can be made from a few $4\frac{1}{2}$ -volt torch batteries in series. Three of them, giving $13\frac{1}{2}$ volts will give very good results. L_1 , L_2 , same as aerial and tuning coils in any of the crystal sets. C_2 , 0.00025 to 0.0005 mfd. C_1 , same as tuning condensers in crystal sets. V_1 , any of the valves shown in the table below.

1G4-GT

30 etc.



1. N.C.
2. Fil
3. P.
4. N.C.
5. G.
6. (absent)
7. Fil.
8. N.C.



1. Fil
2. P.
3. G.
4. Fil

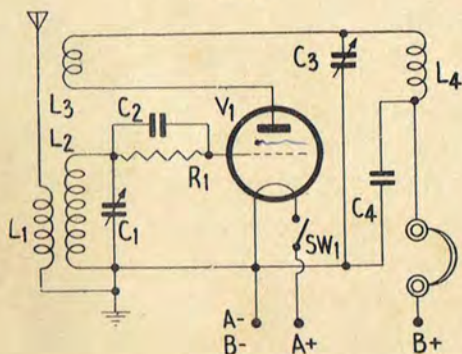
These diagrams show the pins to which the various elements of the valves given in the table are connected.

N.C. stands for No Connection, and is used when the pin is present, but has nothing inside the valve connected to it.

Tube Type.	Fil. Voltage	Fil. Current.	Type of Base.
1G4-GT	1.4	0.05 amp.	Octal
1H4-G	2.0	0.06 amp.	Octal
30	2.0	0.06 amp.	4-pin
A-415	4.0	0.06 amp.	4-pin
A-409	4.0	0.06 amp.	4-pin
PM2DX	2.0	0.06 amp.	4-pin

NOTE.—The last three types are old Philips or Mullard battery valves, which may sometimes be bought quite cheaply second-hand. Even if very cheap, they should be tested before buying.

A SIMPLE 1 VALVE REGENERATIVE SET



C_1 0.0003 to 0.0005 μ f. variable.

C_2 0.00025 to 0.0005 μ f. fixed.

C_3 0.00025 μ f. Can be air or mica-spaced.

V_1 Any of the types in the above table.

L_3 , Tickler coil. 10 turns of 30 D.C.C., wound over the lower ten turns of L_1 .

C_4 0.0005 mfd. fixed.

L_1 , L_2 , same as for aerial and tuning coils or any of the crystal sets. See page 7.

A Battery, to suit valve used.

B battery, $13\frac{1}{2}$ to 45 volts.

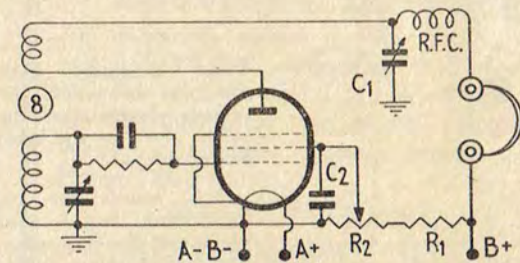
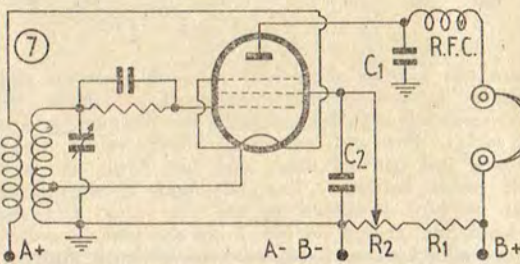
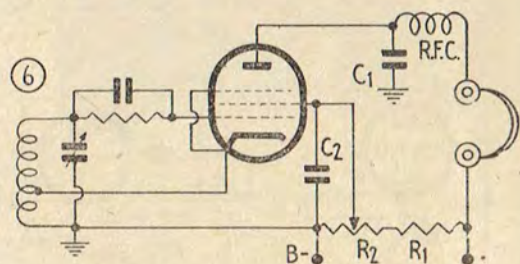
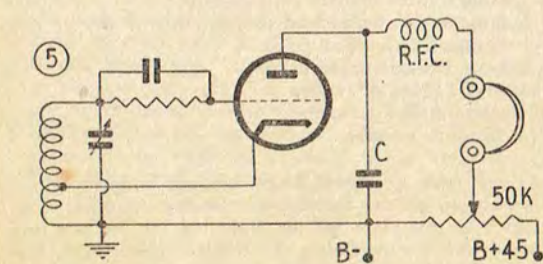
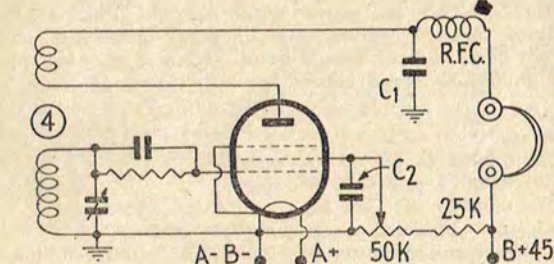
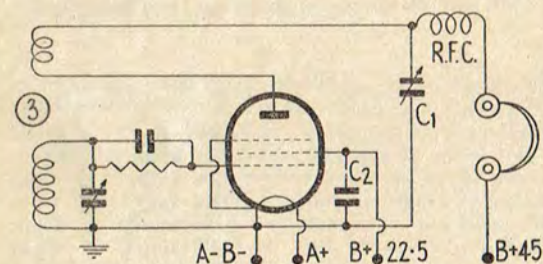
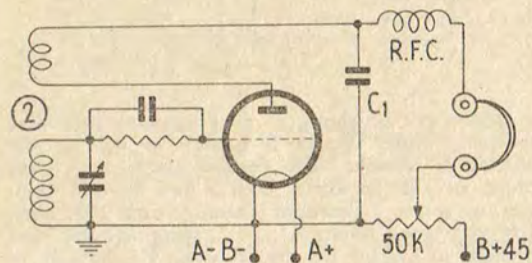
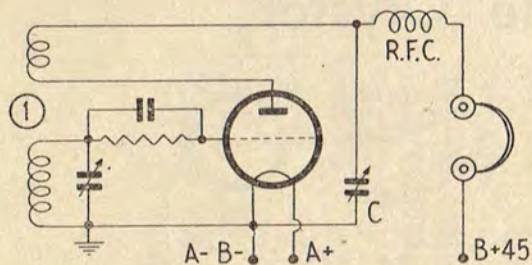
L_4 Broadcast R.F. choke.

SW_1 On/off switch.

Note.—If the three windings are all wound in the same direction, on the former, connecting the *bottom* of the tickler to the plate will be right. If the set will not oscillate at all, try reversing the tickler connections, because the direction of winding might not be right.

Regenerative Detector Circuits

SEE "RADIO AND ELECTRONICS," AUGUST, 1946



These eight circuits are a representative selection of the many that have been developed over a long period. All will work well if properly built, and they give a choice of valve types, methods of controlling reaction, and of coil winding methods. In the case of pentodes, the B+ can be maximum recommended in the valve books for the valve used, but in all cases, the maximum screen voltage should not be allowed to go higher than 45 volts. For triode circuits, no more than 45 volts is needed, or desirable, for any valve type, if best results are to be had.

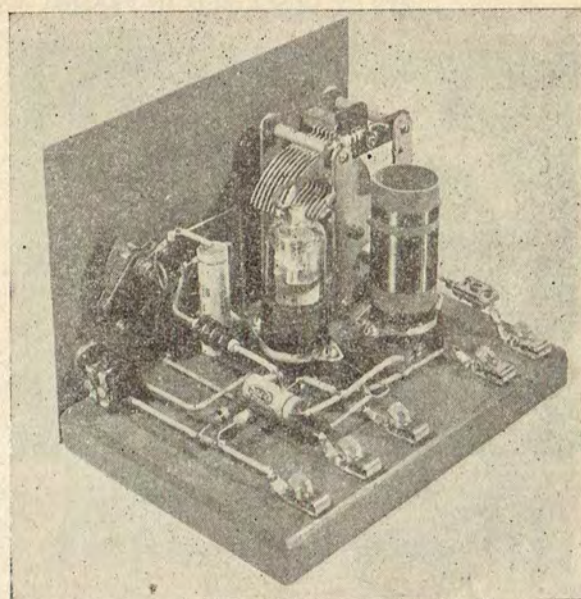
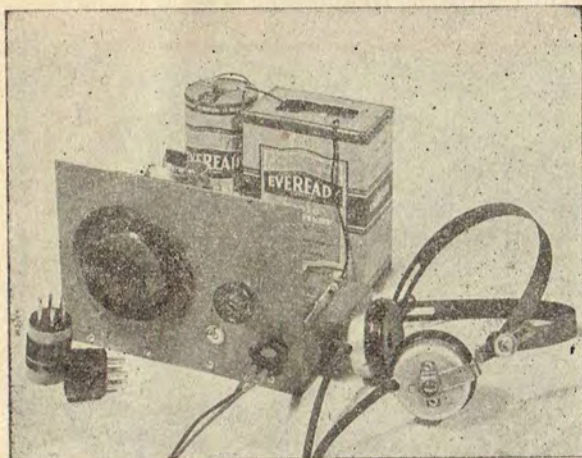
In all pentode circuits, R1 can be 50 to 100k., with R2 at 50k.

C1 should be 0.00025 or larger, whether fixed or variable if the set is to work on the broadcast band. For shot-wave a value of 0.0001 is better.

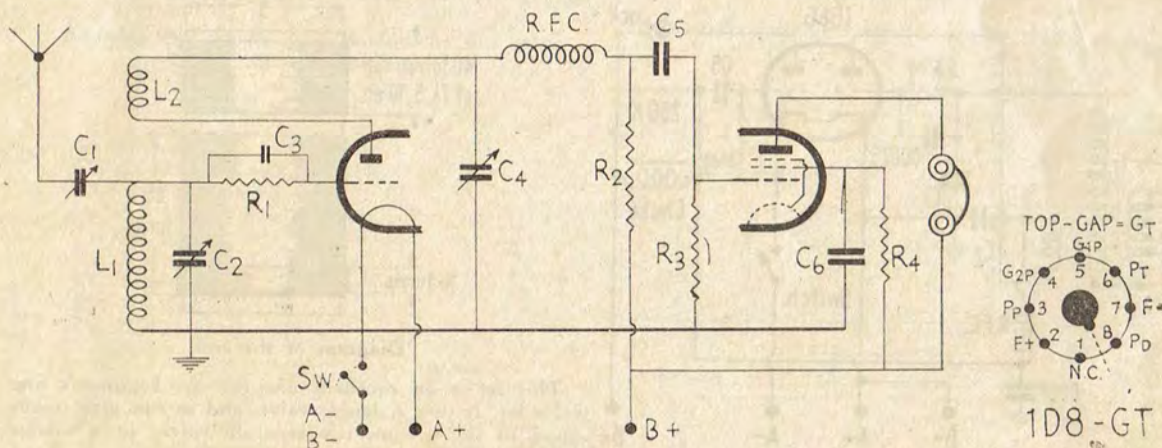
Nos. 6 and 7 are suitable only for heater-cathode type valves, but all the other circuits can also be used for these valves, as well as for filament valves. To use Nos. 1, 2, 3, 4, 7, and 8 for cathode valves, all that has to be done is to earth the cathode pin and one side of the heater.

The Radel One

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," MAY AND JUNE, 1946



Two views of the completed set. The coil-formers are made by glueing 1 1/4 in. bakelized paper tubing to Amphenol four-pin plugs, with the covers removed. A four-pin valve socket is used to plug the coils into. It does not matter which coil pins are used for which connection, as long as the coil socket is wired accordingly, and all coils are arranged in the same way.



- C1, 30 μ f. max. trimmer.
- C2 0.00035 μ f. max. variable.
- C3, 0.0001 μ f. fixed.
- C4, 0.0003 μ f. max. variable.
- C5, C6, 0.1 μ f.
- R1, 2 Megs.
- R2, 50,000 ohms.
- R3, 5 Megs.
- R4, 20,000 ohms.

COIL DATA

Broadcast

- L1, 105 turns 36 gauge enamelled wire, close wound.
- L2, 30 turns of same wire, close wound.

Short-Wave A (approx. 30m.-90m.)

- L1 16 turns 24 gauge enamelled wire, double spaced.
- L2 10 turns of same wire close-wound.

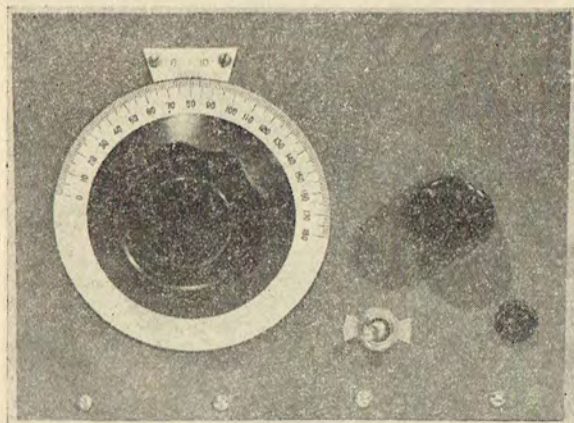
Short-Wave B (approx. 19m.-60m.)

- L1 6 turns 24 gauge enamelled wire, double spaced.
- L2 10 turns of same wire close-wound.

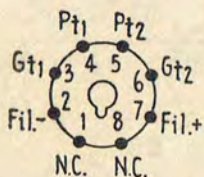
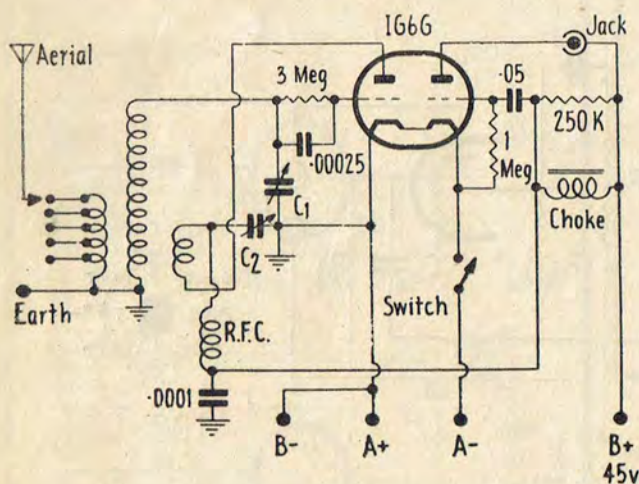
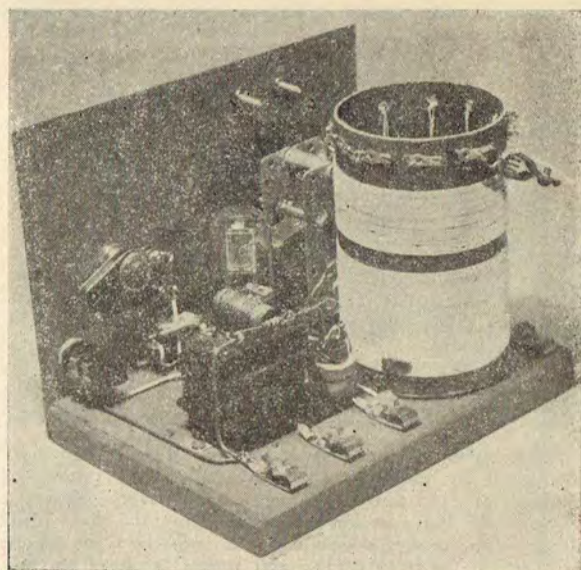
Note.—All tickler coils spaced 1/4 in. from top of grid coil.

The Radel Single-twin

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," DECEMBER, 1948



Front panel view of the set.



Above: Base connections of the 1G6G when viewed from under the socket "N.C." means "No Connection."
Left: Circuit diagram of the set. The choke is the primary winding of an old audio transformer. This can be bought second-hand for only a shilling or two.

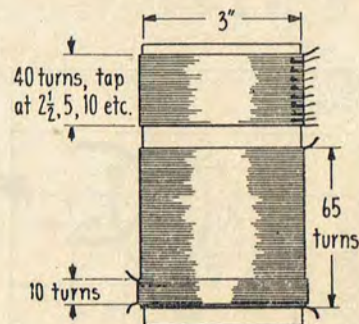


Diagram of the coil.

This set is an excellent one for the beginner's first valve set. It uses a double valve, and so can give results equal to those from two separate valves in a similar circuit.

The audio frequency choke can be the primary of an old audio transformer. These are picked up quite cheaply for only a few shillings, and as long as the primary winding is intact, the secondary's condition does not matter. The jack is where the headphones are connected, and, if desired, terminals can be used instead.

The A battery should be one of 1.5 volts. More than 45 volts for the B battery is not recommended, as a higher voltage battery is more expensive, and will not noticeably improve the results.

If a few more turns are put on the tickler, B battery as low as 12.5 volts will work the set quite well.

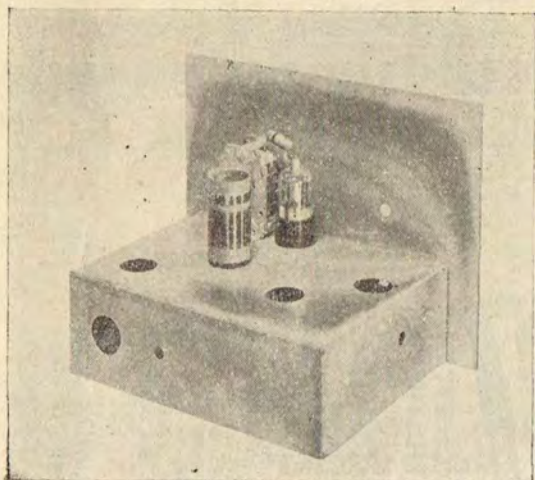
Note.—If the set will not oscillate when first turned on, reverse the connections to the tickler (10-turn) winding.

The Radel "Progressive" Battery Three

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," SEPTEMBER, OCTOBER,
NOVEMBER, AND DECEMBER, 1946

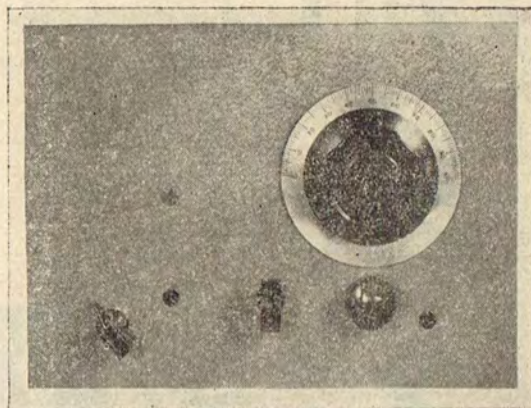
This set was designed for those starting off to learn about the practical side of radio sets. The three stages of the construction are complete sets in themselves, each being excellent of its kind. The chassis was

designed so that all three stages of the construction could be built on it. Only after the final stage has been reached are all the chassis holes filled up.

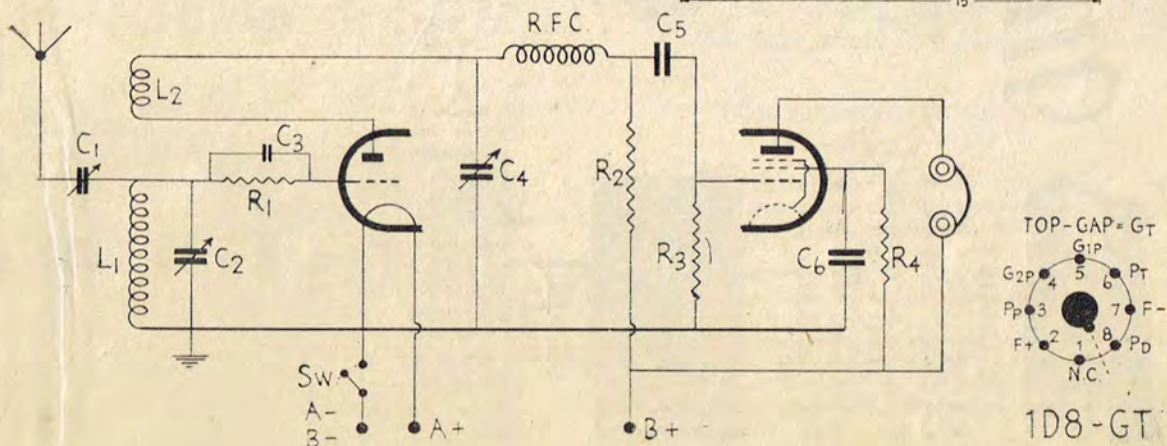
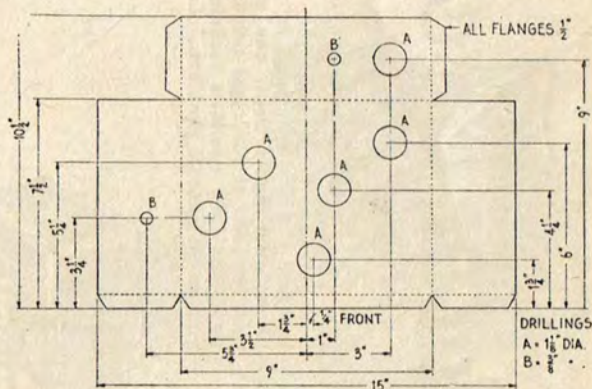


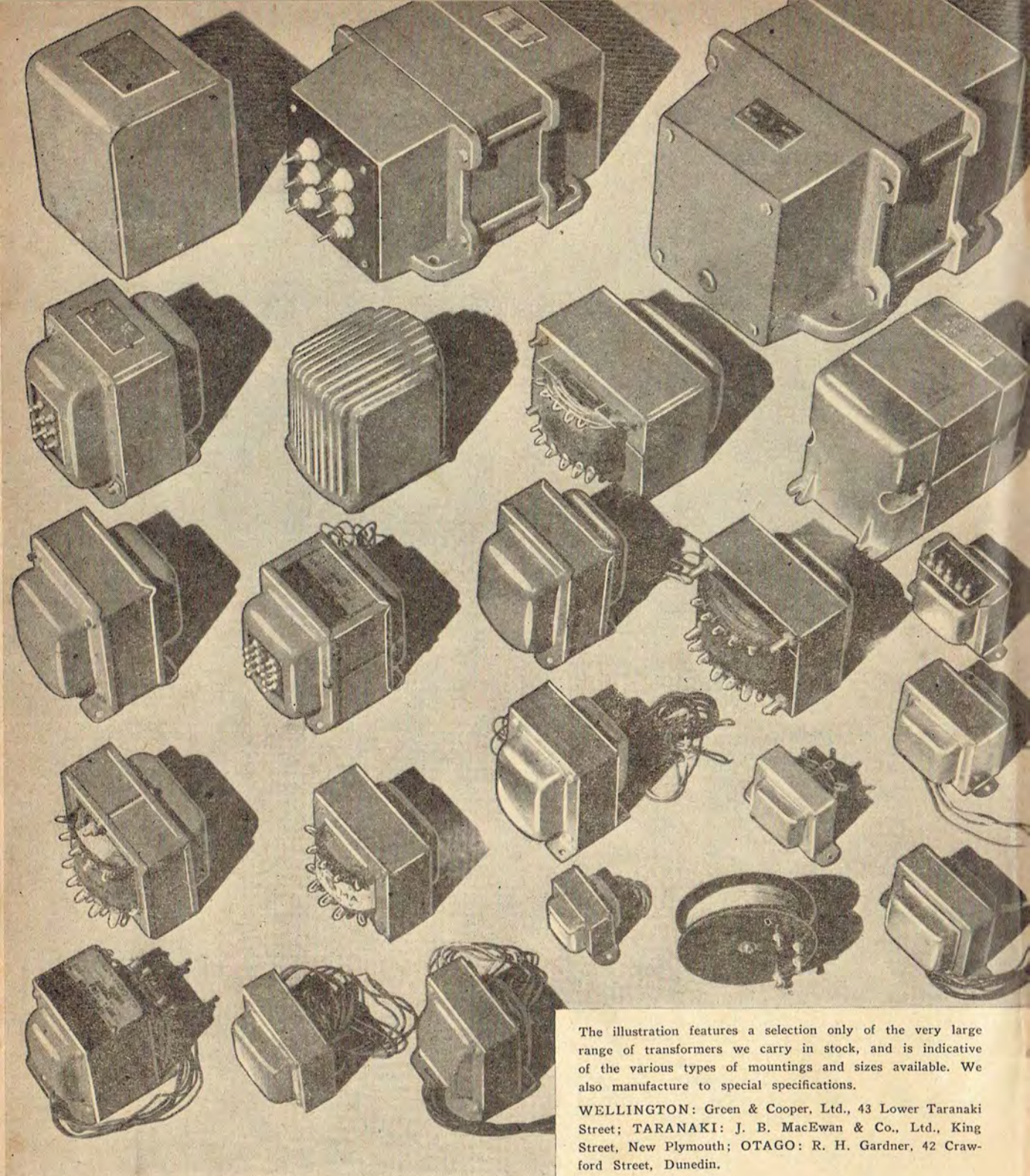
Showing the layout of parts for the first stage of the construction.

- C1, 30 μ f. max. trimmer.
C2, 0.00035 μ f. max. variable.
C3, 0.0001 μ f. fixed.
C4, 0.0003 μ f. max. variable.
C5, C6, 0.1 μ f.
R1, 2 Megs.
R2, 50,000 ohms.
R3, 5 Megs.
R4, 20,000 ohms.



The front panel, with controls mounted for the first stage of construction.



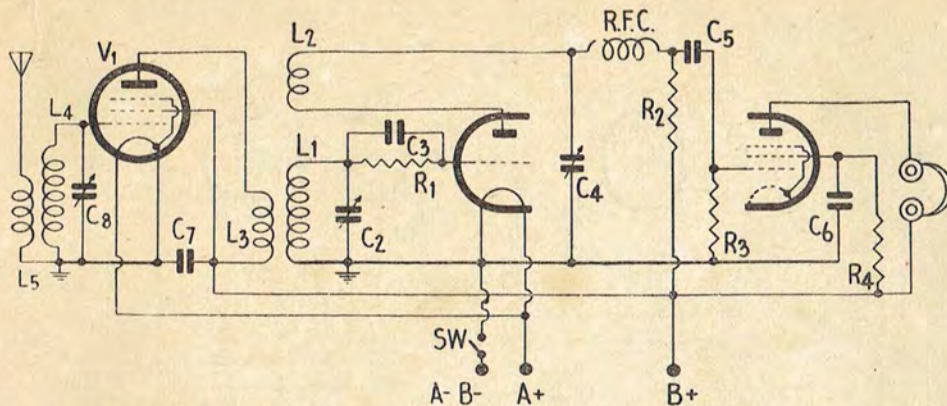


BEACON

RADIO LIMITED

32 Fanshawe St. AUCKLAND

THE SECOND STAGE OF THE "PROGRESSIVE" THREE



C₁, 30 μ f. max. trimmer.
 C₂, 0.00035 μ f. max. variable.
 C₃, 0.0001 μ f. mixed.
 C₄, 0.0003 μ f. max. variable.
 C₅, C₆, C₇, 0.1 μ f.
 V₁, 1N5-GT.

R₁, 2 Megs.
 R₂, 50,000 ohms.
 R₃, 5 Megs.
 R₄, 20,000 ohms.
 R₅, 10,000 ohms.
 R.F.C., 2.5 mh. choke.

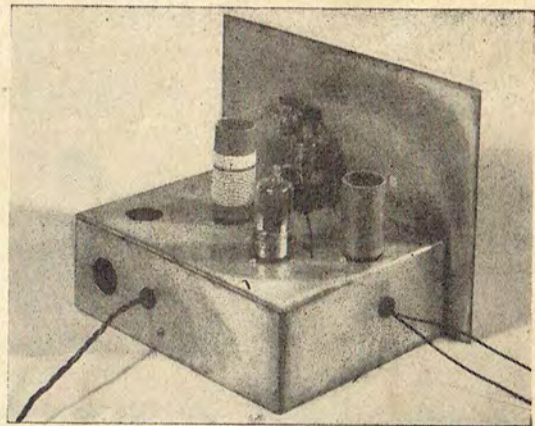
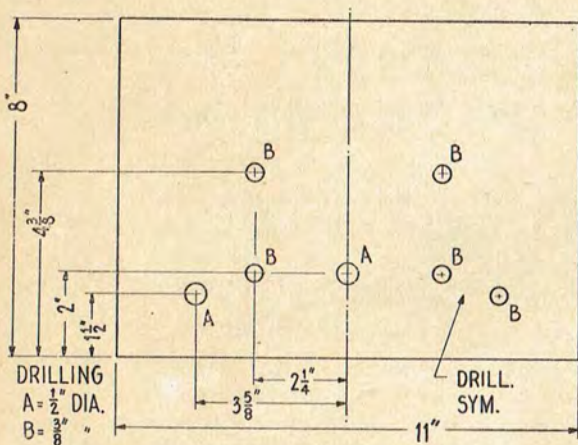
TOP-CAP = GT



1D8-GT



1N5-GT



COIL SPECIFICATIONS FOR STAGES 1 AND 2

The coil specifications are as follows. It will be noted that, with the exception of the primaries, numbers of turns are identical with those used previously.

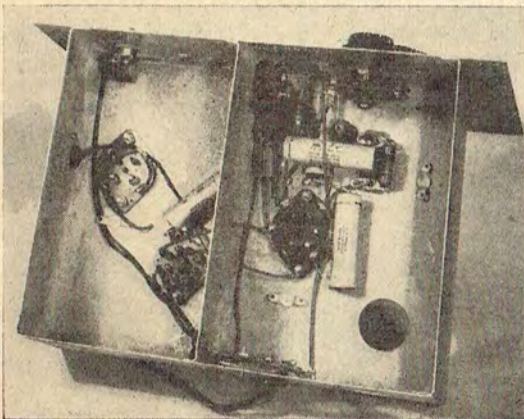
Broadcast

- L₁, 105 turns 36-gauge en. close-wound.
- L₂, 30 turns same wire, close-wound $\frac{1}{8}$ in. from top of L₁.
- L₃, 40 turns same wire, wound over bottom end of L₁.

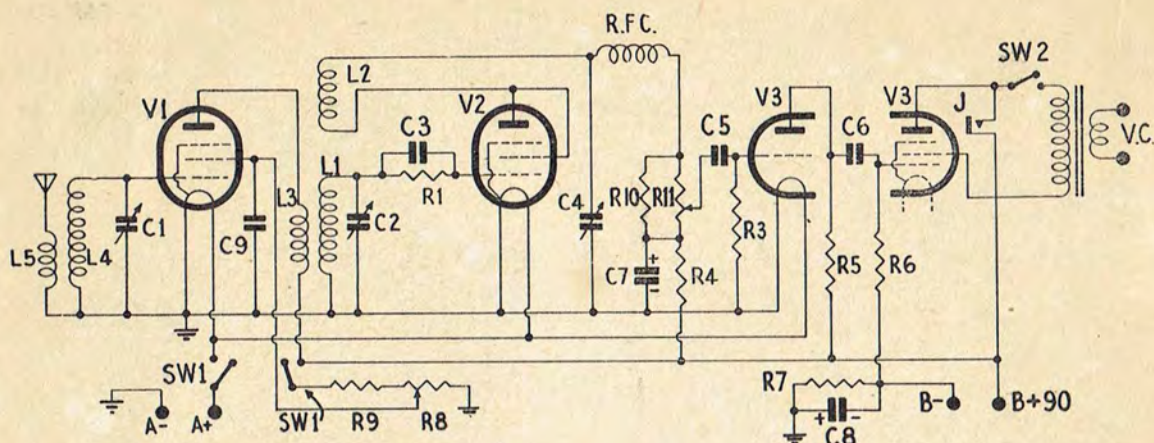
Short-Wave A (approx. 30-90m.)

- L₁, 16 turns 24-gauge en. or D.C.C. double-spaced.
- L₂, 10 turns same wire, close-wound $\frac{1}{8}$ in. from top of L₁.
- L₃, 6 turns 36-gauge en. inter-wound at bottom of L₁.

(Continued on next page.)

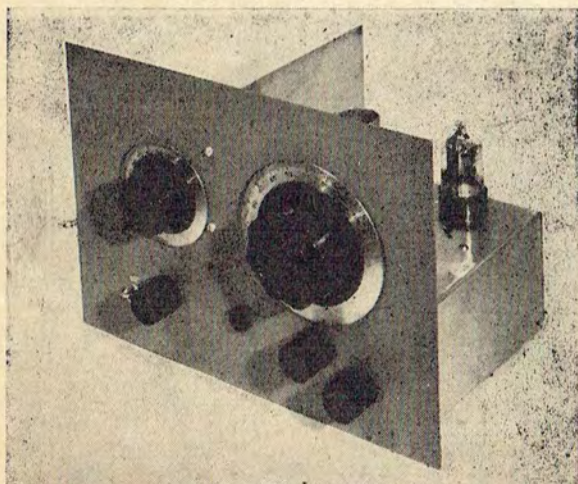


FINAL STAGE OF THE "PROGRESSIVE THREE"



R_1 , 2 Meg.
 R_2 , 10 Meg.
 R_3 , 25k.
 R_4 , 100k.
 R_5 , 0.5 Meg.
 R_6 , 1.5k.
 R_7 , 50k. pot.
 R_8 , 10k.
 R_9 , 50k.
 R_{10} , 100k. pot.
 C_1 , C_2 , 0.00035 μ f. max. variable.
 C_3 , 0.0001 μ f.

C_4 , 0.0003 μ f. max. variable.
 C_5 , 0.01 μ f.
 C_6 , C_7 , 0.1 μ f.
 C_8 , 8 μ f. electro.
 C_9 , 25 μ f. 25v. electro.
 SW_1 , Double-pole on/off.
 SW_2 , Single-pole on/off.
 R.F.C., 2.5 mh. choke.
 J, open ckt. phone jack.
 V_1 , V_2 , IN5-GT or 1P5-GT.
 V_3 , 1D8-GT.
 Output Transformer, 12,000 ohms—voice coil.



COIL SPECIFICATIONS—Continued

Short-Wave B (approx. 19-60m.)

L_1 , 6 turns 24-gauge en. or D.C.C. double-spaced.
 L_2 , 10 turns same wire, close-wound $\frac{1}{8}$ in. from top of L_1 .
 L_3 , 4 turns 36-gauge en. inter-wound at bottom of L_1 .

Note.—All coils wound on $1\frac{1}{4}$ in. diam. tubing.

The completed "Progressive Three." The dial on the right is the detector tuning, while the smaller one on the left is the R.F. tuning control. The knobs from left to right are: R.F. gain, regenerative control, and audio gain. In the centre is the phone jack, and on the extreme left is the on/off switch.

SPECIFICATION OF AERIAL COILS FOR STAGE THREE

The output from the 1D8 is ample on strong stations, both broadcast and shortwave, to drive a small loudspeaker. The phone jack and switch are included so that the phones can be used instead of the speaker for DX listening.

Broadcast:

- L_1 , 105 turns 36-gauge en. close-wound.
 L_2 , 20 turns same wire, wound over bottom end of L_1 .

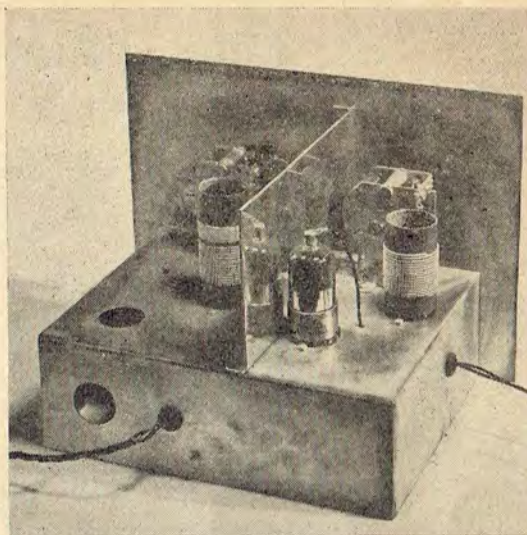
Short-Wave A (approx. 30-90m.)

- L_1 16 turns 24-gauge en. or D.C.C. doubled spaced.
 L_2 5 turns 36-gauge en. inter-wound at bottom of L_1 .

Short-Wave A (approx. 19-60m.)

- L_1 6 turns 24-gauge en. or D.C.C. double spaced.
 L_2 3 turns 36-gauge en. inter-wound at bottom of L_1 .

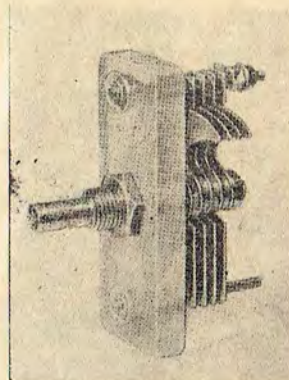
The winding should be terminated on the pins of the plug as follows: Pin No. 1, top of L_1 ; pin No. 2, bottom of L_2 ; pin No. 3, top of L_2 ; pin No. 4, bottom of L_1 .



This photograph shows the position of the aluminium shield that must be added on top of the chassis when the tuned R.F. stage is added. When the R.F. stage is untuned, this shielding is not needed.

Straight Line Frequency Variable Condensers

THIS range of low loss condensers is fitted with a special type of bearing which prevents side play and noise on rotation at high frequencies. Losses are kept to an absolute minimum by the use of a polystyrene end plate. The vanes are shaped to give approximately straight-line-frequency tuning and minimum capacities have been kept as low as possible consistent with sound mechanical construction. Although designed primarily for receiving work these condensers are suitable for use in the early stages of transmitters. Under normal conditions, the spacing of the vanes is adequate for 500 volts D.C.



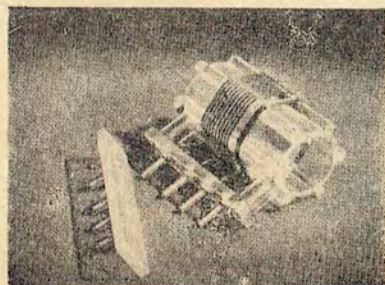
Type No.	Capacity PF		New Price
	Max.	Min.	
VCR 15	15	2.9	11/-
VCR 25	25	3.2	11/8
VCR 50	50	3.5	12/6
VCR 100	100	5.5	13/6

TYPE 1—COILS AND FORMERS

A RANGE of 4 or 6 pin plug-in coils in which losses are reduced to a minimum by the use of polystyrene ribbed formers and bases. The horizontal mounting ensures leads of minimum lengths.

DIMENSIONS:

Coil height including pins	2.0 " (51 mm.)	Bases 4-pin width	0.375" (95 mm.)
Former average diameter	1.125" (28.5 mm.)	Bases 6-pin width	0.875" (22.5 mm.)
		Former length	2.0 " (51 mm.)
		Bases length	2.0 " (51 mm.)
Ranges 7 and 8 are on 3/8" diameter formers fitted to the normal 4-pin base			
Former fitted to sub-base 4 pin		Ref. IF/1004	4/6
Former fitted to sub-base 6 pin		Ref. IF/1005	5/-
Socket base 4 pin		Ref. 5S/1000	2/2
Socket base 6 pin		Ref. 5S/1001	1/10

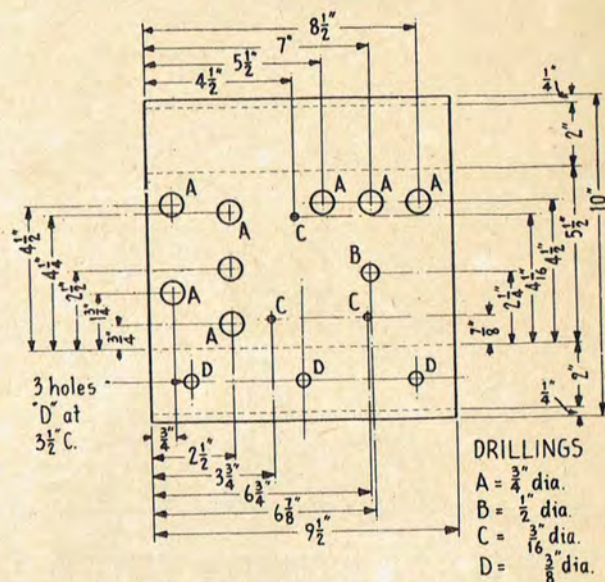
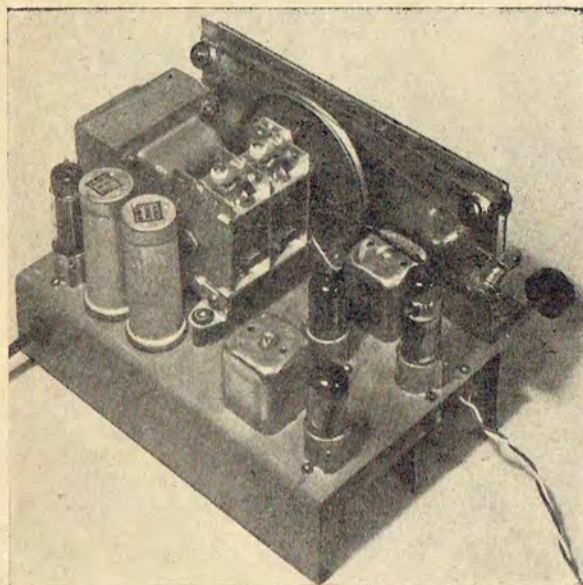


RADIO REPAIRS LTD.

7A GREAT NORTH ROAD, AUCKLAND

The Radel "Rimlock" T.R.F. Four

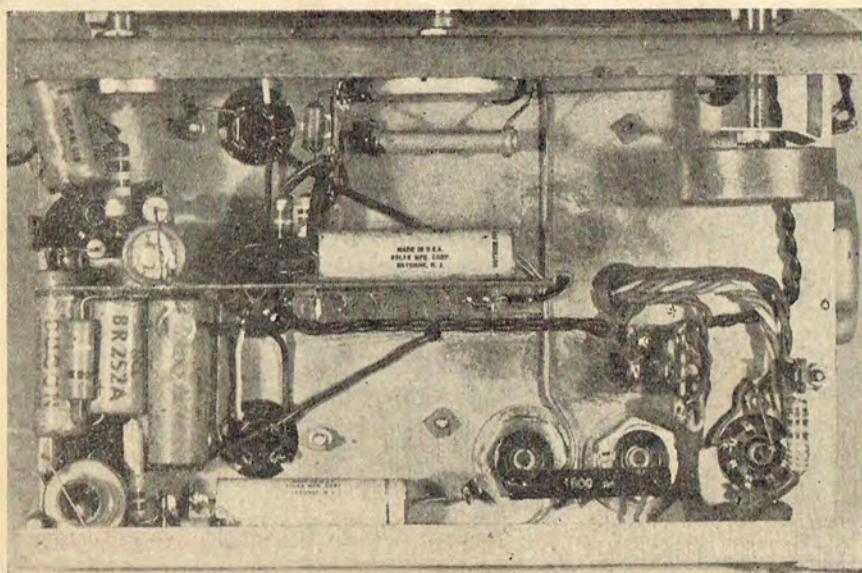
FULLY DESCRIBED IN "RADIO AND ELECTRONICS," AUGUST, 1948



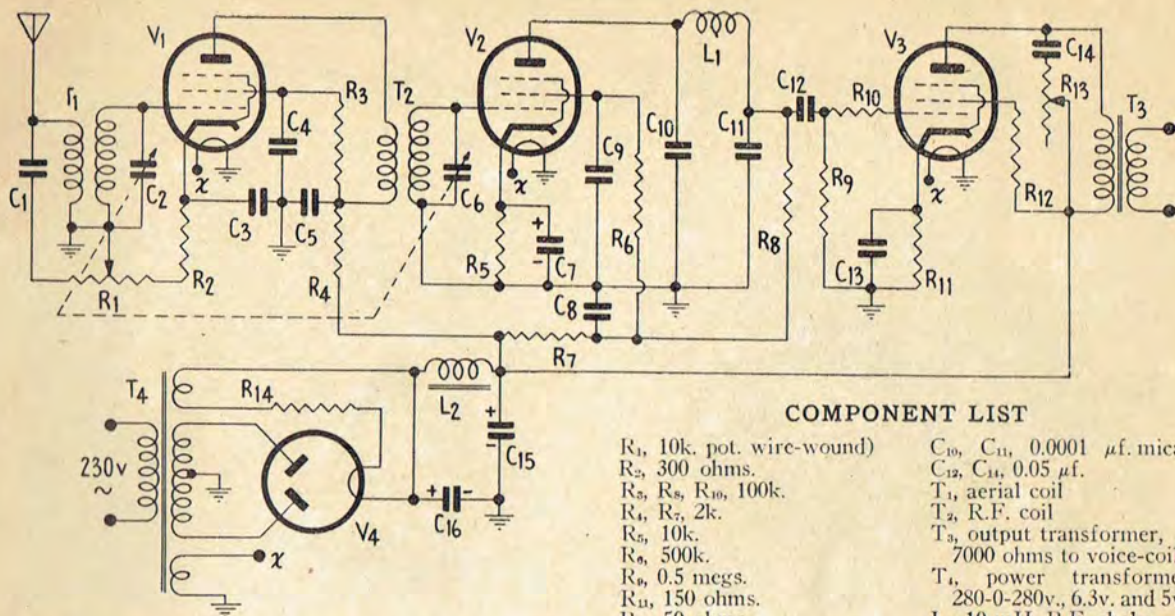
Chassis diagram of the T.R.F. receiver.

This set is a modern version of the A.C. operated three-valve T.R.F. The fourth valve is, of course, the rectifier. Note carefully the position of the underneath shield, which is taken across the socket of V1, the R.F. amplifier, so as to isolate the grid pin from

the plate pin. These pins are on opposite sides of the shield, the grid circuit on the front side of it. The valve between the coil cans is the R.F. amplifier, and the detector is at the back left-hand corner of the chassis.



Under-chassis view of the receiver. The back edge is at the top of the picture. The baffle-shield crosses the valve socket, while the detector valve is at the extreme top right-hand corner, under the R.F. choke. The rectifier is at the top left-hand corner.

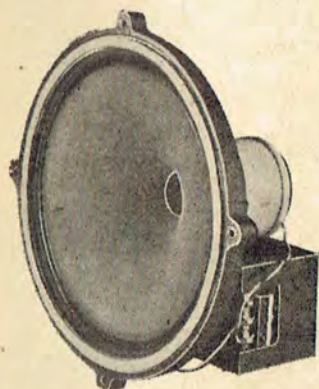


COMPONENT LIST

R ₁ , 10k. pot. wire-wound)	C ₁₀ , C ₁₁ , 0.0001 μ f. mica
R ₂ , 300 ohms.	C ₁₂ , C ₁₄ , 0.05 μ f.
R ₃ , R ₈ , R ₁₀ , 100k.	T ₁ , aerial coil
R ₄ , R ₇ , 2k.	T ₂ , R.F. coil
R ₅ , 10k.	T ₃ , output transformer,
R ₆ , 500k.	7000 ohms to voice-coil
R ₉ , 0.5 meg.	T ₄ , power transformer,
R ₁₁ , 150 ohms.	280-0-280v., 6.3v. and 5v.
R ₁₂ , 50 ohms.	L ₁ , 10 mH. R.F. choke
R ₁₃ , 25k. pot.	L ₂ , 60 ma. smoothing choke
R ₁₄ (see Note below).	or preferably 1500-ohm
C ₁ , 0.0005 μ f.	5w. resistor
C ₂ , C ₆ , gang condenser.	V ₁ , V ₂ , EF41
C ₃ , C ₄ , C ₅ , C ₈ , 0.05 μ f. paper	V ₃ , EL41
C ₇ , C ₁₃ , 50 μ f. 25v. electro.	V ₄ , AZ41.
C ₉ , 0.1 μ f.	

Note.—R₁₄ is made by winding seven inches of 28-gauge S.W.G. nichrome wire on to a 1/2-watt carbon resistor, used as a former. The required resistance is 1.6 ohms.

The TANNOY High-fidelity Loudspeaker



This is a twin loudspeaker system consisting of a direct radiator low-frequency unit and a hornloaded high-frequency unit fed from a carefully designed cross-over network. The response of both units is intrinsically level and the wide-frequency range is not obtained by "trick" effects, such as cone break-up or diaphragm resonance. The design of the low-frequency cone which forms the final section of the high-frequency horn is such that an even distribution of the high frequencies is obtained over a wide angle. In order that the low-frequency diaphragm shall move more nearly as a piston, the body thickness has been increased and the surround is treated to prevent the setting-up of subsidiary resonances. In the design of this loudspeaker, great care has been taken to ensure that the entire system is aperiodic, which, together with the wide frequency range, results in good transient response and faithful reproduction.

TECHNICAL DATA

Voice Coil Dia. LF, 2 in.
Voice Coil Dia. HF, 2 in.
Voice Coil Impedance LF D.C. 9 ohms, 12 ohms at 400 cps.
Voice Coil Impedance HF D.C. 8 ohms, 12 ohms at 2000 cps.
Power handling capacity (peak), 20 watts.
Impedance via Cross-over Network, 15 ohms.
Frequency response, 25-20,000 cps. plus minus 3 db. 40-12,000 cps.
Intermodulation products less than 2 per cent.

Bass response will depend on baffle size or volume of enclosure if infinite baffle is used, details for which can be supplied.

DIMENSIONS

Overall diameter, 15.25 in. Depth, 11 in. Fixing holes P.C.D., 15.5 in.
Weight, including matching transformer and cross-over network, 30 lb.

PRICE £39/5/-

Sole New Zealand Agents for Tannoy Twin Concentric High-Fidelity Speakers:



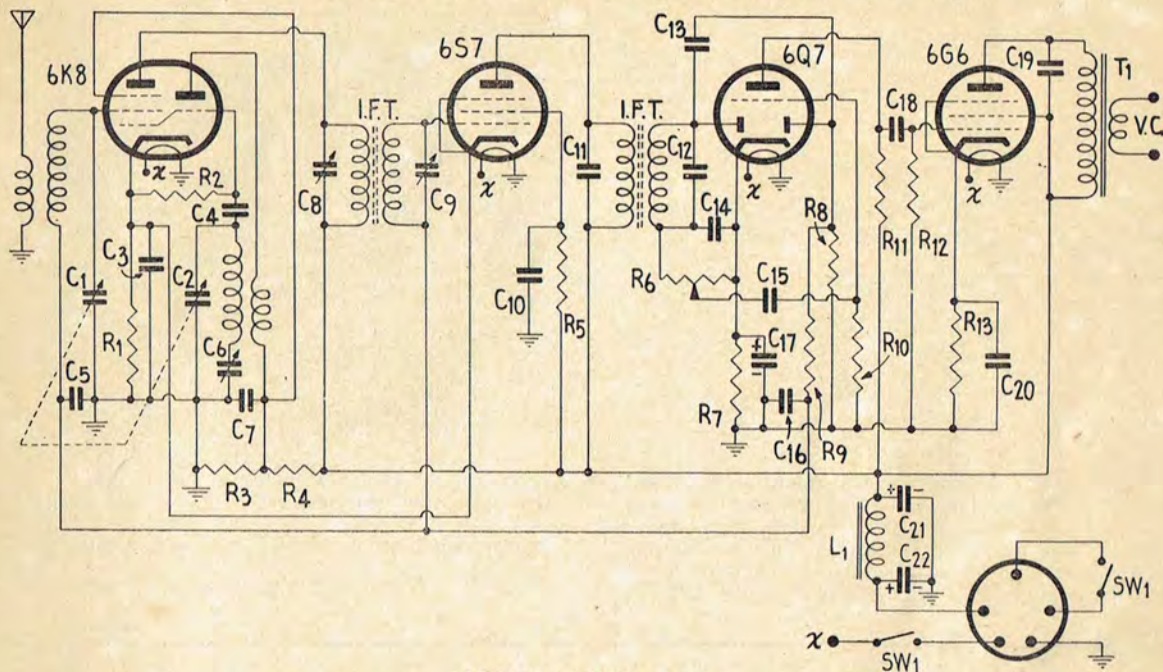
Green & Cooper Ltd.

RADIO ENGINEERS

Phone 54-418 :: 43 Lower Taranaki Street, Wellington, C.3 :: Telegrams "Fidelatone"

The Radel Vibrator Four

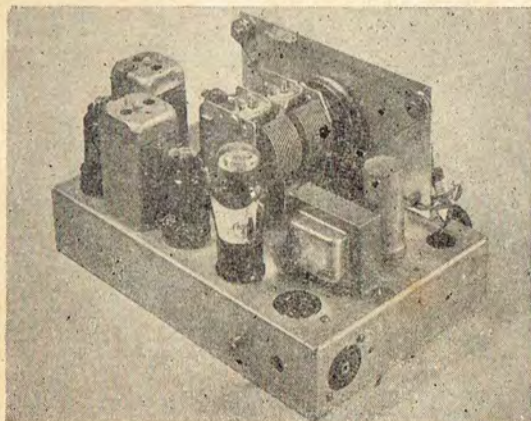
FULLY DESCRIBED IN "RADIO AND ELECTRONICS," MARCH, 1947



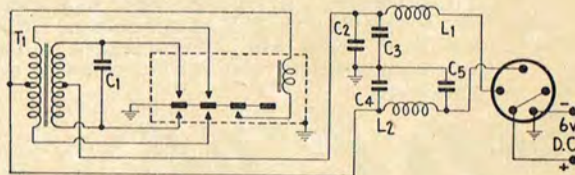
COMPONENT LIST

R₁, 166 ohms (1000 and 200 in parl.)
 R₂, 50k. $\frac{1}{2}$ w.
 R₃, 20k. 1w.
 R₄, 2.5k. 1w.
 R₅, 70k. (100k. and 250k. in parl.)
 R₆, 0.5 meg. pot.
 R₇, 5k. $\frac{1}{2}$ w.
 R₈, R₉, 1 meg. $\frac{1}{2}$ w.
 R₁₀, 0.5 meg. $\frac{1}{2}$ w.
 R₁₁, 250k. $\frac{1}{2}$ w.
 R₁₂, 0.5 meg. $\frac{1}{2}$ w.
 R₁₃, 500 ohms 1w.
 C₁, C₂, condenser gang.

C₃, C₇, 0.25 μ f. paper.
 C₄, C₁₃, C₁₄, 0.0001 μ f. mica.
 C₅, C₁₀, C₁₅, C₁₈, 0.1 μ f. paper.
 C₆, 600 μ f. padder.
 C₈, C₉, C₁₁, C₁₂, I.F. trimmers.
 C₁₆, 0.01 μ f. paper.
 C₁₇, C₂₀, 25 μ f. 25v. electro.
 C₁₉, 0.002 μ f. paper.
 C₂₁, C₂₂, dual 10 μ f. 450v. electro.
 L₁, 40 ma. vibrator choke.
 SW₁, double pole on/off.
 T₁, output transformer, 10,000 ohms to V.C.



View of the completed receiver. Note the sockets for connection of the speaker and power cable. The latter is plugged into the five-pin socket on side of the chassis.



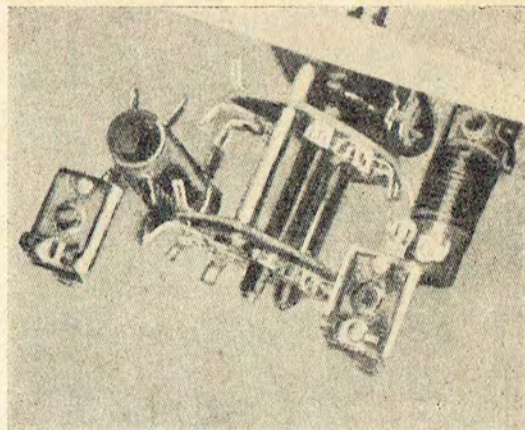
Circuit and Component Values for the Vibrator power supply unit

T₁, 6v. vibrator transformer, centre-tapped primary, output 135v. D.C.
 C₃, 0.001 μ f. mica.
 C₁, 0.05 μ f. 500v. mica.
 L₁, 10 μ f. R.F. choke.
 C₂, C₄, C₅, 0.1 μ f.
 L₂, R.F. choke (see text).

This is really a vibrator version of the A.C. Broadcast Five. The chassis can be the same as that for the Dual-wave Five, and a scale drawing is given on page 23. In this set the smoothing choke is mounted where the power transformer can be seen on the Broadcast Five, and there is also room for the speaker socket, which can be seen behind the choke in the photograph on this page.

The Radel A.C. Dual Wave Five

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," SEPTEMBER, 1946



This set is the dual-wave version of the "A.C. Broadcast Five." The mounting of the shortwave coils and wave-change switch is illustrated in the photograph above. The broadcast coils are mounted in the same positions that they occupy in the "Broadcast Five." (Please see note on page 20.)

Showing how the shortwave coils and wave-change switch are mounted before wiring them up.

FOR FAULTLESS RECEPTION

- CHROMIUM PLATED
- RUSTLESS
- SPRING CONTACT BETWEEN SECTIONS
- PRECISION ENGINEERED

The "Walbar" telescopic car aerial is designed to fit any make of car and is available in a variety of lengths and models. Fitted with its specially insulated mounting to obtain maximum performance, the "Walbar" aerial will assure faultless radio reception whether your car is stationary or travelling.

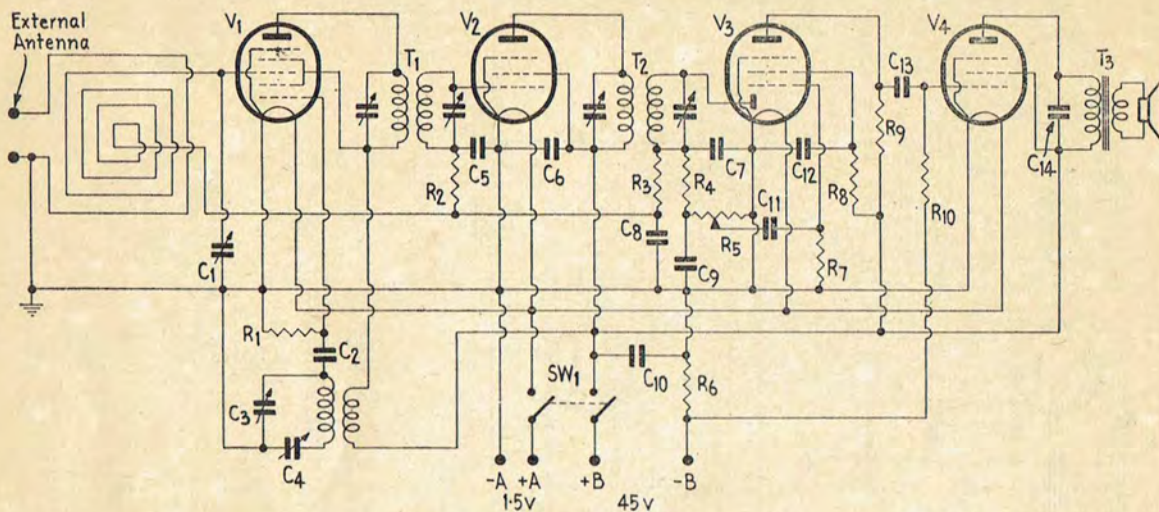
"Walbar"
telescopic
car aerial



Sole New Zealand Distributors: Miles Nelson Ltd., Chancery Chambers, Chancery Street, Auckland, Wholesale Stockists of Radio Components

The Radel Portable Four

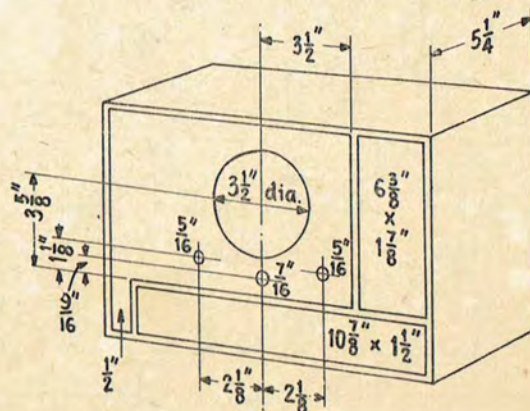
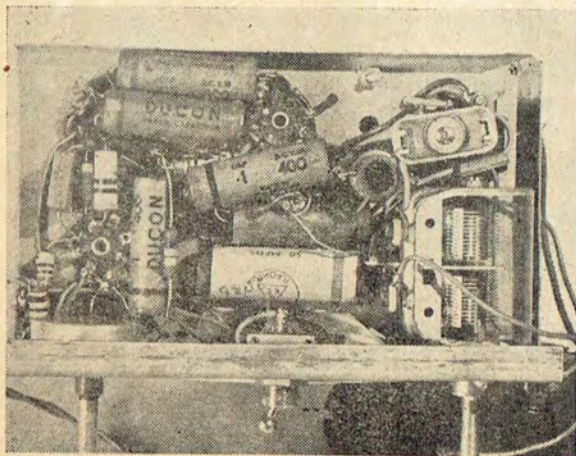
FULLY DESCRIBED IN "RADIO AND ELECTRONICS," DECEMBER, 1947

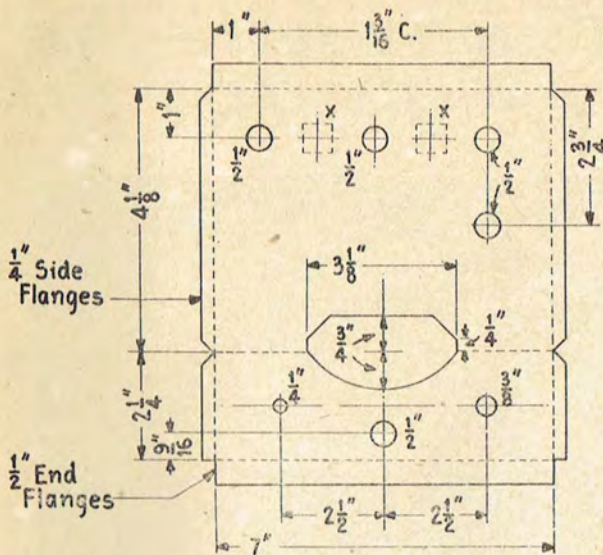


COMPONENT LIST

R_2 , 1 meg. pot.
 R_4 , 500 ohms.
 R_7 , 10 megs.
 R_8 , 3 megs.
 R_9 , 1 meg.
 T_1 , T_2 , 465 kc/sec. I.F. transformers.
 T_3 , output transformer 8000 ohms to V.C.
 SW_1 , D.P.S.T. on/off.
 V_1 , 1R5.
 V_2 , 1T4.
 V_3 , 1S5.
 V_4 , 1S4.

C_1 , C_3 , 2-gang condenser.
 C_2 , 50 μ f.
 C_4 , 600 μ f. padder.
 C_5 , C_8 , 0.05 μ f.
 C_6 , C_{12} , 0.1 μ f.
 C_7 , C_9 , 100 μ f.
 C_{10} , 8 μ f. 50v. electro.
 C_{11} , C_{14} , 0.002 μ f.
 C_{13} , 0.0005 μ f.
 R_1 , R_2 , 100k.
 R_8 , R_{10} , 2 megs.
 R_1 , 50k.





Above is a working drawing for the chassis of the Portable Four.

This four-valve portable was designed for ease of building rather than extreme compactness. The large A battery that can be used is a great advantage. The speaker is mounted on the chassis with two small angle-brackets, so that the speaker screws hold the whole chassis to the cabinet. The front edge of the chassis rests on the shelf above the A battery. Along the back of the chassis, looking at the chassis diagram, are, from left to right, the 1R5, V1, the 1T4, V2, and the 1S5, V3. The output tube, V4, is in front of the row.

Performance is improved in this set by the use of full-sized I.F. transformers. Note how the loop is well away from the metal parts of the set, increasing its sensitivity on that account.

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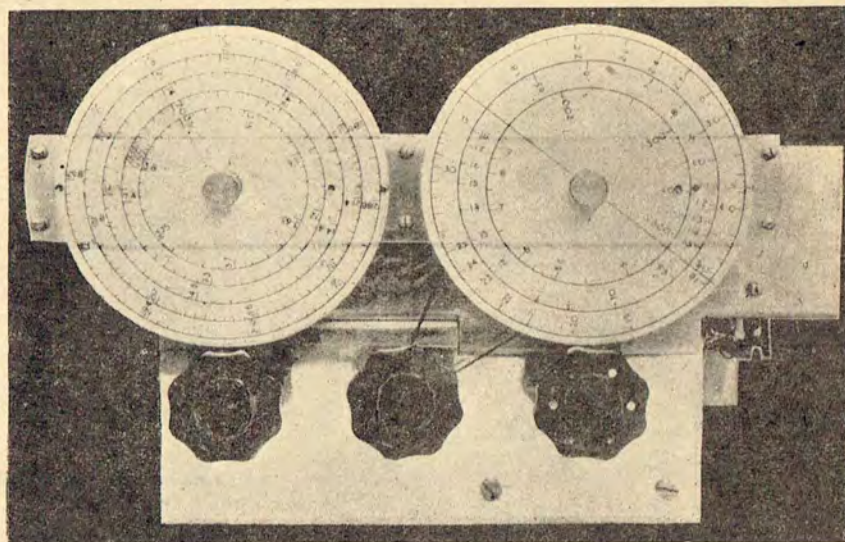
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A TECHNICAL DESCRIPTION

The C.T.4 is a complete allwave tuning unit, mainly for use in communication receivers, having one high-gain R.F. stage, mixer and separate oscillator, and covering, in six ranges, 175 kc/s. to 36 mc/s. with an I.F. of 1.6 mc/s. The well-known Denco turret assembly arrangement is used.



IMPORTANT FEATURES

(1) Constant gain characteristic from 1.65 to 36 mc/s., made possible by the use of a special circuit arrangement for coupling between R.F. and mixer stages. When the recommended input circuit is used, the gain variation is not more than 6 db. over this range, thus going a long way to overcome the familiar discrepancies in "S" meter readings.

(2) Calibrated bandspread of all amateur bands by means of mechanical partial rotation of the stator vanes of the three-gang tuning condenser. Bandspread on intermediate frequencies is also possible on logging scale.

(3) Coils wound on low-loss Polystyrene, with adjustable iron-dust cores.

(4) Polystyrene insulation used throughout

(5) Accurate tracking of signal and oscillator circuits, all condensers, etc., being provided.

(6) Concentric air-spaced trimmers for each coil in the unit.

(7) Provision for matching a number of varying aerial impedances over the three highest frequency bands.

(8) Six bands covered by the turret are as follows:—

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1650.0–5.0 Mc/s.

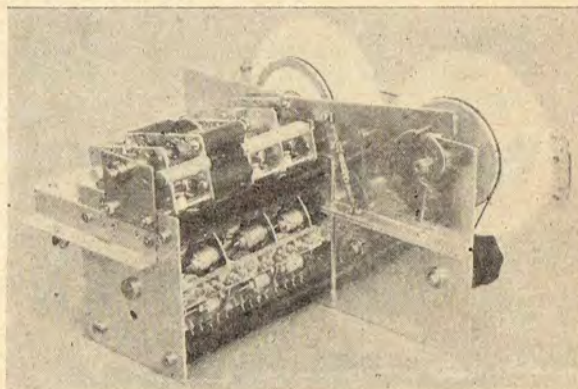
9.4–18.8 Mc/s.

515–1545 Kc/s.

4.8–9.6 Mc/s.

18.0–36.0 Mc/s.

(9) Designed for high-slope tubes from 4 to 9 ma/v.



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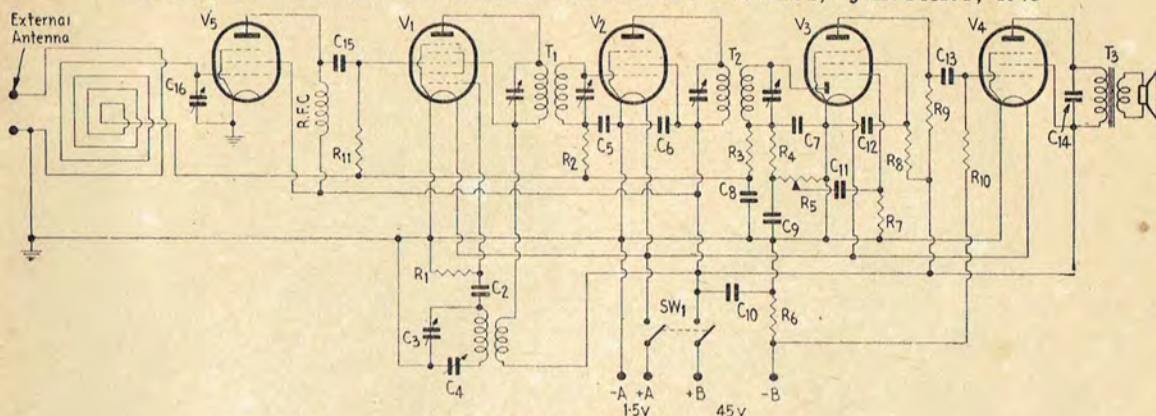
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The Radel Portable Five

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JANUARY, 1948

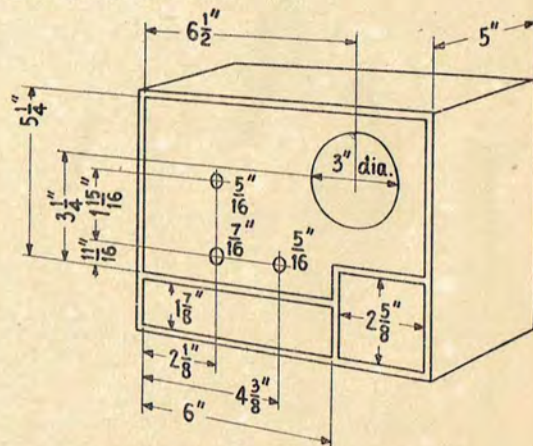
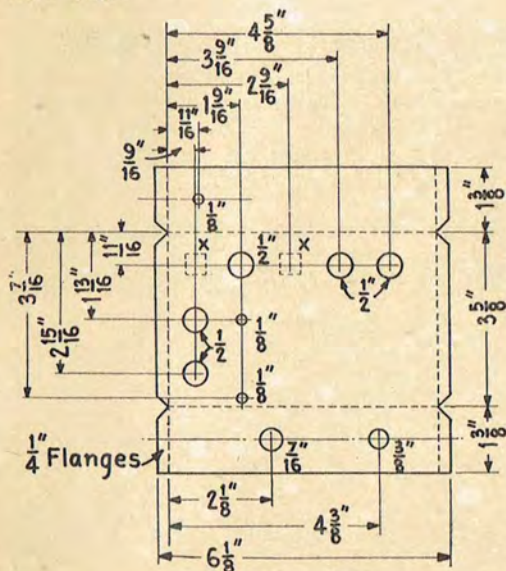


COMPONENT LIST

C₃, C₁₀, midget two-gang condenser.
 C₂, 50 μ f. mica.
 C₄, 600 μ f. padder.
 C₅, C₆, C₈, C₁₂, 0.02 μ f. paper.
 C₇, C₉, C₁₅, μ f. 100 μ f. mica.
 C₁₀, 8 μ f. 50v. electro.
 C₁₁, C₁₄, 0.002 μ f. paper.
 C₁₃, 0.005 μ f.
 R₁, R₂, 100k.
 R₃, R₁₀, 2 megs.
 R₄, 50k.
 R₅, 1 meg. pot.
 R₆, 500 ohms.
 R₇, 10 megs.
 R₈, 3 megs.

R₉, R₁₁, 1 meg.
 T₁, T₂, midget 465 kc/sec. I.F. transformers.
 T₃, output transformer, 8000 ohms to V.C.
 SW₁, D.P.S.T. on/off.
 V₁, 1R5.
 V₂, V₅, 1T4.
 V₃, 1S5.
 V₄, 1S4.
 "A" battery, type No. 742.
 "B" battery, type No. 482.

Note.—If desired, a 67.5v. battery type may be used instead of type 482 for the "B," and will give higher output power. The only change necessary would be to increase the rating of C₁₀ to a value higher than 67.5 volts.



At left: Working drawing of chassis.

Above: Skeleton drawing showing layout of partitions in the cabinet, and the placement of the necessary holes in the front. All measurements are INSIDE dimensions.

This is a compact five-valve portable which is none the less easy to construct. Photographs of the completed set appear on the next page.

Note the untuned coupling between the R.F. amplifier and the mixer. Looking at the chassis diagram, the set starts at the bottom left-hand

corner with the R.F. stage, with the 1R5 behind it. In the left-hand back corner is the first I.F. transformer (midget), after which the set progresses along the back of the chassis, exactly following the circuit. The 1/8 in. holes on the chassis are the mounting holes for the midget gang condenser.



Back view of the receiver, showing the physical layout of the chassis, speaker, and batteries. Although the set is quite small, there is plenty of space available.



Front view of the receiver, showing the location of the controls.

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TRANSMITTING TUBES: 807 Radiotron, 6/6; 834 RCA, 10/-; 808 GE 39/6; 866A, 22/6.

VALVE SOCKETS: S8 Amphenol Octal, 3/11 doz.; 4, 5, 6 pin, 6d. each; 7 wafer, 3d.; Johnson Acorn plated contacts, 7/-; ICA Acorn, 3/6.

ZC1 SPARES: Dynamic Phones, 75 ohm, flex and plug, 6/6; Stromberg Carlson 100 ohm, 6/6; 2000 ohm ditto, 15/6; Filter Chokes, 100 ma., 7/11; I.F. Transformers, 465 kc. Iron Core, 7/6; Knobs, 4d.; Heavy-duty Vibrator Packs, 12v.-300v., 57/6; Remote Control Units (Buzzer, Key, Switches, Condensers, Cast Aluminium Case), 7/11 each; Carbon Mics, flex and plug, 6/6; Dynamic Type, 3/6 each; BFO Coil Units, 2/11; Phone Plug, Dynamic 1/6, Standard 2/6; Morse Keys, 2/6; Calibrated Dial and Knob, 1/-; Single Relays, 4/-; plus many others.

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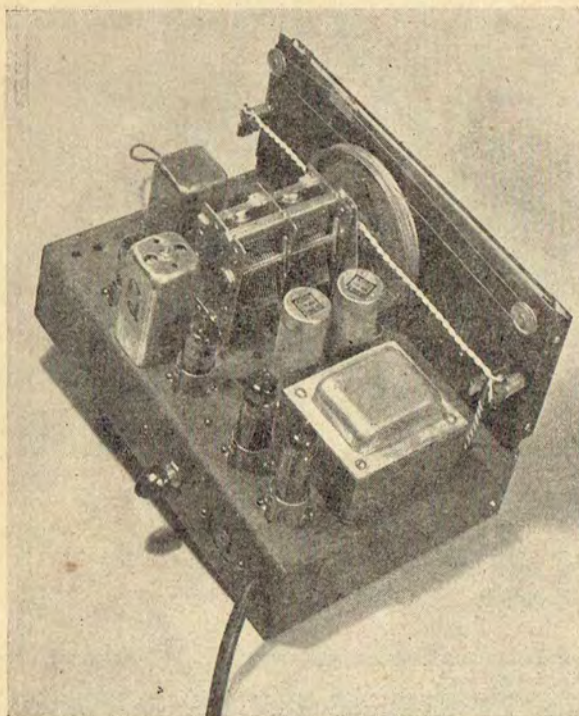
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THE RADEL RIMLOCK DUAL-WAVE FIVE



A general view of the receiver. The tone control can be seen at the back of the chassis next to the speaker socket.

COMPONENT LIST

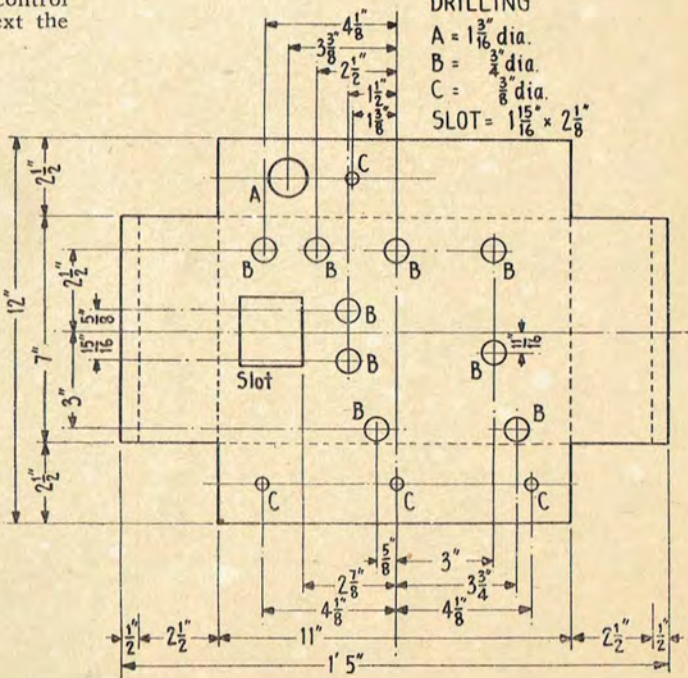
- $R_1, R_4, R_{11}, R_{18}, 50k.$
 $R_2, 200 \text{ ohms.}$
 $R_3, R_5, 30k.$
 $R_6, 300 \text{ ohms.}$
 $R_7, R_8, R_{14}, 1 \text{ meg.}$
 $R_9, R_{15}, R_{16}, R_{21}, 100k.$
 $R_{10}, 2k.$
 $R_{12}, R_{17}, 500k. \text{ pot.}$
 $R_{13}, 1200 \text{ ohms.}$
 $R_{19}, 150 \text{ ohms.}$
 $R_{20}, 1200 \text{ ohms, } 5w.$
 $C_1, C_{21}, \text{two-gang condenser, } 420 \mu\text{f. max.}$
 $C_2, C_3, C_4, C_6, C_7, C_9, C_{10}, C_{11}, C_{14}, C_{16}, 0.05 \mu\text{f.}$
 $C_5, \text{padder in coil unit.}$
 $C_8, C_{22}, 50 \mu\text{f. mica.}$
 $C_{12}, C_{13}, 100 \mu\text{f. mica.}$
 $C_{15}, 25 \mu\text{f. } 25v. \text{ electro.}$
 $C_{17}, 500 \mu\text{f. mica.}$
 $C_{18}, 50 \mu\text{f. } 25v. \text{ electro.}$
 $C_{19}, C_{20}, 32 \mu\text{f. } 250v. \text{ electro.}$
 $T_1, T_2, \text{aerial and oscillator coils, in coil unit.}$
 $T_3, T_4, \text{I.F. transformers, } 465 \text{ kc/sec.}$
 $T_5, \text{output transformer, } 7000 \text{ ohms to voice-coil.}$
 $T_6, \text{power transformer, } 280-0-280v., 60 \text{ ma., } 6.3v.$
 $\quad \quad \quad 2 \text{ amp., } 5v. 1 \text{ amp. (See text.)}$
 $V_1, \text{ECH41.}$
 $V_2, V_3, \text{EAF41.}$
 $V_4, \text{EL41.}$
 $V_5, \text{AZ41. (See text.)}$

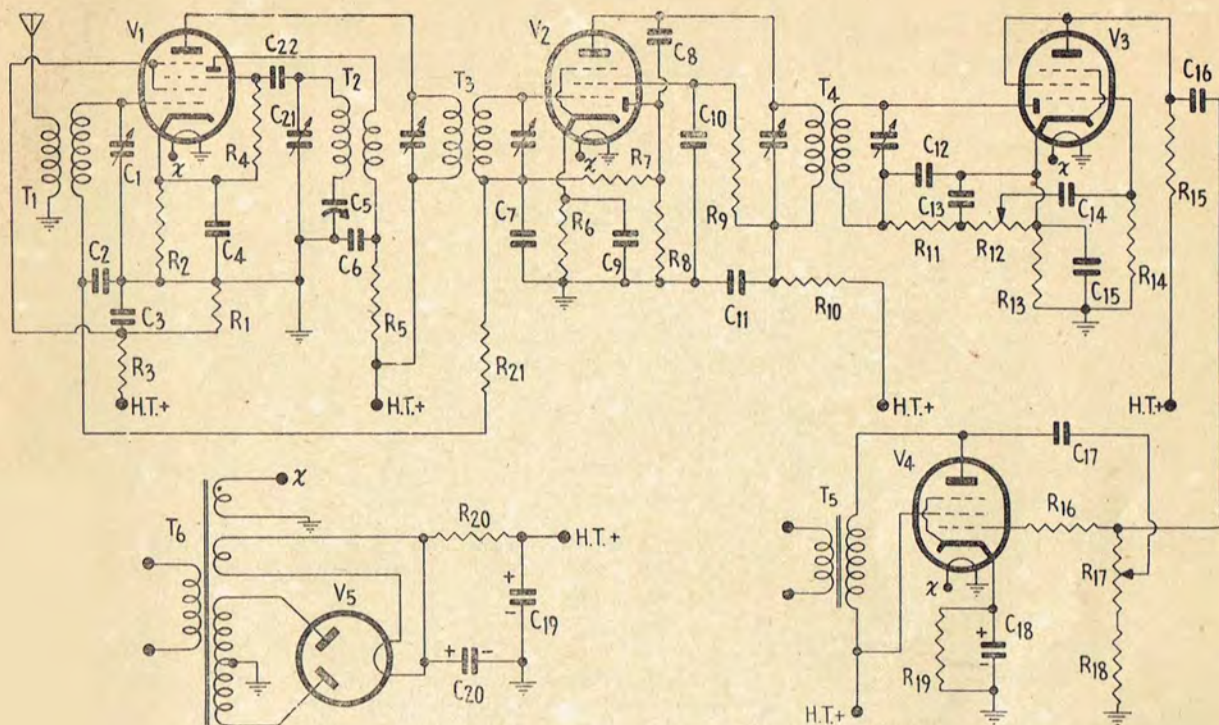
DRILLING

- $A = 1\frac{3}{16} \text{ dia.}$
 $B = \frac{3}{4} \text{ dia.}$
 $C = \frac{3}{8} \text{ dia.}$
 $\text{SLOT} = 1\frac{15}{16} \times 2\frac{1}{8}$

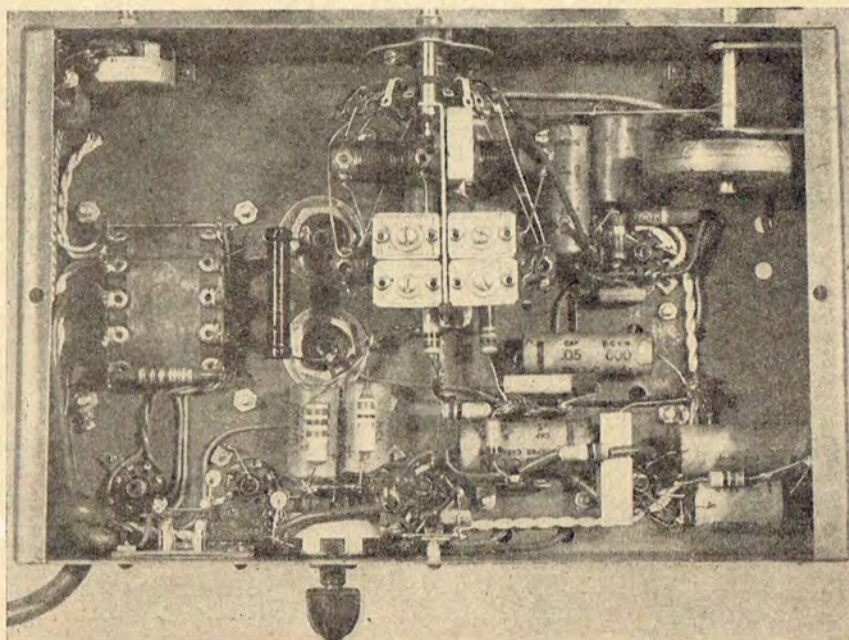
This set is a compact one for a dual-wave five-valve, but is not cramped. It is an excellent performer in all respects, and the use of the new single-ended Rimlock valves does not introduce any difficulties for the constructor.

The AZ41 rectifier has been used in order to keep the Rimlock types throughout. Unfortunately, this valve has a 4v. filament, so that, if a transformer with a 4v. filament winding is not available, it will be necessary to use a home-made dropping resistor, as described under the "Radel T.R.F. Four," which also uses an AZ41 rectifier. If it is desired to avoid this trouble, one can use any ordinary small rectifier which has a 5v. filament.





Note.—For the AZ41 rectifier, a dropping resistor not shown on the diagram, of 1.6 ohms must be used in series with the filament if a 5v. winding is used for the rectifier.



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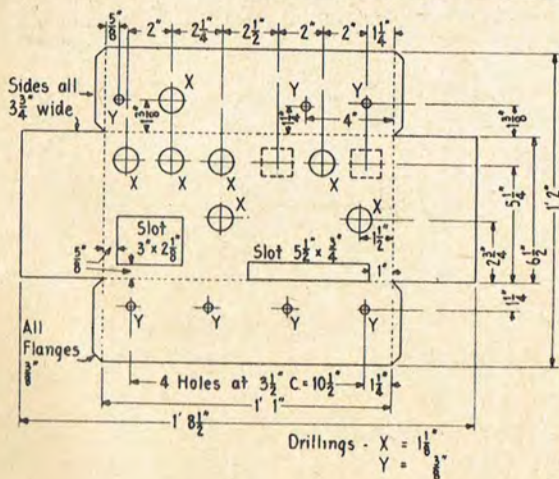
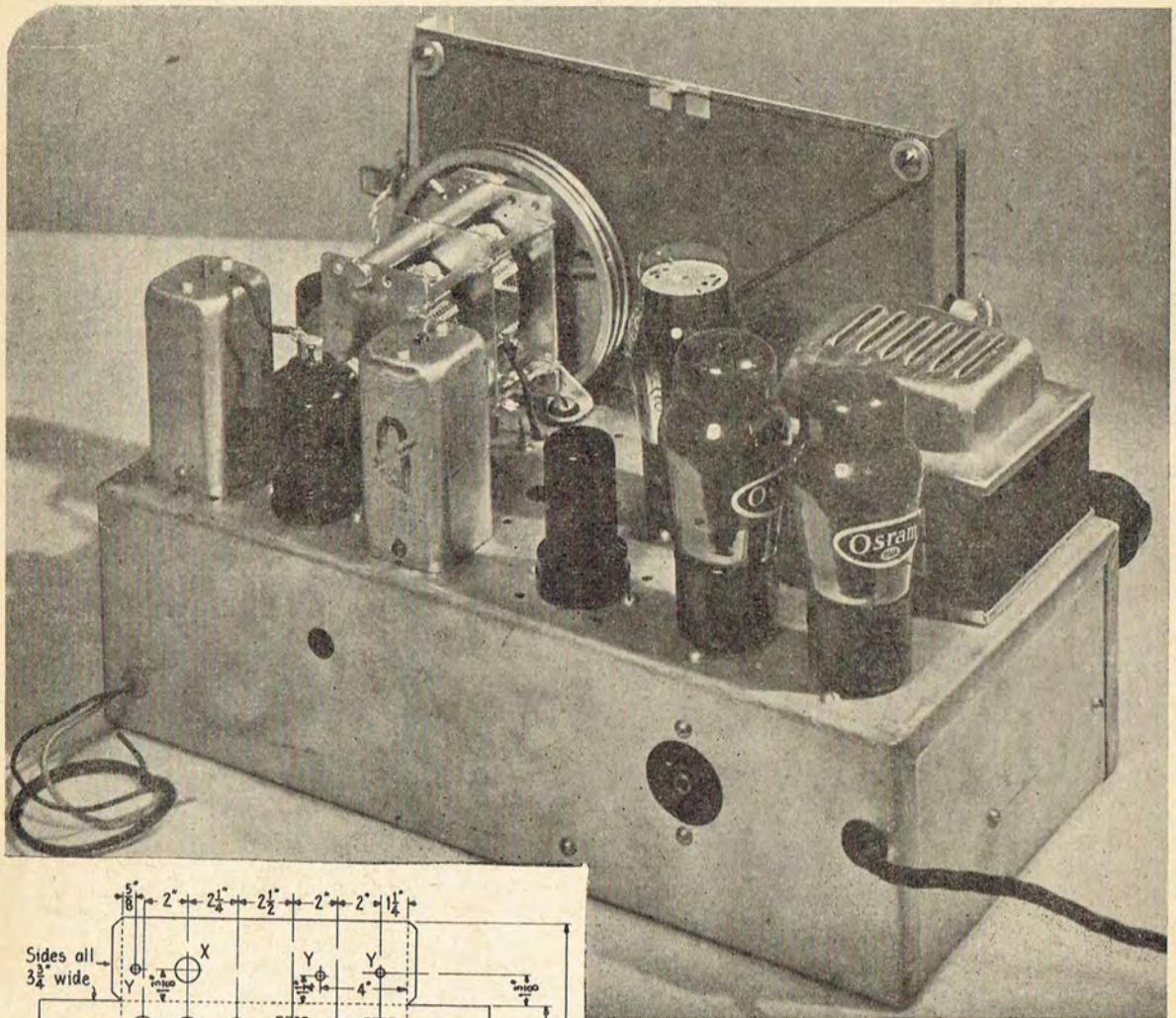
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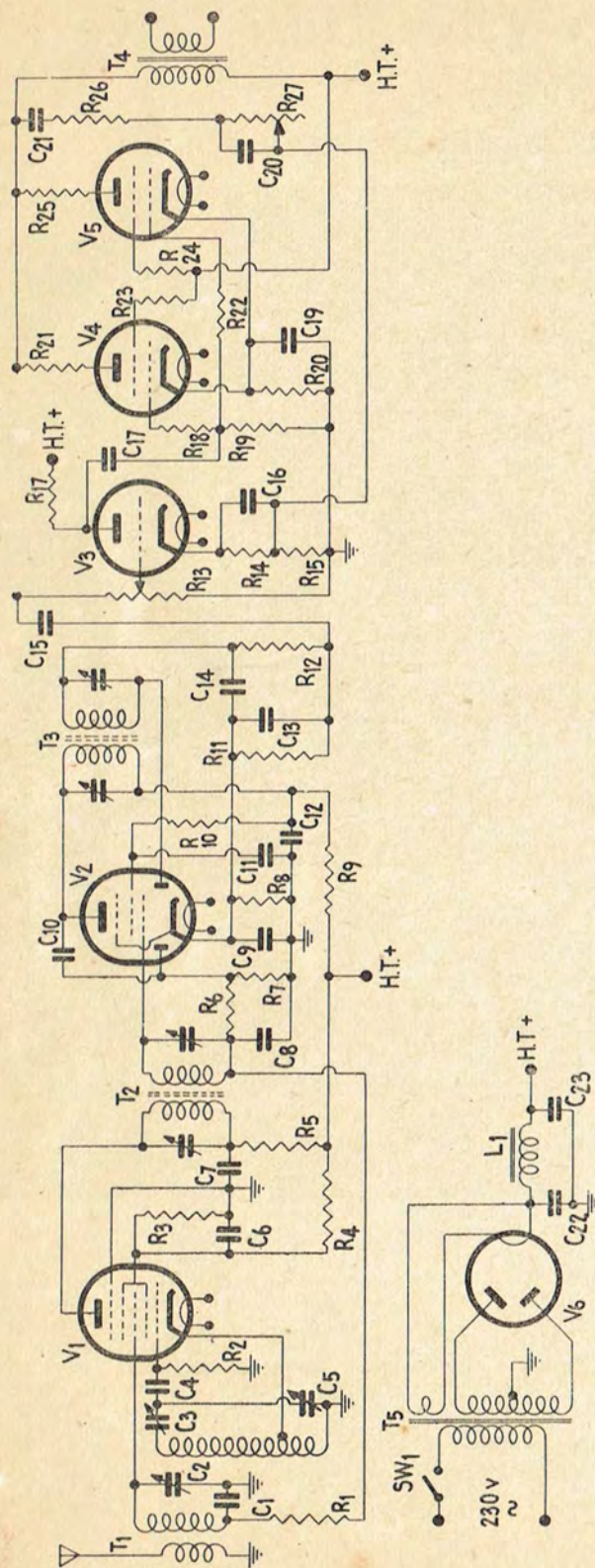
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A High-Quality Six-Valve Dual-Wave Receiver

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," MARCH, 1948

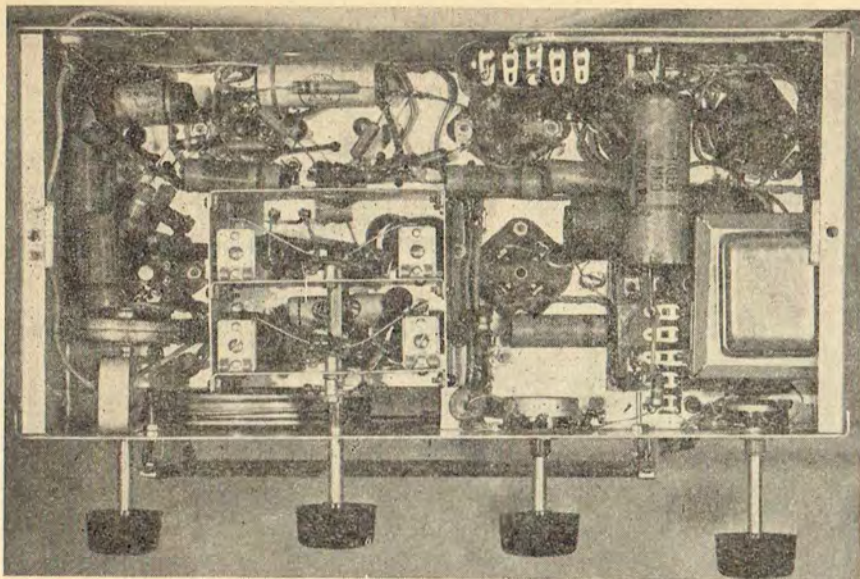


This set is like the usual five-valve in that it has no R.F. stage, but the extra valve is used as an additional power valve. The output stage thus consists of two Osram KT61's in parallel, giving an undistorted output of 8 watts, with good fidelity. This is excellent where more than the usual power output is wanted, without the additional expense usually incurred by using a push-pull output stage. Tone control by means of adjustable negative feedback is incorporated. The layout is straightforward, and follows the circuit along the back of the chassis, with the exception that the 6SA7 oscillator-mixer is in front of the first I.F. transformer, at the left-hand end in the photograph.



COMPONENT LIST

- C₁, C₂, C₃, C₄, C₅, C₆, C₇, C₈, C₉, C₁₀, C₁₁, C₁₂, C₁₃, C₁₄, C₁₅, 0.05 μ f. paper.
 C₁₆ + C₁₇, gang condenser.
 C₁₈, paddler, in coil unit.
 C₁₉, C₂₀, C₂₁, C₂₂, C₂₃, C₂₄, C₂₅, C₂₆, C₂₇, 0.0001 μ f. mica.
 C₂₈, C₂₉, 0.1 μ f. paper.
 C₃₀, C₃₁, C₃₂, C₃₃, 50 μ f. 25v. electro.
 C₃₄, 50 μ f. mica.
 C₃₅, 0.001 μ f. paper.
 C₃₆, 0.5 μ f. paper.
 C₃₇, C₃₈, 16 μ f. 450v. electro.
 T₁, aerial coil, in coil unit.
 T₂, T₃, I.F. transformers, 465 kc/sec., iron-cored.
 T₄, output transformer, 3000 ohms to voice-coil.
 T₅, power transformer, 330-0-330v., 100 ma., 5v.
 L₁, 100 ma., 20 H. smoothing choke.
 V₁, 6SA7.
 V₂, 6B8-G or 6B8 metal.
 V₃, 6J5 metal or 6J5-G.
- V₄, V₅, KT61.
 V₆, 80.
 R₁, R₂, 50k.
 R₃, 20k.
 R₄, R₅, R₆, R₇, R₈, R₉, R₁₀, R₁₁, R₁₂, R₁₃, R₁₄, R₁₅, 100k.
 R₁₆, 15k.
 R₁₇, R₁₈, 2k.
 R₁₉, R₂₀, R₂₁, 1 meg.
 R₂₂, 250 ohms.
 R₂₃, 1 meg. pot. (volume).
 R₂₄, 1.5k.
 R₂₅, 1k.
 R₂₆, 250k.
 R₂₇, 50 ohms.
 R₂₈, R₂₉, R₃₀, R₃₁, R₃₂, 25 ohms.
 R₃₃, 200k.
 R₃₄, 2 meg. pot. (tone).
 SW₁, S.P.S.T. on/off.

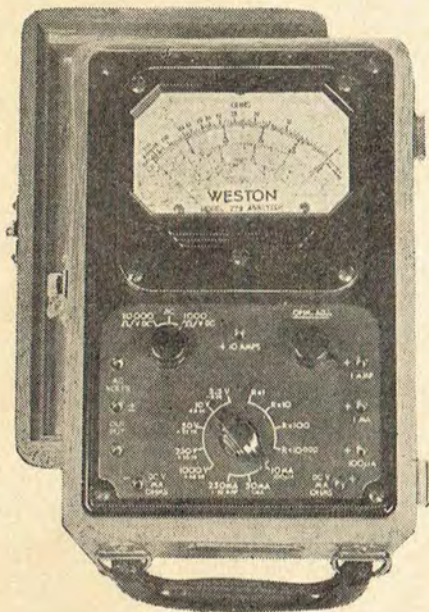


Under-chassis view of the set. The smoothing choke can be seen in the right-hand corner of the photograph. The right-hand knob is the tone control, and the next one is the volume control.

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50	50	10 Ma.	+ 12 to + 28	0.300,000	
250	250	50 Ma.	+ 26 to + 42	0.30 Meg.	
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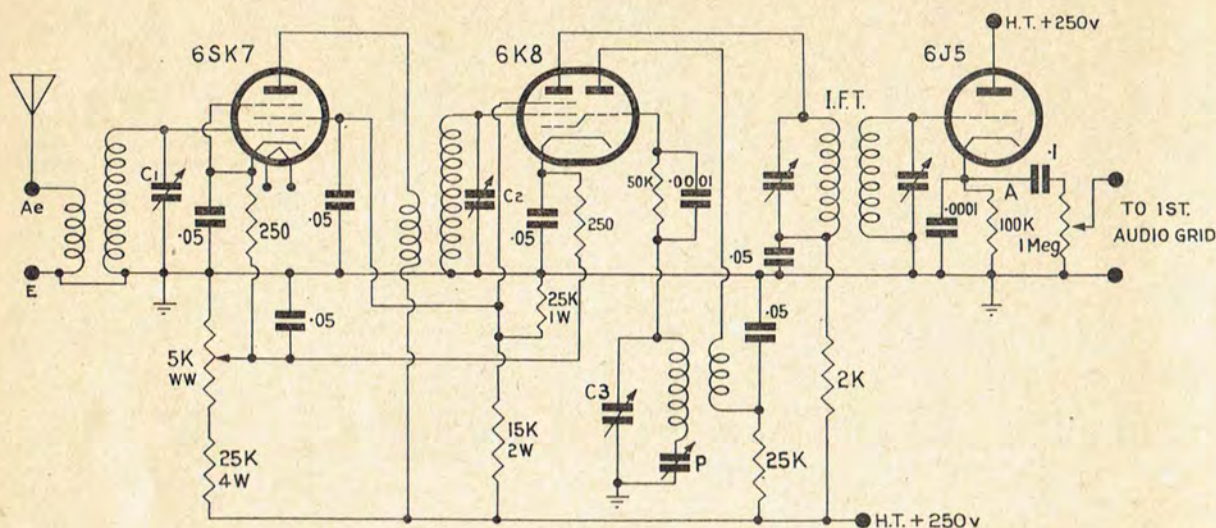
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FULLY DESCRIBED IN "RADIO AND ELECTRONICS," DECEMBER, 1946



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Please note that there is an important error on the circuit diagram. The 50k. oscillator grid leak should have its lower end connected directly to the cathode of the 6K8, and not to the coil, as shown. The I.F. is 455 kc/sec., or near it, depending on the coils used. These, together with gang, trimmers, and padder, are ordinary broadcast aerial, R.F. and oscillator coils, and the tuner is aligned in the usual way.

One useful feature of the infinite-impedance detector is the low output impedance, which enables the output connection to be made up to 100 feet long without requiring shielding. If this is done, the output should be taken from the point A (the cathode of the 6J5) and the 0.1 μ f. condenser and the volume control should be placed right at the audio amplifier input. If this is not done, the output no longer has a low impedance, and therefore possesses no hum-reducing properties.

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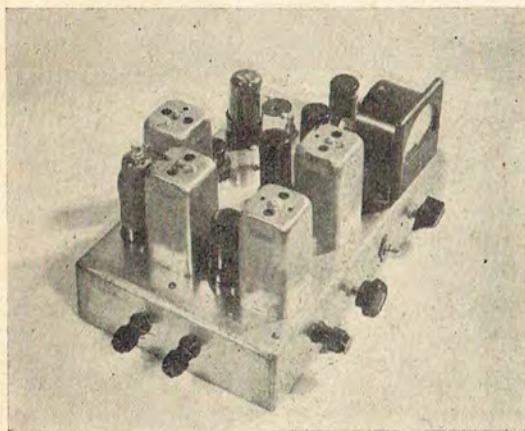
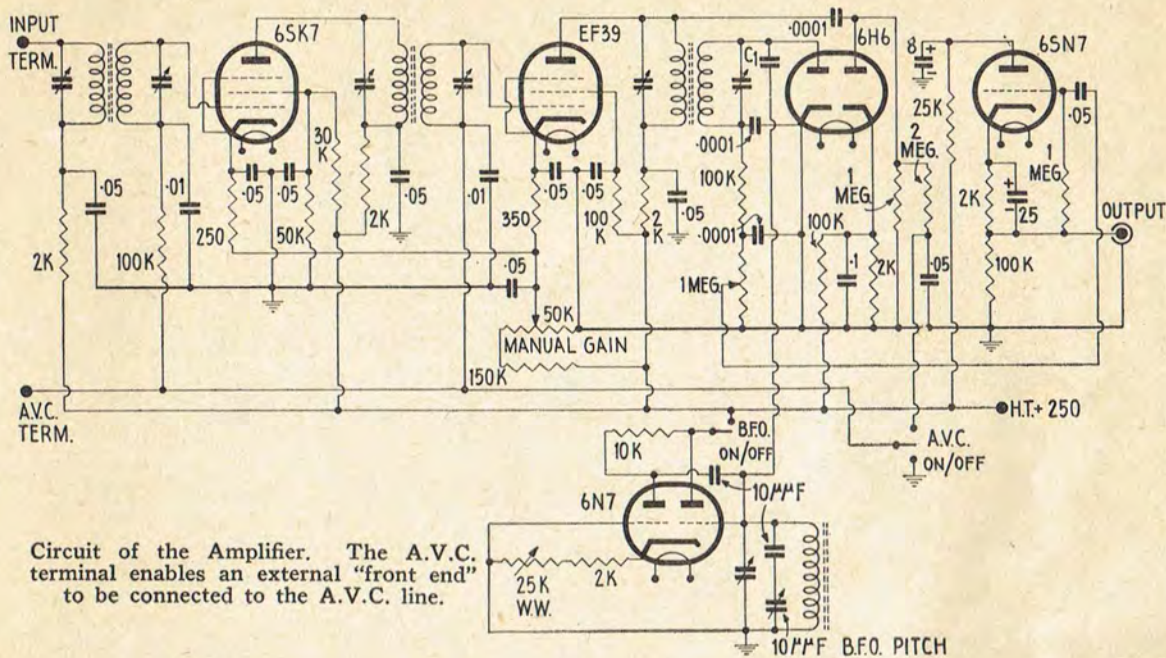
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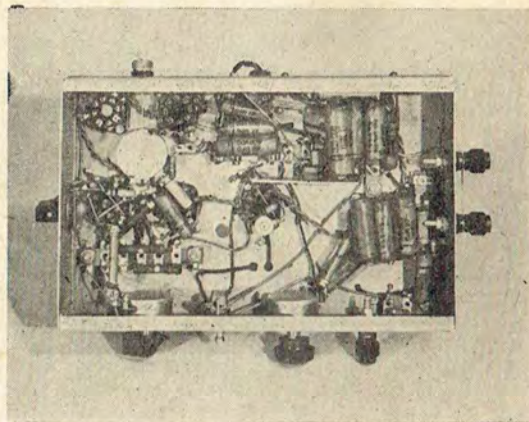
Dept. 10, Wakefield Chambers,
182 WAKEFIELD STREET, WELLINGTON

An Experimental Two-Stage Amplifier

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JANUARY, 1947



General view of the experimental amplifier. The meter, unnecessary in most applications, was included in the prototype constructed in our laboratory to act as a V.T. voltmeter for taking gain measurements, etc.



Underneath view of the amplifier. The terminals on the side are in the plate circuit of the 6SK7, and enable the first stage to be left out of circuit for experiments where only one stage is required.

This unit was designed for use as the "back end" of a communications receiver, or as an experimental unit with which to test experimental "front ends." It has A.V.C. and manual gain control and a cathode-follower output after the diode detector, so that it can readily be used to feed an external audio amplifier. An A.V.C. terminal is provided so that the R.F.

and mixer stages can have A.V.C. applied to them if desired. The B.F.O. circuit is unusual, and is a very useful one because it does not need a coil with a second winding, or tapping for regeneration. It is a so-called "two-terminal" oscillator, needing only a tuned circuit, which can be made from one winding of an old I.F. transformer.



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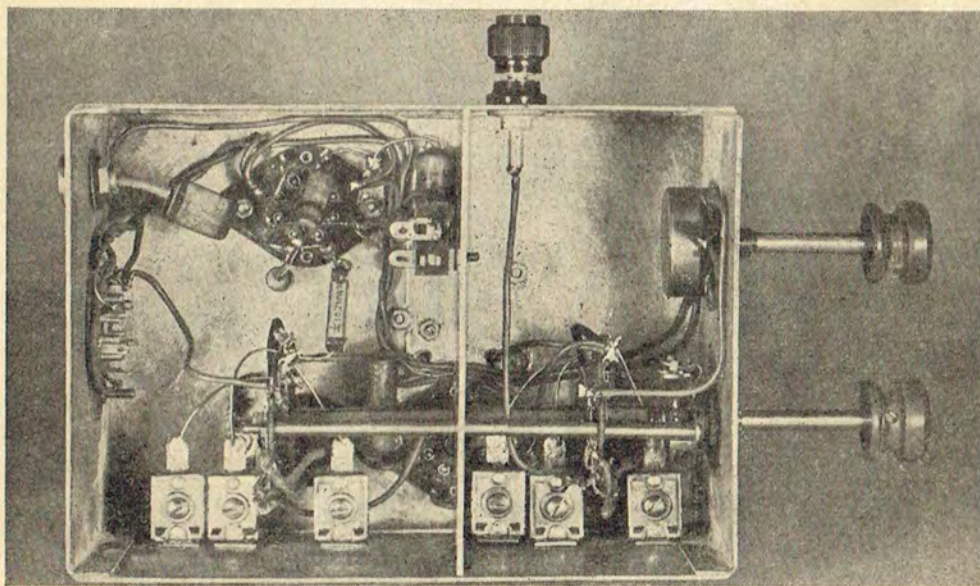
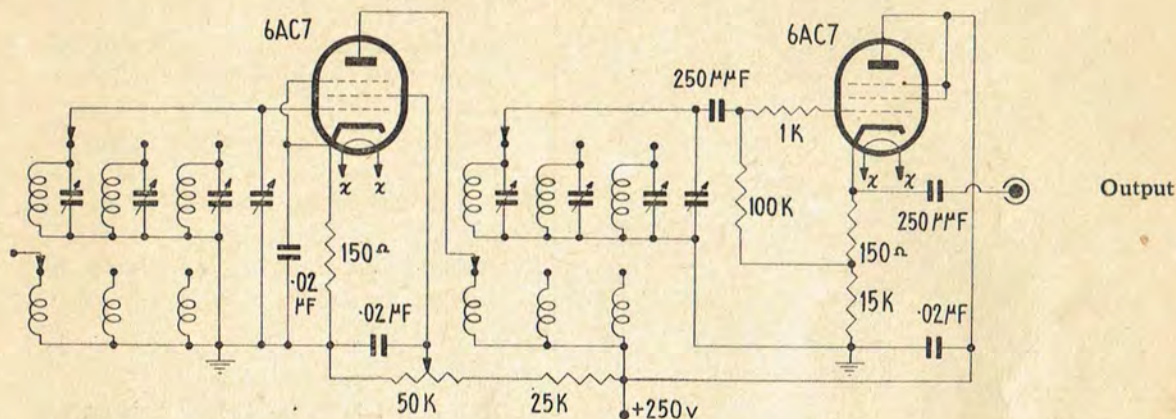
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A High-Gain Low-Noise Preamplifier Using 6AC7's

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," AUGUST, 1947



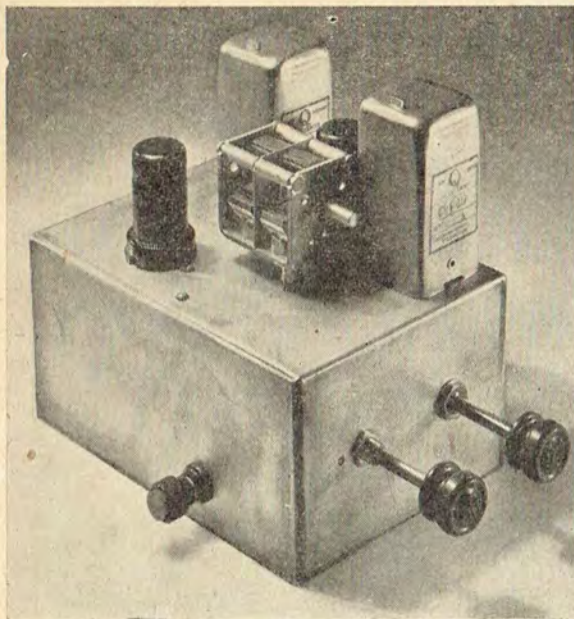
Underneath view, showing layout of trimmers and the placement of the baffle-shield.

This pre-amplifier is intended as an addition to any receiver, and will improve the overall gain considerably, but, **WHAT IS MORE IMPORTANT**, it will give the whole set a greatly improved signal-to-noise ratio, and will enable weak DX stations to be copied that could only just be heard before. As can be seen from the photograph on this and the next page, it uses triple-wave coils in cans and a wave-change switch. It covers from broadcast to 20 mc/sec. inclusive.

It has a very efficient form of output coupling—

namely, a cathode follower, which matches the impedance of the aerial terminal of the set to which it is attached, without causing any loss of signal voltage. The output lead should be as short as possible, and shielded. The shielded type of connector should be used at the output and the shield braid of the wire should be firmly earthed to the plug.

Note that an aluminium shield partition is placed across the R.F. amplifier's socket in such a way that grid and plate pins are on opposite sides of it. This is essential for stable operation.



General view of the preamplifier. The right-hand control is the wave-change switch, and that on the left is the gain control. No dial arrangements are shown, but space is available for fitting any type of movement.

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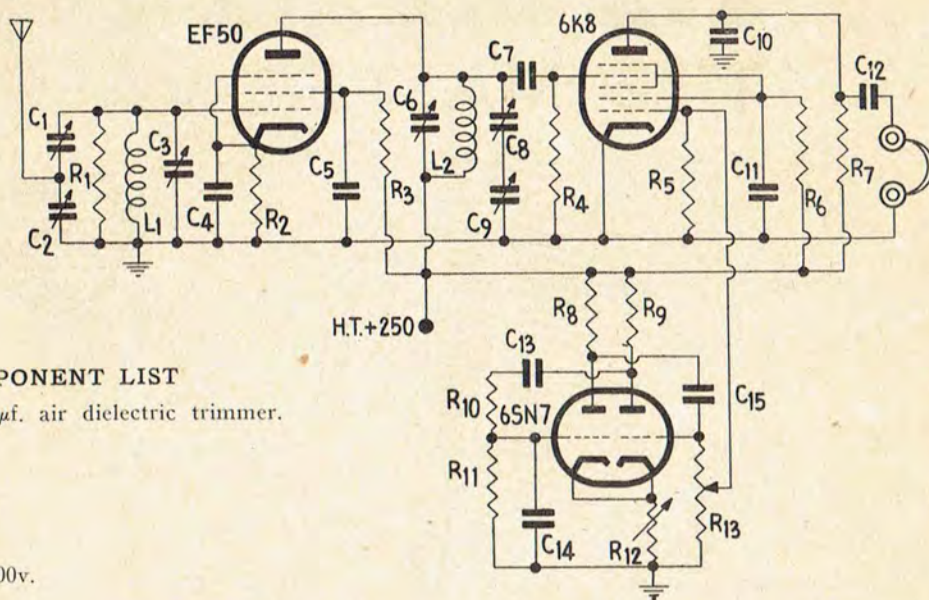
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THE C. & A. ODLIN CO., LTD., WELLINGTON

AN ADVANCED SUPER-REGENERATIVE RECEIVER FOR SIX METRES

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," FEBRUARY, 1948



COMPONENT LIST

- C₁, C₃, C₆, C₈, 3–30 μ f. air dielectric trimmer.
 C₂, 100 μ f. variable.
 C₄, C₅, 0.01 μ f. 600v.
 C₇, 10 μ f. mica.
 C₉, 25 μ f. variable.
 C₁₀, 0.002 μ f. 600v.
 C₁₁, C₁₂, C₁₃, 0.1 μ f. 600v.
 C₁₄, C₁₅, 250 μ f.
 R₁, 9k.
 R₂, R₃, 150 ohms.
 R₄, 2 meg.
 R₅, 50k.
 R₆, R₇, R₈, R₉, 25k.
 R₁₀, R₁₁, 10k.
 R₁₂, 10k. pot. in series with 10k. fixed.
 R₁₃, 50k. pot.
 L₁, L₂, see text.

This receiver for the 50–54 mc/sec. band has all the virtues of the super-regenerative set without its drawbacks. The EF50 acts as an R.F. stage, while the 6K8 is a super-regenerative detector, separately quenched by the 6SN7 quench oscillator. The latter has an adjustment for waveform (R12) and injection amplitude (R13), and these can be set for best results. The use of the R.F. stage prevents radiation and eliminates aerial loading on the detector.

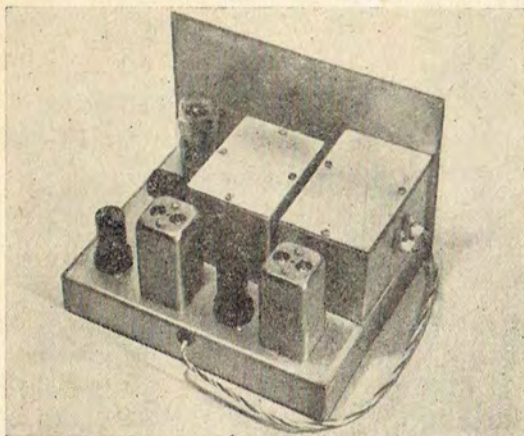
The input circuit is novel. C3 is the tuning condenser, and is pre-set to the centre of the band. The resistive loading of R1 then sees that the response at the band edges is no more than 3 db. down on that at the centre. C1 and C2 are also pre-set, and act as an impedance transformer to match the aerial to the grid circuit of the EF50. Different ratios of C1 to C2 are tried, and C3 is retuned at every trial until the setting of C1 and C2 is found that gives the best results for the particular aerial in use.

10 METRE CONVERTER

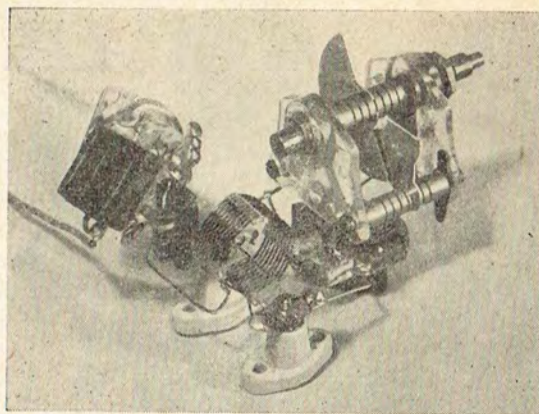
The converter shown on the opposite page was specially arranged to have exceptionally good signal-to-noise ratio for achieving the best possible performance on weak signals in the 10-metre band. It also has remarkable frequency stability and full band-spread. The first detector is an infinite-impedance mixer using a triode-connected 6J7, which is tuned separately from the oscillator. A high-gain I.F. stage on 4 mc/sec. follows, so that, in use, the main receiver is tuned to this frequency. The oscillator circuit is built up separately and then inserted in the small box in the centre of the chassis, and the tube itself is mounted on the side of the box to keep the heat of the valve away from the circuit, thereby minimizing drift. The bandspread condensers have their shafts coming through the front panel, while the shafts of the band-setting condensers come through under the chassis. The coils are wound as follows and mounted on midget stand-off insulators. The windings are self-supporting, except for four $\frac{1}{8}$ in. wide celluloid strips, one of which is used to mount the whole to the insulators. It is recommended that intending builders should consult the original article in "Radio and Electronics" referred to at the heading.

A HIGH-PERFORMANCE 10-METRE CONVERTER

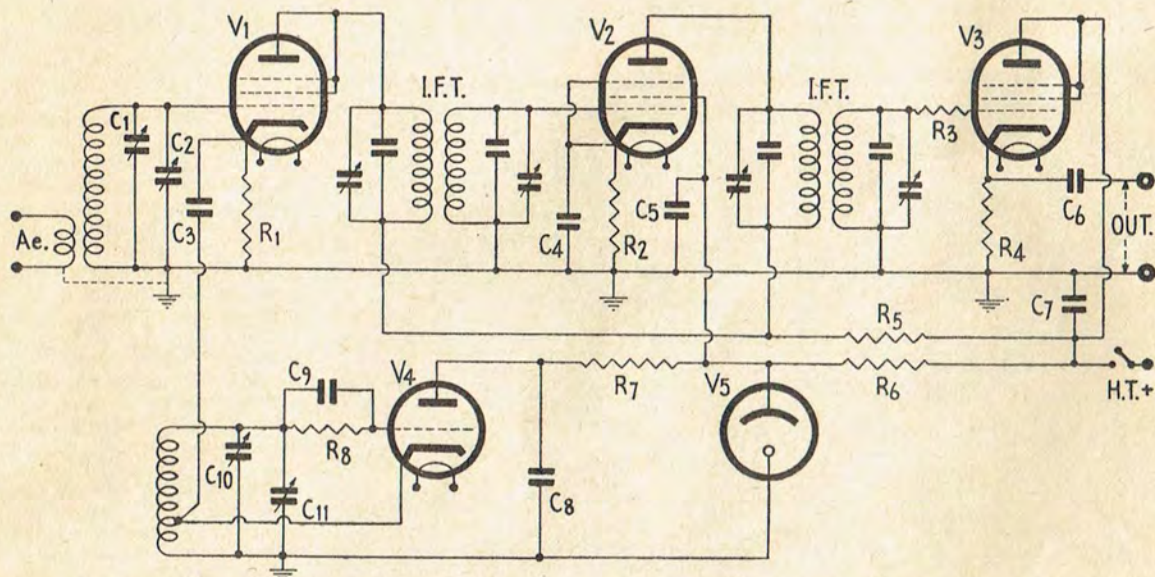
FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JULY, 1946



Back view of the converter. The oscillator valve can be seen mounted on the side of the central box, which contains the oscillator circuit.



View of the oscillator circuit, which was wired up and slipped into the box afterwards, since the box was too small to work in comfortably with the soldering-iron.

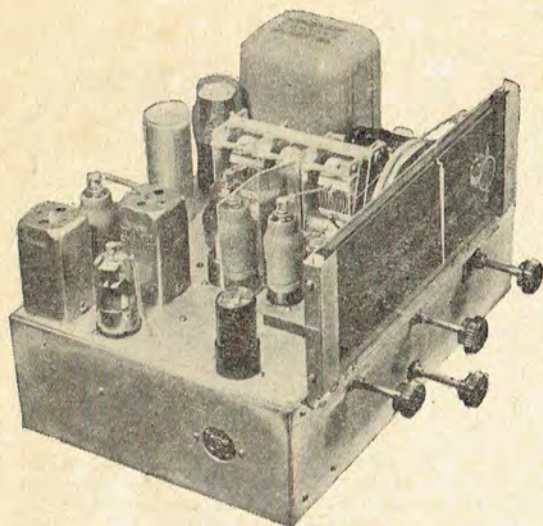


C_1, C_{10} , 3-25 μf . pre-set.
 C_2, C_{11} , 3-10 μf . variable.
 C_3, C_9 , 100 μf . mica.
 C_4, C_5, C_7, C_8 , 0.1 μf .
 C_6 , 0.001 μf .
 R_1 , 100k.
 R_2 , 150 ohms.
 R_3 , 500 ohms.
 R_4 , 1000 ohms.

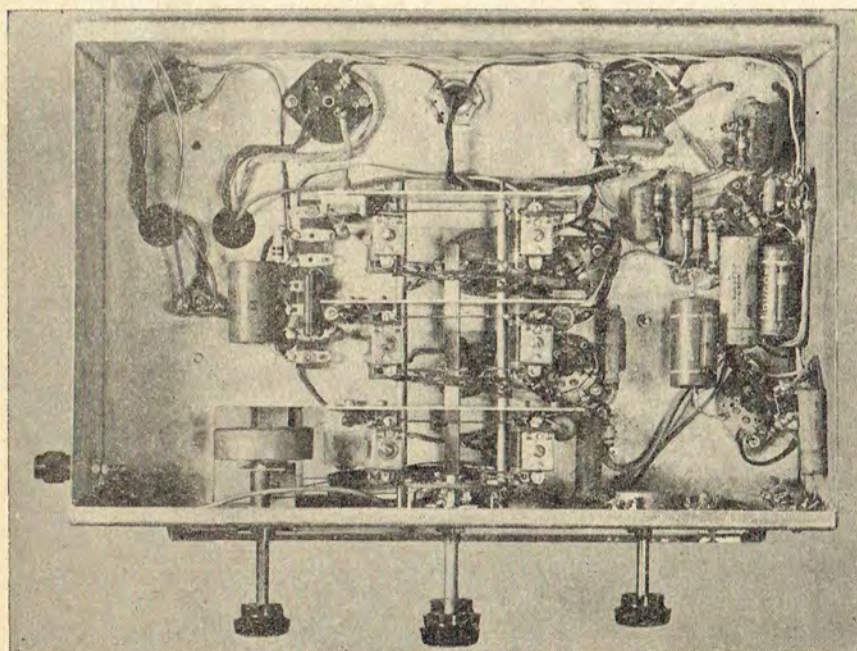
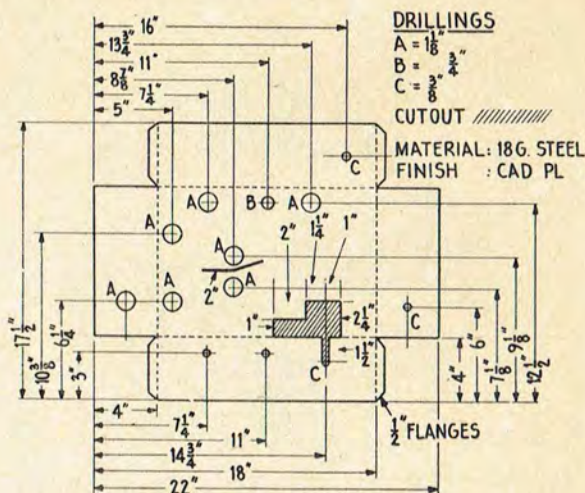
R_5 , 2000 ohms.
 R_6 , 2500 ohms 5w.
 R_7 , 2500 ohms.
 R_8 , 25k.
 V_1 , 6J7.
 V_2, V_3 , 6AC7/1852.
 V_4 , 6J5.
 V_5 , VR 150/30.
 All resistors are 1 watt except R_6 , which is 5 watt.

The Radel Dual-Wave Six

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JUNE, 1947



General view of the Dual-wave Six. Note the aluminium baffle-shield between the EF39 R.F. stage and the 6F8-G oscillator-mixer.

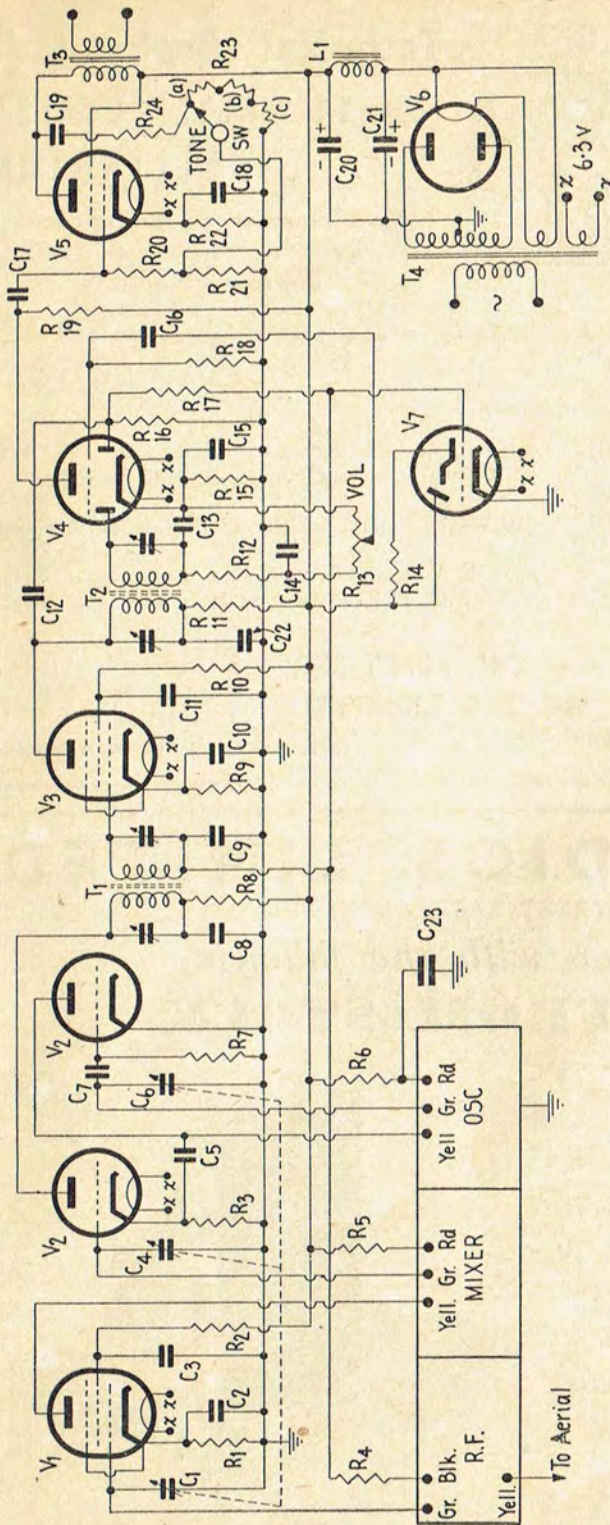


Left: The under-chassis arrangement. The controls, left to right, are tuning, tone control switch, and volume. The wave change switch shaft is directly beneath the tone control shaft. The tube at the right front of the chassis is the 6V6 output stage. The sockets for the R.F. and oscillator-mixer stages may be seen in the two back compartments of the coil unit. Directly behind the 6V6 socket is that of the 6Q7-GT, while the ones at the back of the chassis are the I.F. amplifier, with the rectifier at the left near the power transformer leads.

Below: Chassis diagram. Note the position of the baffle-shield between the R.F. and mixer stage sockets.

This set is a six-valve dual or triple-wave receiver designed for a console cabinet. It uses a commercial dual or triple-wave coil unit, and is notable for its excellent shortwave performance, which is due largely to the use of the low-noise infinite-impedance

mixer. The latter is one-half of a 6F8-G, the other half of which is used as the local oscillator. Coils and I.F. transformers are designed for an I.F. of 455 to 465 kc/sec.



COMPONENT LIST

R1, 350 ohms 1w.
 R2, R3, R6, R10, 100k. 1/2w.
 R4, R12, R21, 50k. 1/2w.
 R5, 4k. 1/2w.
 R7, R24, 25k. 1/2w.
 R8, R11, 2k. 1/2w.
 R9, 350 ohms 1w.
 R13, 500k. pot.
 R14, R16, R17, 1 meg. 1/2w.
 R15, 3k. 1/2w.
 R18, R20, 500k. 1/2w.
 R19, 250k. 1/2w.
 R22, 250 ohms 1w.
 R23 (a), (b), (c), each 25k. 1/2w.
 R24, 25k. 1/2w.

C1, C4, C6, three-gang condenser. (See text.)
 C2, C3, C8, C10, C11, C22, 0.05 μf. 600v. paper.
 C5, C7, C13, C14, 100 μf. mica.

C9, C16, 0.1 μf. 600v. paper.
 C12, 50 μf. mica.
 C15, C18, 25 μf. 25v. electro.
 C17, 0.25 μf. 600v. paper.
 C19, 0.02 μf. 600v. paper.
 C20 + C21, dual 10 μf. 450v. electro.
 C23, 8 μf. 450v. electro.
 V1, V3, 6U5 or 6G5.
 V2, 6F8-G.
 V4, 6Q7-GT.
 V5, 6V6.
 V6, 80.
 V7, 6U5 or 6G5.
 T1, T2, 465 kc/sec. I.F. transformers.
 T3, speaker transformer, 5000 ohms to V.C.
 T4, power transformer, 385-0-385v. 80 ma., 6.3v., 5v.
 L1, 1500-ohm speaker field.

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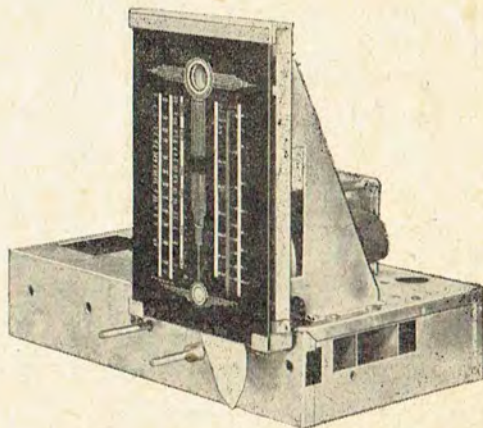
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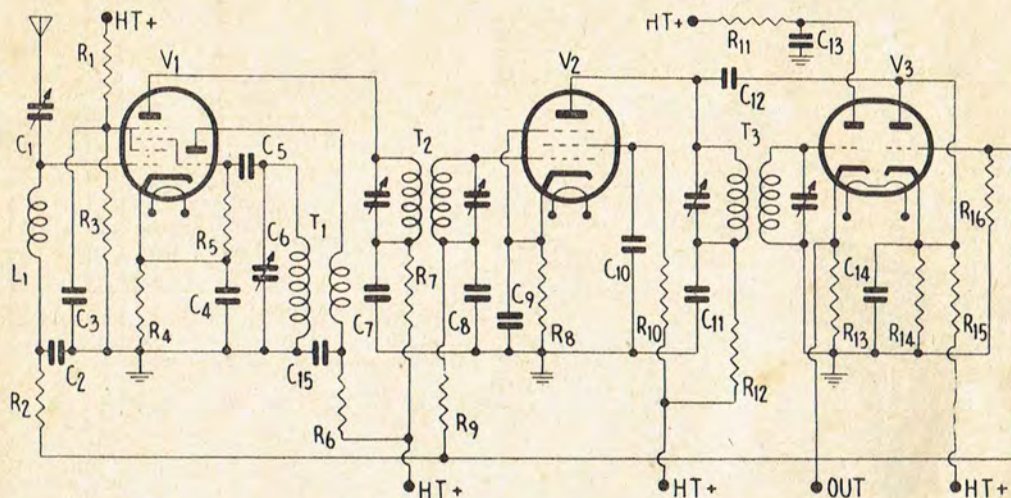


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An Idea For A High-Fidelity Tuner

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JULY AND AUGUST, 1948



This tuner is a superhet. circuit with a high-frequency I.F. of 2 mc/sec. This gives it a wide pass-band, and therefore excellent fidelity from local stations. The input to the mixer is untuned, and tuning is done on the oscillator only. The oscillator coil can be a home-made one. Its frequency range is 2.5 to 3.5 mc/sec., so that a 50 μ mf. tuning condenser suffices for tuning over the whole broadcast band. Instead of a home-made coil, it is possible to use a commercial coil of the kind used for the oscillator in the intermediate band in all-wave coil units. The method of finding the correct capacities for covering the broadcast band is as follows: Capacity is added in parallel with the coil until the oscillator frequency is 3.5 mc/sec. This should be between 300 and 400 μ mf. A variable condenser of approximately 150 to 200 μ mf. should then tune the oscillator to 2.5 mc/sec. at maximum capacity.

At the right is an untuned R.F. amplifier which can be added in front of the mixer for situations where the signal-strength of the nearest stations is on the low side.

COMPONENT LIST

R1, 25k. 1 watt.	C6, 50 μ mf. variable, in series with 3-30 μ mf. pre-set.
R2, R9, R13, 100k.	C13, 8 μ f. 450v. electro.
R3, R10, 30k. 1 watt.	C3, C14, C15, 0.1 μ f.
R4, 350 ohms.	V1, ECH35.
R5, R6, R11, 50k.	V2, 6SG7.
R7, R12, 2k.	V3, 6SN7.
R14, 7.5k.	T1, osc. coil. (See text)
R8, 200 ohms.	T2, T3, I.F. transformers, 1.6-2.0 mc/sec.
R15, 250k.	L1, 10 μ H. R.F.C.
R16, 1 meg.	H.T., 250v.
C1, 3-30 μ mf. pre-set.	
C2, C4, C7, C8, C9,	
C10, C11, 0.05 μ f.	
C5, C12, 50 μ mf.	

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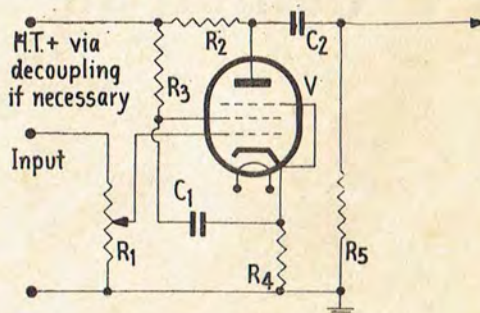


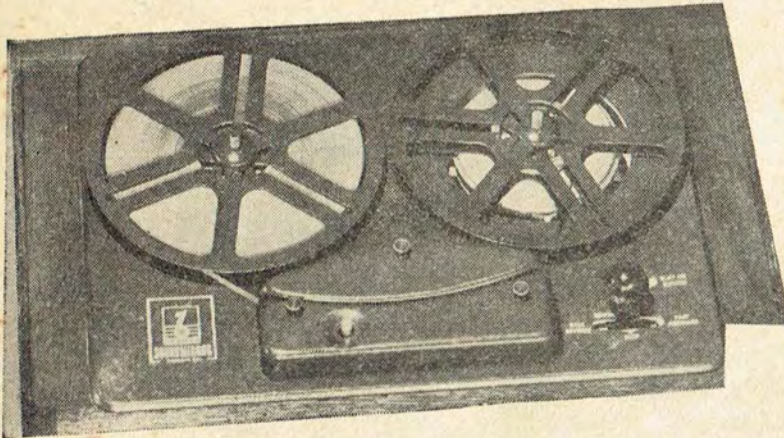
Fig. 2

R1, not critical, say, 1000 ohms pot.
R2, 10k.
R3, 20k.
R4, 200 ohms.
R5, 100k.
C1, C2, 0.01 μ f.
V, 6F50.

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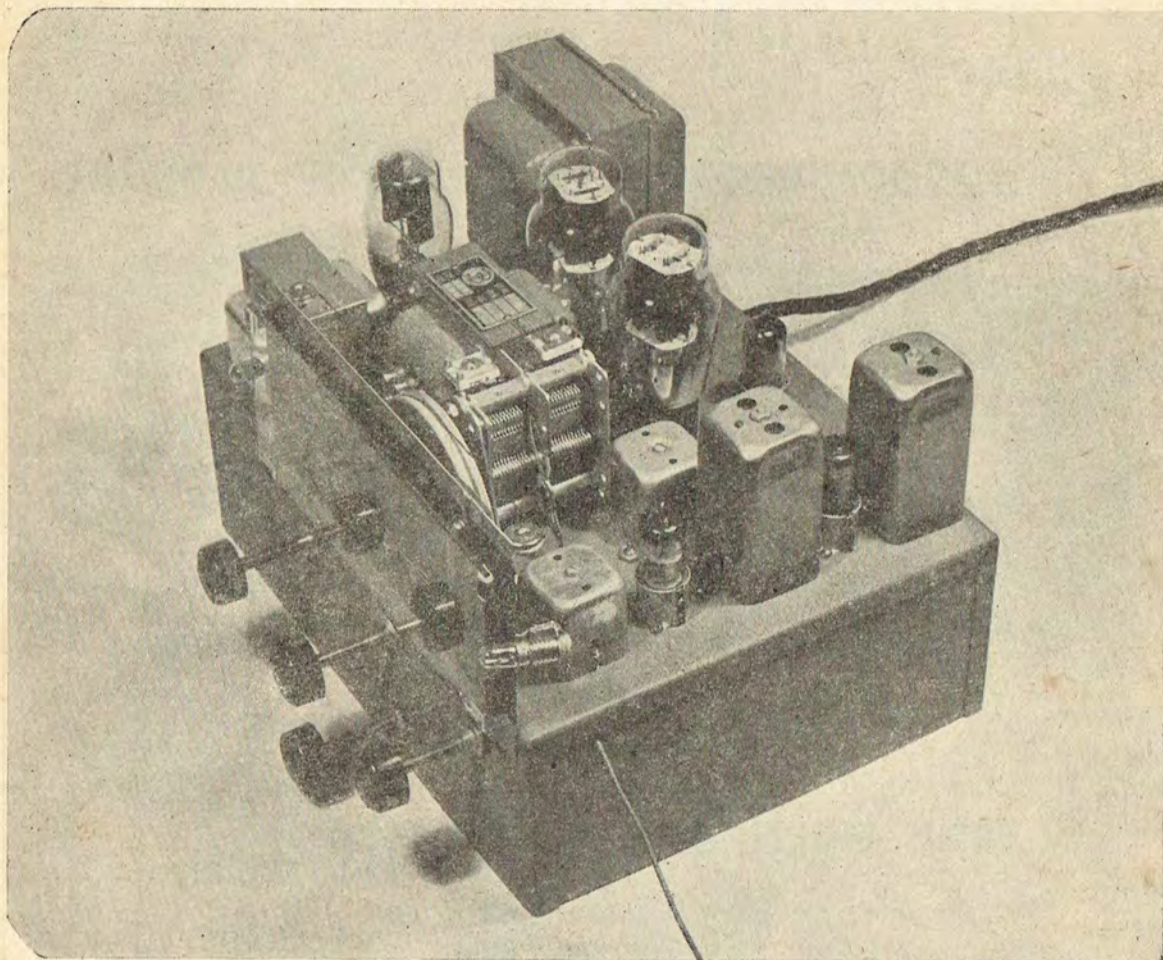
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Seven-Valve Quality Broadcast Receiver

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," SEPTEMBER, 1948

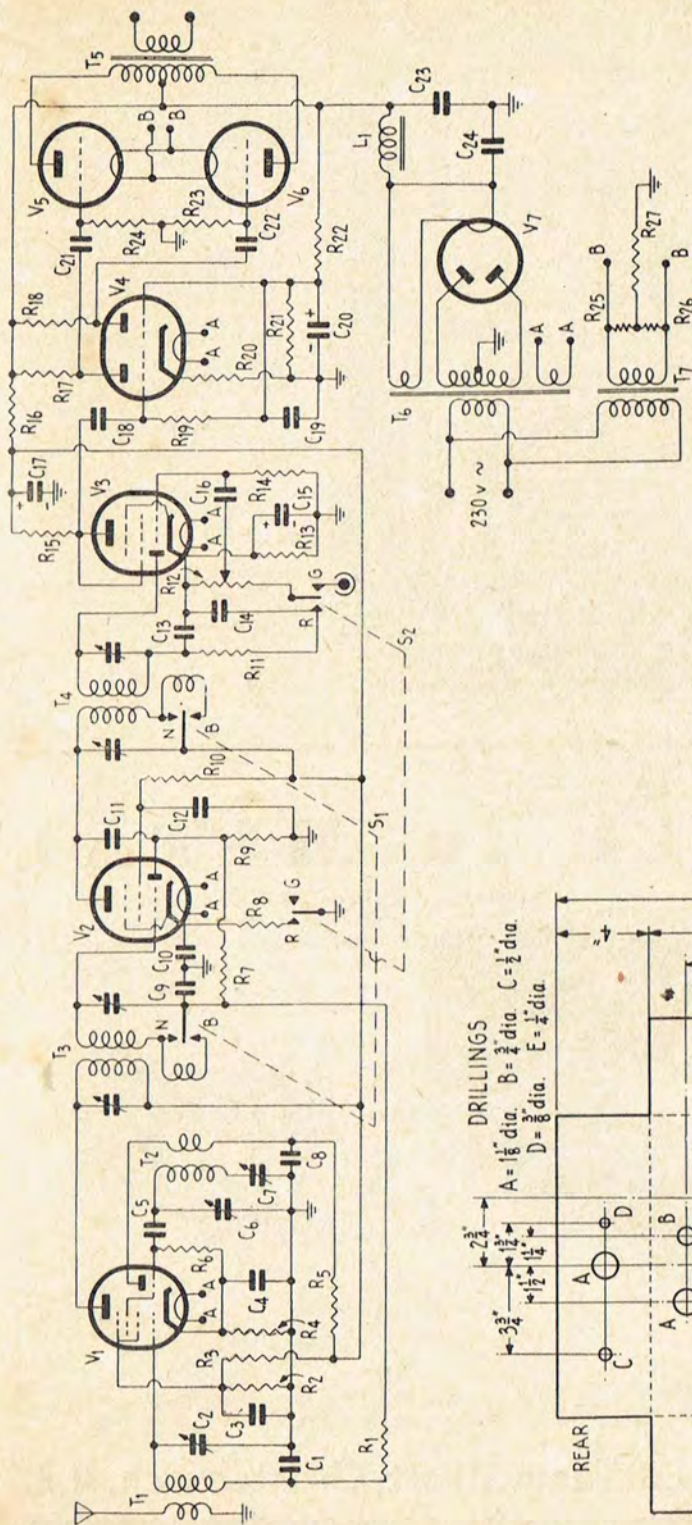


This receiver is one for quality enthusiasts, and, owing to the excellent push-pull triode amplifier which is incorporated in it, it makes an admirable radio-gram unit. Provision is made for the use of two-position variable selectivity I.F. transformers. Rimlock valves are used in the R.F. end, and give the set ample sensitivity for distant as well as for local broadcast reception. An R.F. stage has been purposely omitted so that the constructor will be unlikely to get undesired regeneration, which could completely vitiate the extra bandwidth of the I.F. amplifier in the "broad" position, thereby defeating

the purpose of the set.

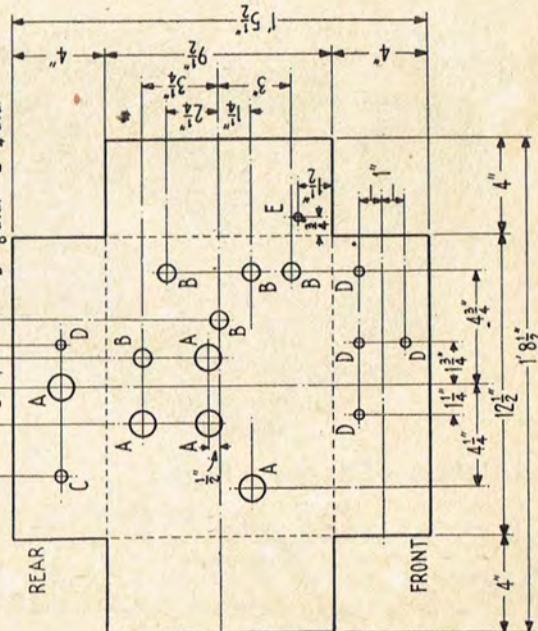
Provision is made for a built-in radio/gram switch which opens the cathode of the I.F. amplifier on the "gram" position, thus preventing all chance of radio break-through.

The mixer valve, V1, can be seen in the front right-hand corner of the set, between the aerial coil and the first I.F. transformer. The oscillator coil is between the gang condenser and the first I.F. transformer. The 6N7 phase-inverter is almost obscured in the photographs by the 6A3's, but V3 can be seen directly behind the right-hand 6A3.



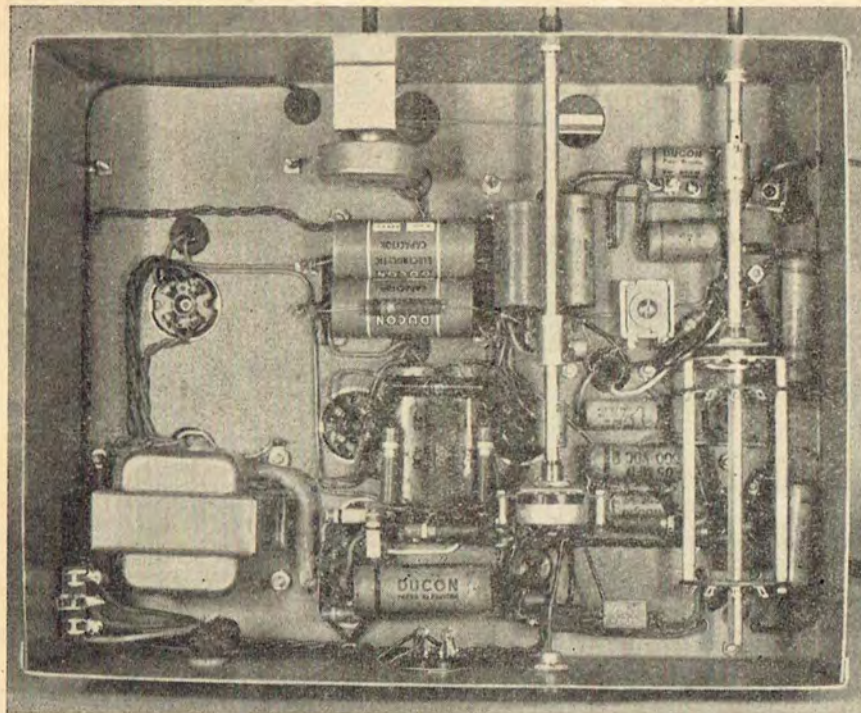
DRILLINGS

A = 1/8" dia. B = 3/4" dia. C = 1/2" dia.
D = 3/8" dia. E = 1/4" dia.



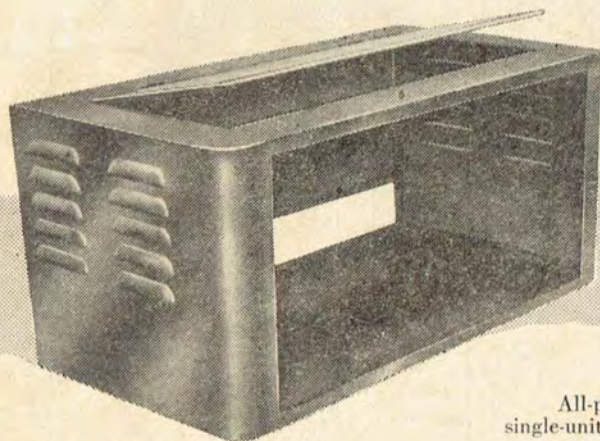
COMPONENT LIST

- C1, C8, C9, C12, C16, 0.05 μ f.
 C2, C6, gang condenser.
 C3, C4, C10, C19, 0.1 μ f.
 C5, C11, 50 μ f. mica.
 C7, 600 μ f. paddler.
 C13, C14, 100 μ f. mica.
 C15, 25 μ f. 25v. electro.
 C17, C20, 8 μ f. 450v. electro.
 C18, C21, C22, 0.25 μ f.
 C23, C24, 16 μ f. 450v. electro.
 R1, R10, R15, R17, R18, 100k.
 R2, R5, 30k.
 R3, R20, R21, 35k. 1 watt.
 R4, 200 ohms.
 R6, R11, R16, R22, 50k.
 R7, R9, 1 meg.
 R8, 300 ohms.
 R12, 500k. pot.
 R13, 1200 ohms.
 R14, 500k.
 R19, R23, R24, 250k.
 R25 + R26, 50 ohms C.T.
 R27, 750 ohms 10-watt w-w.
 T1, aerial coil.
 T2, oscillator coil.
 T3, T4, I.F. transformer.
 T5, output transformer, 500 ohms to V.C.
 T6, 280-0-280v. 100 ma., 5v. 2a., 6.3v. 4a.
 T7, filament transformer, 6.3v. 3 amp.
 S1, 2-bank, 2-pos. wafer (separate wafers).
 S2, 2-bank, 2-pos. wafer (both banks on same wafer).
 V1, ECH41.
 V2, V3, EAF41.
 V4, 6N7.
 V5, V6, 6A3.
 V7, 80.
 L1, 100 ma. smoothing choke.

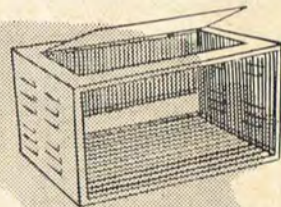


Under-chassis view. Note how the band-width switch is mounted in line with the I.F. transformers with the wafers one over each transformer. Note also that the volume control is operated by an extension shaft and is mounted on a bracket just in front of the V3 socket. The radio/gram switch is also on this bracket immediately under the pot. Its extension shaft cannot be seen in the photograph.

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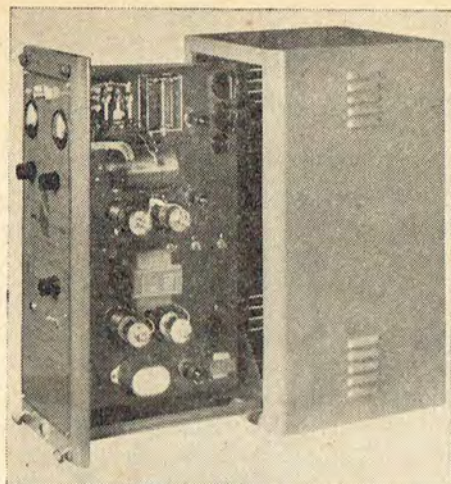


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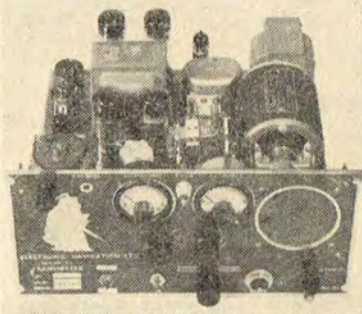
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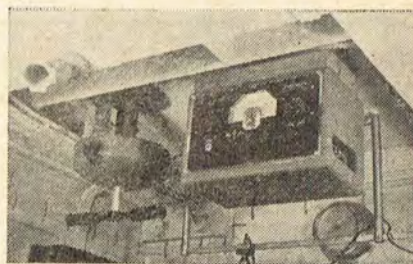
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FULLY DESCRIBED IN "RADIO AND ELECTRONICS, OCTOBER AND NOVEMBER, 1948

This is an advanced circuit in which variable selectivity is obtained by using two separate tuned circuits, coupled by capacity networks. The slug-tuned coils are aligned in the ordinary way with the switch in the "narrow" position—i.e., with the condensers C12, C14, C17 in circuit. Thereafter, no adjustments are needed when the switch is moved to the intermediate and wide positions. If this is to work out properly in practice, the network condensers **must** be accurate to within 5 per cent., as indicated on the circuit diagram.

A cathode-follower output valve is used to enable a long line to be run to the amplifier, without danger of picking up hum. The line can also be shielded without any danger of losing high-frequency response if the cathode-follower is used. It is strongly recommended that the above-mentioned articles in "Radio and Electronics" be consulted by intending builders.

To Radio Enthusiasts

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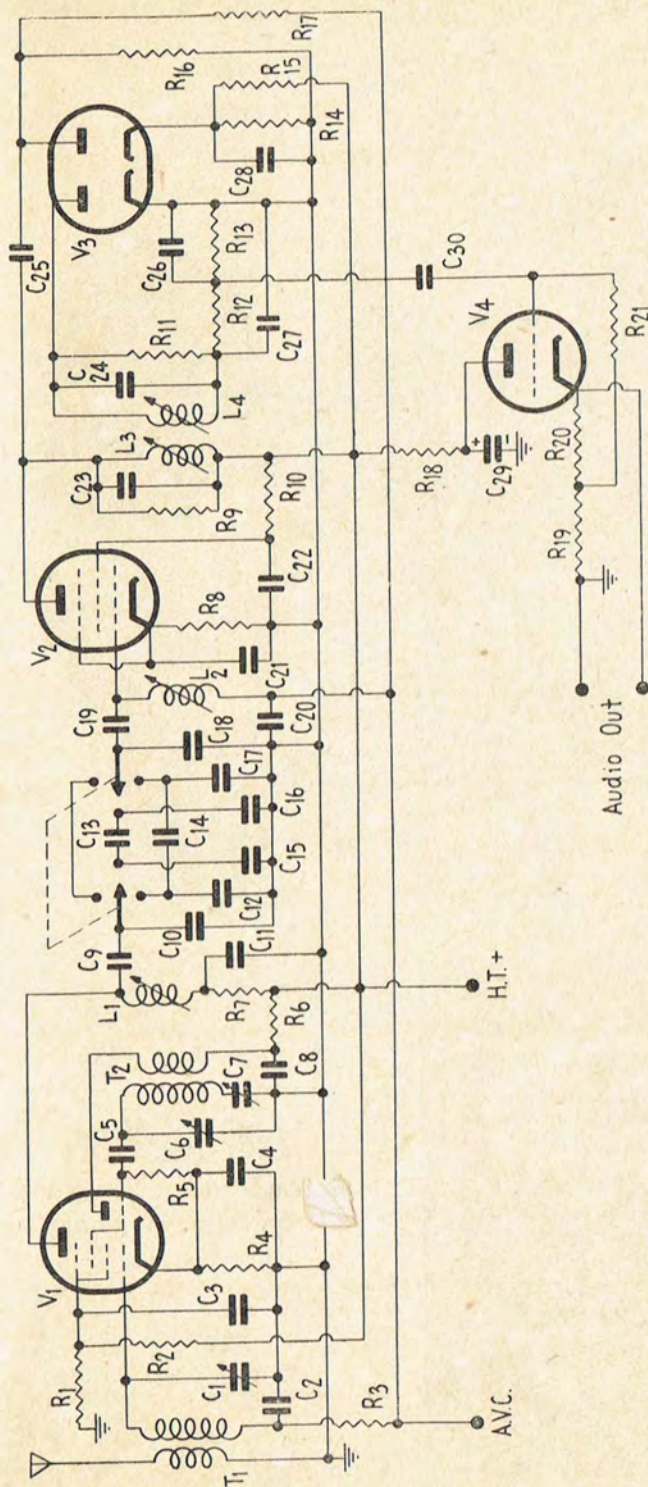
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COMPONENT LIST

- V1, ECH41.
V2, 6BA6.
V3, 6H6.
V4, 6J5.
T1, aerial coil
T2, oscillator
L1, L2, mid-
designed i
L3, L4, C23,
tuned.
R1, R12, 50k
R2, R6, 40k.
R3, R19, 100k
R4, 200 ohm
R5, 25k.
R7, 2k.
R8, 50 ohms
R9, R11, R1
R10, 35k.
R13, R21, 50k

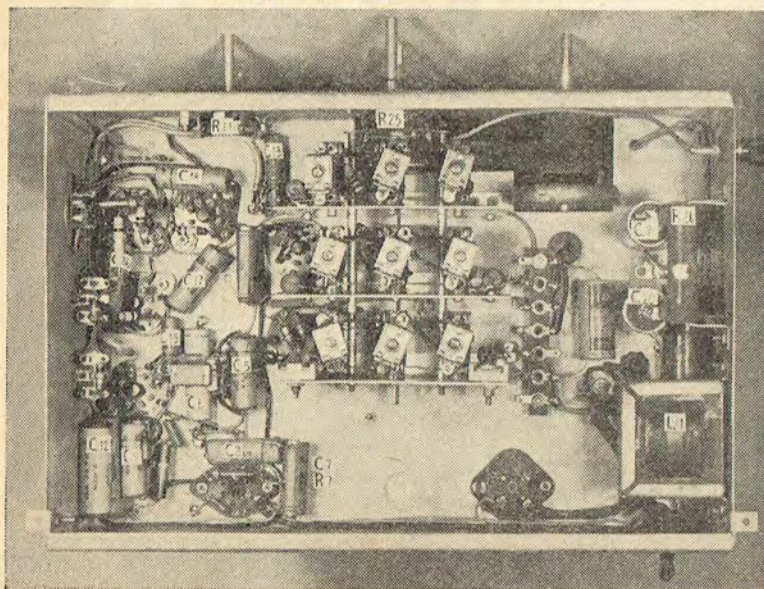
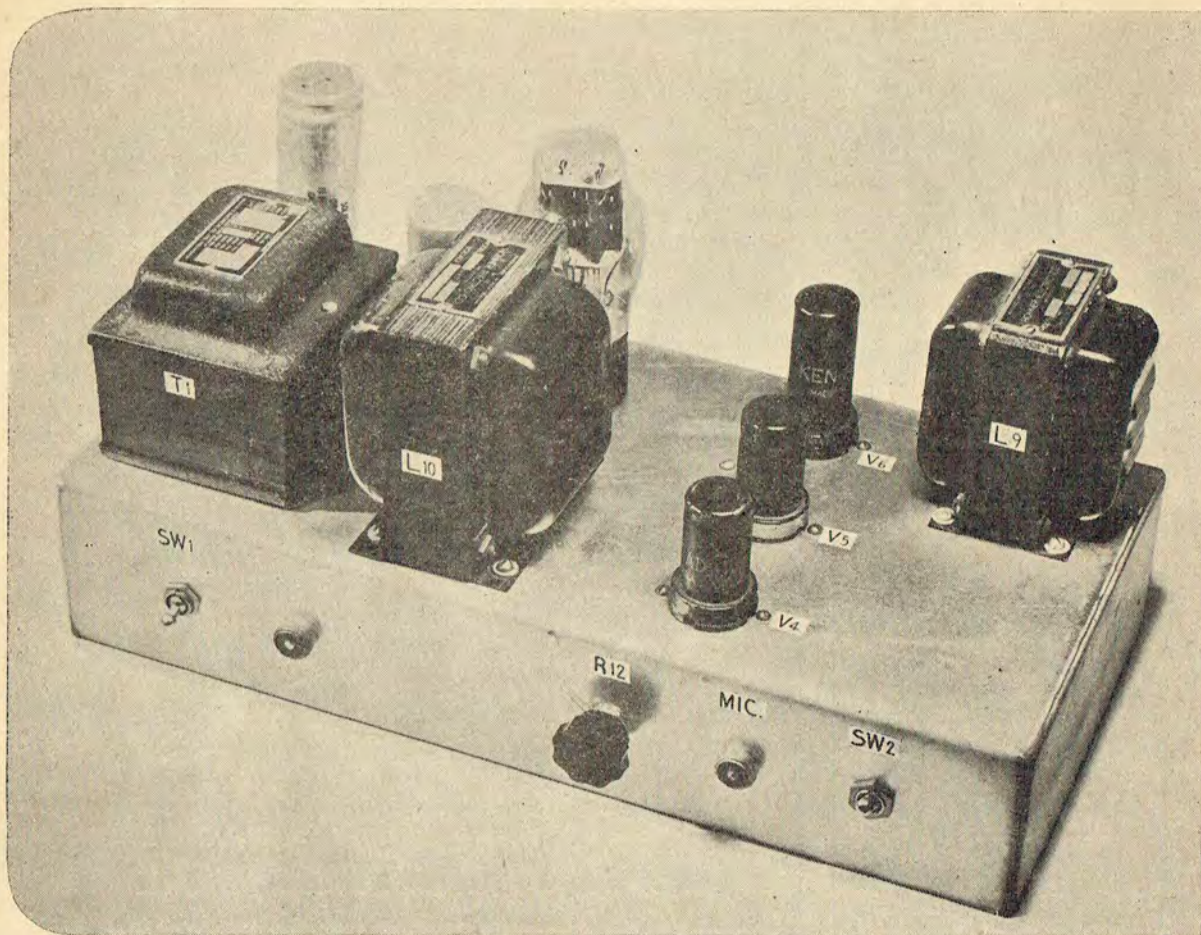
- R14, 10k.
R17, 1 meg.
R18, 50k.
R20, 1500 ohms.
C1, C6, 2-gang tuning condenser.
C2, C11, C20, C30, 0.05 μ f.
C3, C4, C13, C23, C25, 0.1 μ f.
C5, C25, 50 μ f.
C7, 600 μ f. paddr.
C8, 0.01 μ f.

Condensers in I.F. Coupling Network
(N.B.—5% or better—see text):

- C9, C19, 100 $\mu\text{f.}$
C10, C18, 0.001 $\mu\text{f.}$
C12, C17, 750 $\mu\text{f.}$
C15, C16, 200 $\mu\text{f.}$
C13, 0.0024 $\mu\text{f.}$
C14, 300 $\mu\text{f.}$

See text.)

- R9, R11, R15, 250k.
R10, 35k.
R13, R21, 500k.



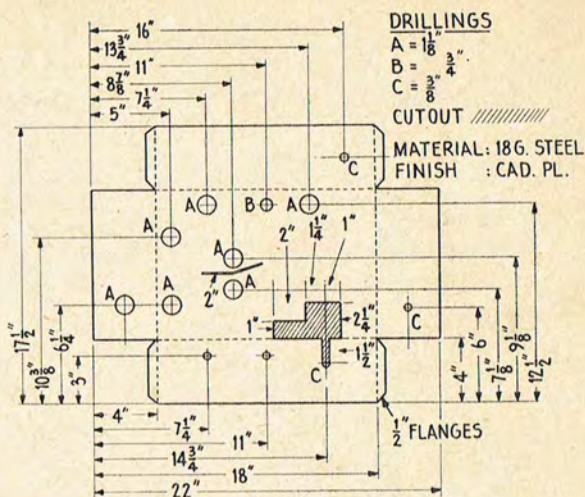
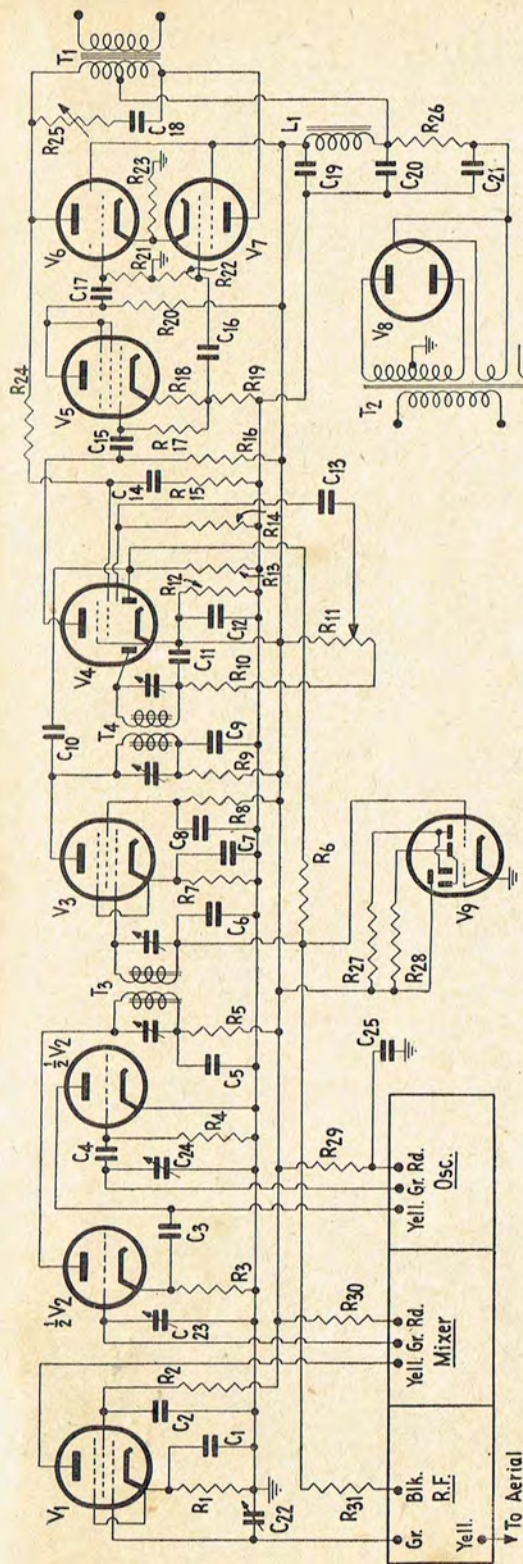
Under-chassis view of the All-wave Eight. The coil unit is in the exact centre of the chassis, with the tone-control mounted directly underneath the wave-change switch shaft.

The Radel All-Wave Eight

Fully described in "Radio and Electronics", November, 1947

This set is an excellent all-purpose receiver for broadcast, shortwave, and gramophone reproduction. The chassis is the same size as that of the "Radel Dual-wave Six," an extra pair of valve holes being drilled between the two at the left-hand edge of the chassis.

Important Note.—There is an error in the circuit diagram which shows the cathode of V4 and the upper end of R11 joined to the H.T. line. The dot which indicates this should be replaced by a cross-over to correct the diagram.

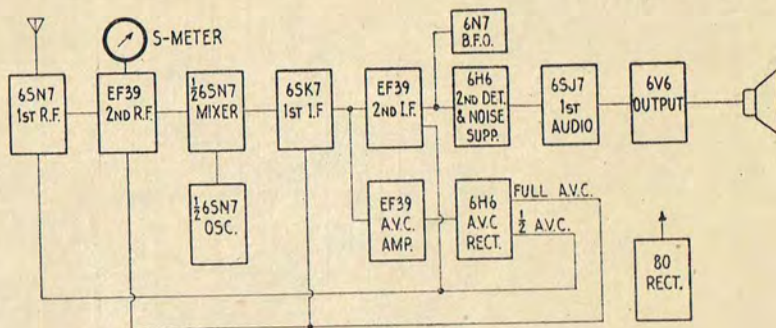


COMPONENT LIST

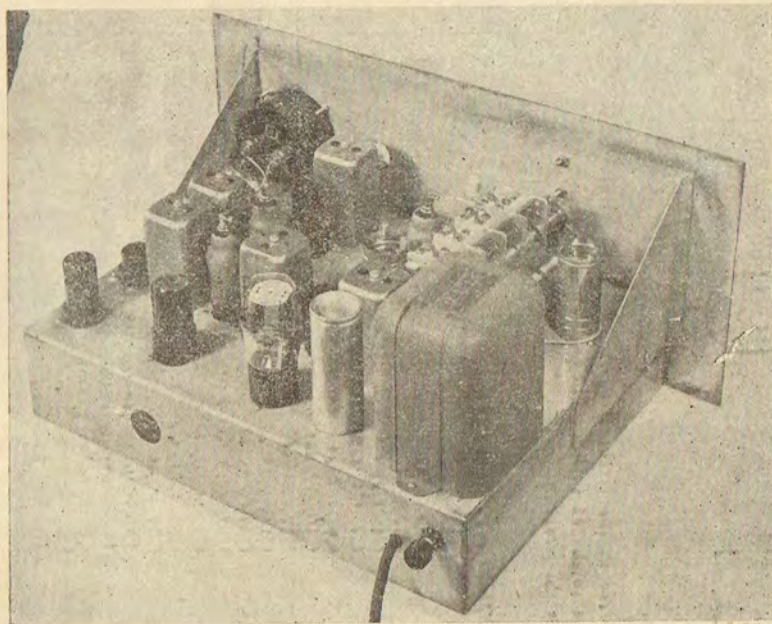
- V1, V3, 6F39.
 V2, 6F8-G or 6SN7-GT.
 V4, 6B8-G.
 V5, 6SJ7 or 6SJ7-GT.
 V6, V7, 6V6 or 6V6-GT.
 V8, 80.
 V9, EM34.
 R1, R7, 350 ohms.
 R2, R3, R8, R10, R19, R20, 100k.
 R4, R15, 25k.
 R5, R9, R18, 1k.
 R6, R13, R14, R27, R28, 1 meg.
 R11, 500k. pot.
 R12, 1600 ohms.
 R16, R17, 250k.
 R21, R22, 500k.
 R23, 125 ohms 2 watts.
 R24, 1.2 megs.
 R25, 50k. pot.
 R26, 1k. 25w.
 R29, R31, 50k.
 R30, 5k.
 C1, C2, C5, C7, C8, C9, C15, C16, 0.05 μ f.
 C3, C4, C11, 100 μ f. mica.
 C6, 0.1 μ f. 400v.
 C10, 50 μ f. mica.
 C12, 25 μ f. 25v. electro.
 C14, 0.25 μ f. 400v.
 C13, 0.25 μ f. 400v.
 C17, C18, 0.05 μ f. 400v.
 C19, C20, C21, 16 μ f. 450v. electro.
 C22, C23, C24, 3-gang condenser, to suit coil unit.
 C25, 8 μ f. 450v. electro.
 T1, output transformer 10,000 ohms to V.C.
 T2 power transformer 385-0-385v., 5v. 2 amp., 6.3v. 4 amp.
 L1, 20H. 50 ma.
 T3, T4, I.F. transformers, iron-cored.

The Radel DX Broadcast 12

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," APRIL, MAY, JUNE, 1947



Block diagram of the receiver



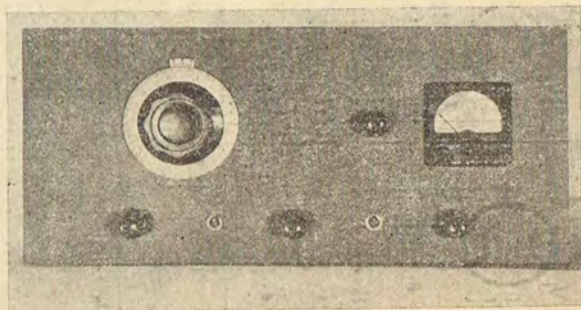
This is quite the most ambitious receiver in this book, but many have been built by amateur constructors with complete success.

We strongly recommend that the relevant articles in "Radio and Electronics" are consulted by intending builders, although very complete details are given here.

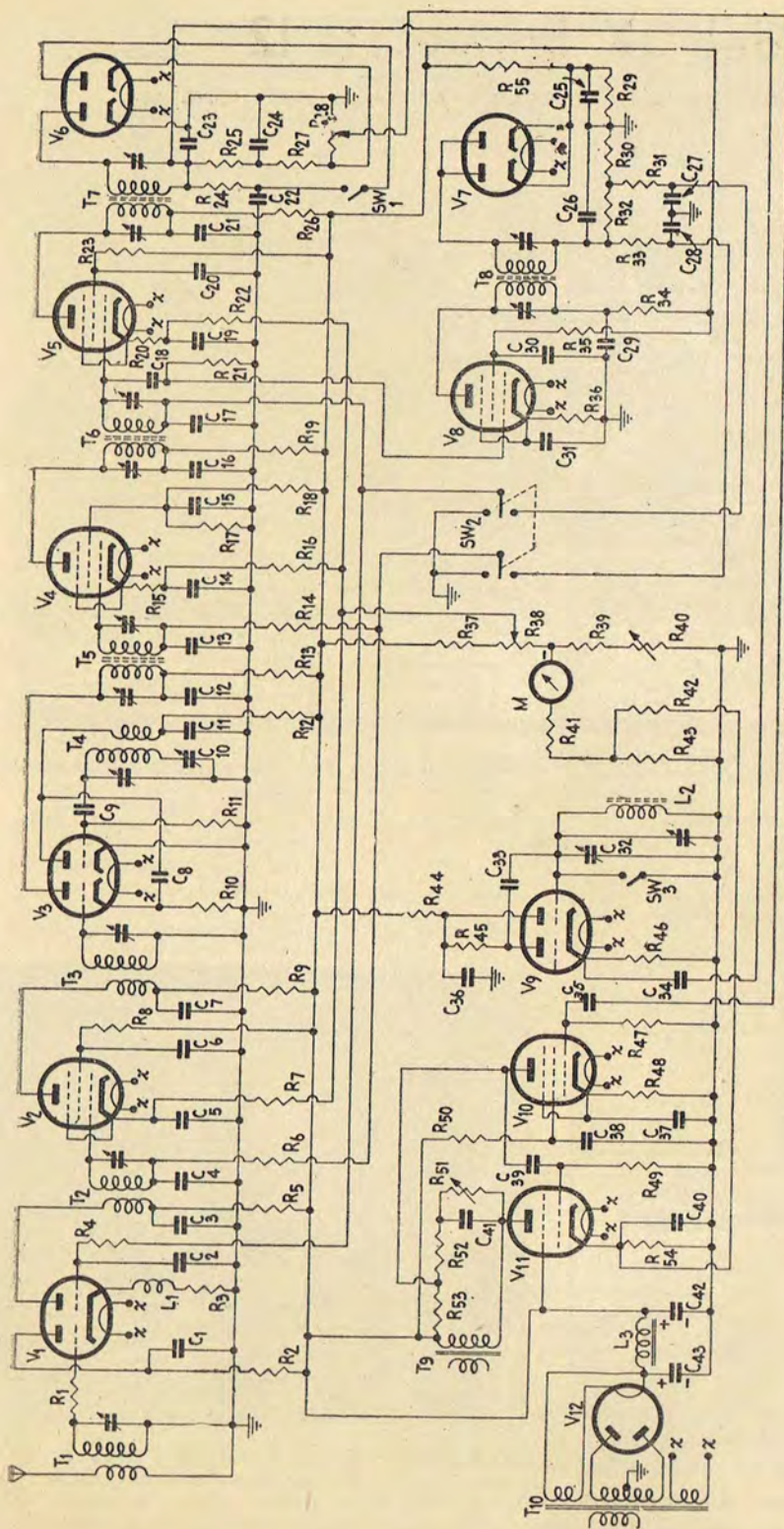
This set was specially designed for broadcast DX work, and has many features only to be found in communications receivers.

The block diagram indicates most of its outstanding features, which include triode first R.F. and mixer stages for good signal-to-noise ratio and amplifier A.V.C. In addition, there is a noise-limiter, and a beat frequency oscillator which can be used for detecting the presence of weak carriers.

The controls from left to right are: Tone, A.V.C. on/off, R.F. gain, noise-limiter on/off, and audio gain. The B.F.O. pitch condenser is at the left of the S-meter.



Front panel



Resistances: R1, R16, R22, 1500 ohms; R2, R5, R9, R13, R19, R26, R34, 2000 ohms; R3, R7, R48, R54, 500 ohms; R4, R11, R14, R17, R25, R30, R32, R37, R44, R45, 50k.; R6, R8, R10, R23, R27, R35, R53, 100k.; R12, R18, 25k.; R15, R20, 150 ohms; R21, R49, R50, R52, 500k.; R24, R33, R47, 1 meg.; R28, 1 meg. potentiometer; R29, 10k.; R31, R55, 250k.; R36, 4000 ohms; R39, R43, 200 ohms; R40, 100-ohm potentiometer; R41, 3000 ohms; R42, 350 ohms; R46, 5000 ohms; R38, 10k. potentiometer; R51, 2 meg. potentiometer.

Condensers: C1, C4, C17, C25, 0.02 μ f.; C3, C5, C6, C7, C11, C12, C36, 0.05 μ f.; C2, C13, C14, C16, C19, C20, C21, C22, C27,

C28, C29, C30, C31, C35, C38, C39, 0.1 μ f.; C8, C23, C24, C26, 0.0001 μ f.; C9, C33, 0.00001 μ f.; C15, 0.005 μ f.; C18, 0.0005 μ f.; C32, 2-10 μ f. variable; C41, 0.001 μ f.; C31, C40, 25 μ f. 25v. electro; C42, C43, dual 8 μ f. electrolytic; C34, two pieces of push-back wire twisted together for $\frac{1}{2}$ inch.

Valves: V1, V3, V9, 6SN7GT; V2, V5, V8, EF39; V4, 6SK7; V6, V7, 6H6; V10, 6SJ7; V11, 6V6; V12, 80.

Switches: SW1, toggle switch S.P.S.T.; SW2, toggle switch D.P.D.T. Meters: M, 0-1 ma.

Transformers: T5, T6, T7, T8, 465 kc. I.F.'s; T9, speaker transformer; T10, power transformer, 380-0-385v.—6.3v.—5v.; L2, B.F.O. coil.

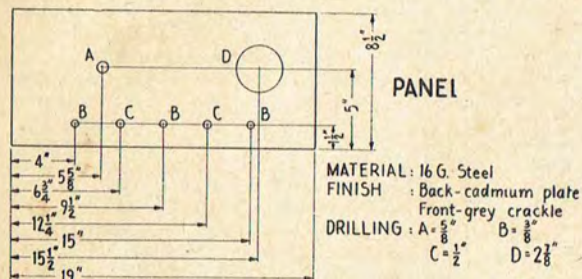
The valve holes are for use as follows: Looking at the chassis diagram, and reading from left to right, we have:

Back row: V12, V11, V10.

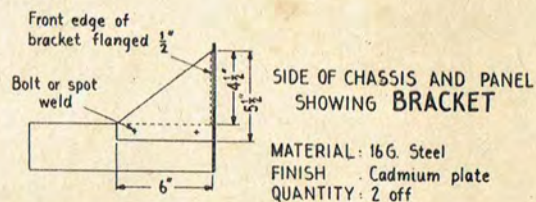
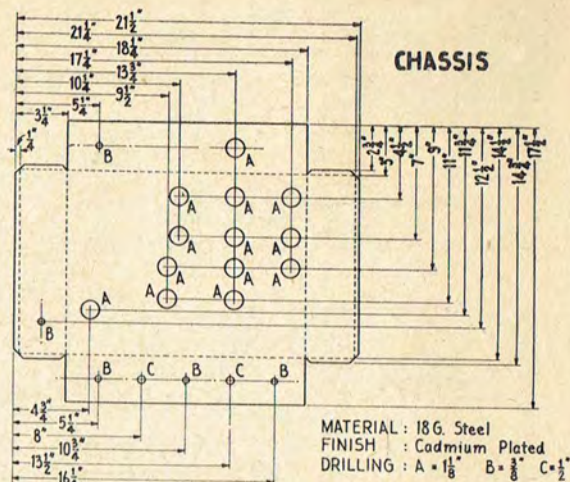
Second row: V4, V5, V6.

Third row: V3, V8, V7.

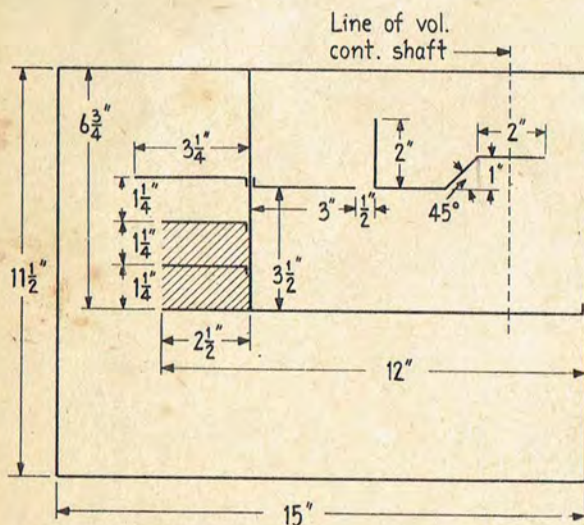
Front row: V1, V2, V9.



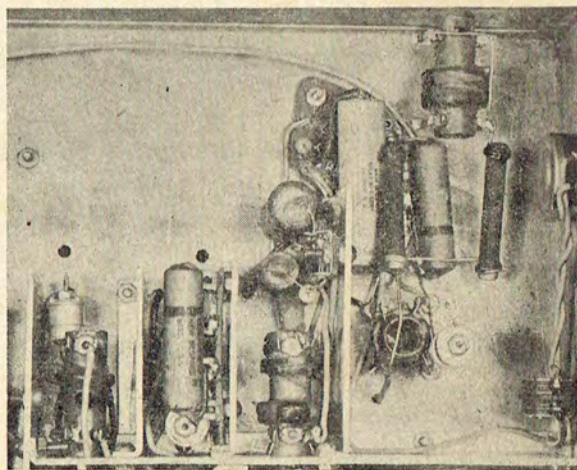
Working drawing for front panel.

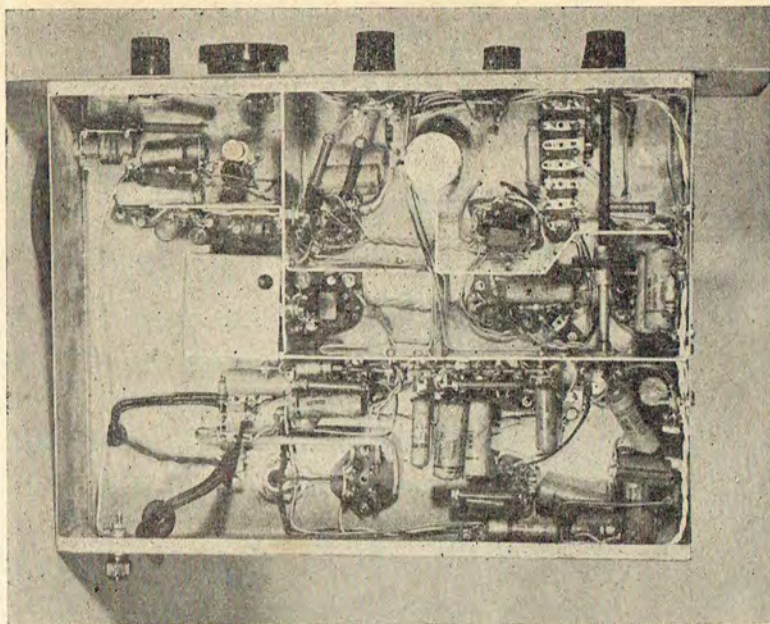


Working drawings for chassis and panel mounting bracket.



Under-chassis diagrammatic view of the "Broadcast 12," showing the layout of baffle-shielding. This is most important to the stability of the receiver, and should be installed exactly as shown. The cross-lined portion is explained in the text.





General underneath view. The portion enlarged in the photograph on the preceding page is the left-hand upper corner in this photo. Here the 6½ in. baffle, which runs vertically at the right of the other picture, can be seen at right-angles to the front edge of the chassis, with the second R.F. stage and oscillator mixer sockets on the right, and the R.F. compartments to the left. The potentiometer near the centre front of the chassis is the zero-adjuster for the S-meter. The audio gain control can be seen at the right, with its extension shaft to the main baffle-shield at the back, where the potentiometer is located, close to the second detector circuit. The valve sockets just in front of this baffle-shield and at the right of the chassis are those of the A.V.C. amplifier and rectifier.

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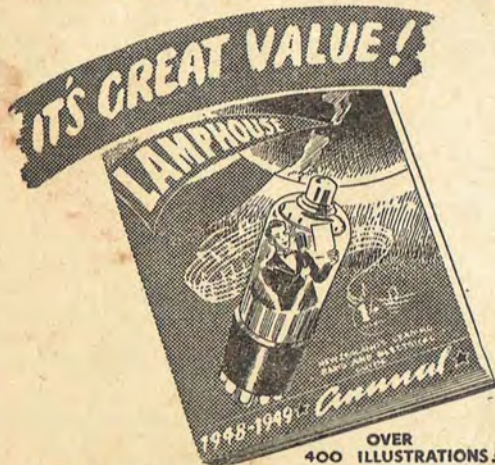
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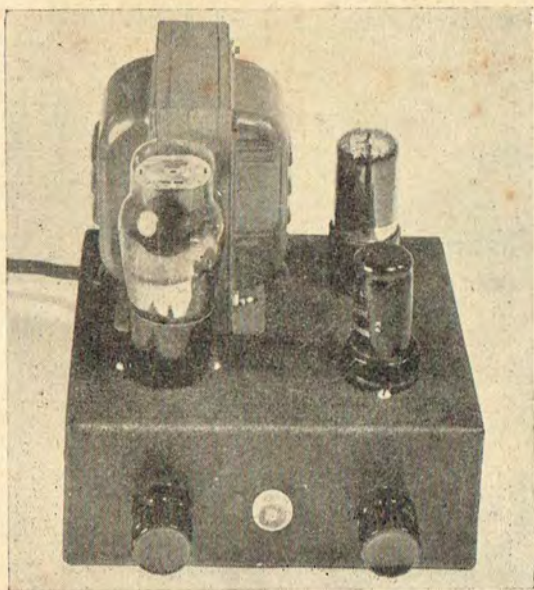
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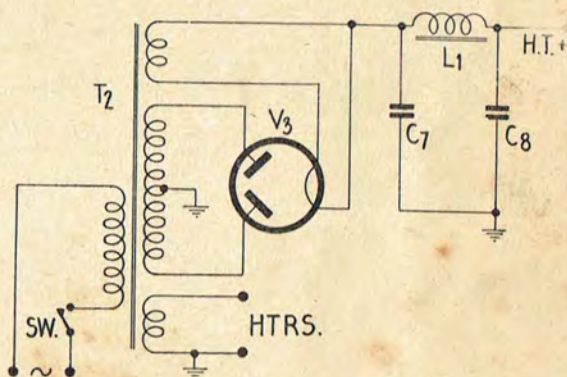
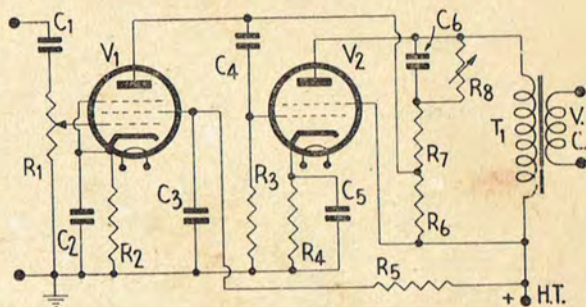
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A Compact 4½-Watt Gramophone Amplifier

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," NOVEMBER, 1946



GENERAL VIEW OF THE AMPLIFIER
The control on the left is the bass boosting pot., while the volume control is on the right.



COMPONENT LIST

- R1, 1 meg. pot.
- R2, 500 ohms.
- R3, R5, R7, 500k.
- R4, 250 ohms.
- R6, 100k.
- R8, 500k. pot.
- C1, C4, 0.1 μ f. 600v.
- C2, C5, 50 μ f. 25v. electro.
- C3, 0.5 μ f. 600v.
- C6, 0.001 mica.
- C7, C8, 16 μ f. 450v. electro.
- T1, output transformer, 5000 ohms to voice-coil.
- T2, power transformer, 385-0-385v. 80 ma., 6.3v. 3 amp., 5v. 2 amp.
- V1, 6SJ7.
- V2, 6V6-GT.
- V3, 80.
- L1, 2000 ohms speaker field.

Note.—If greater effective bass-boost is required from the bass-boosting type of tone-control used, C6 can be decreased in value (say, to 0.0005 μ f.) and R8 increased to 2 meg.

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44/-

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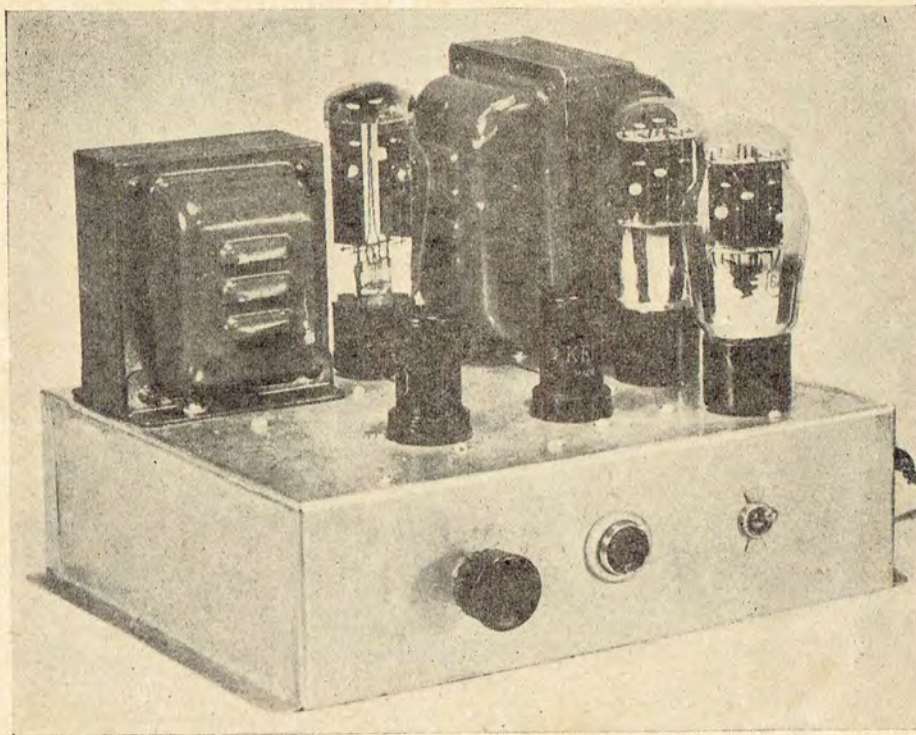
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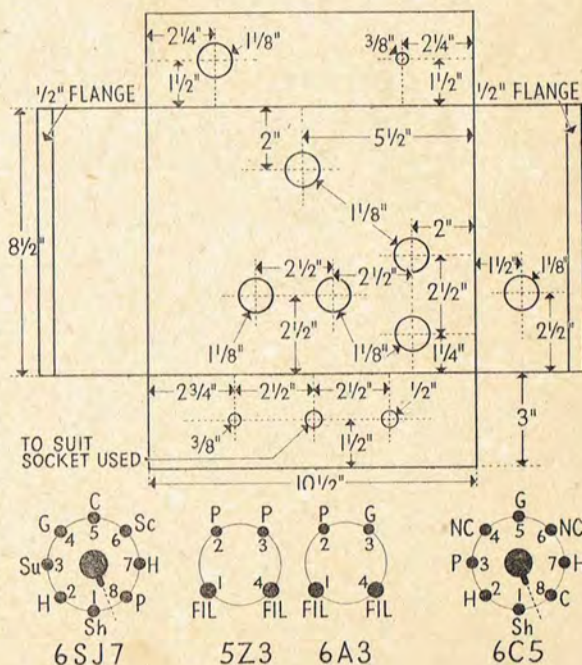
A QUALITY 6A3 AMPLIFIER

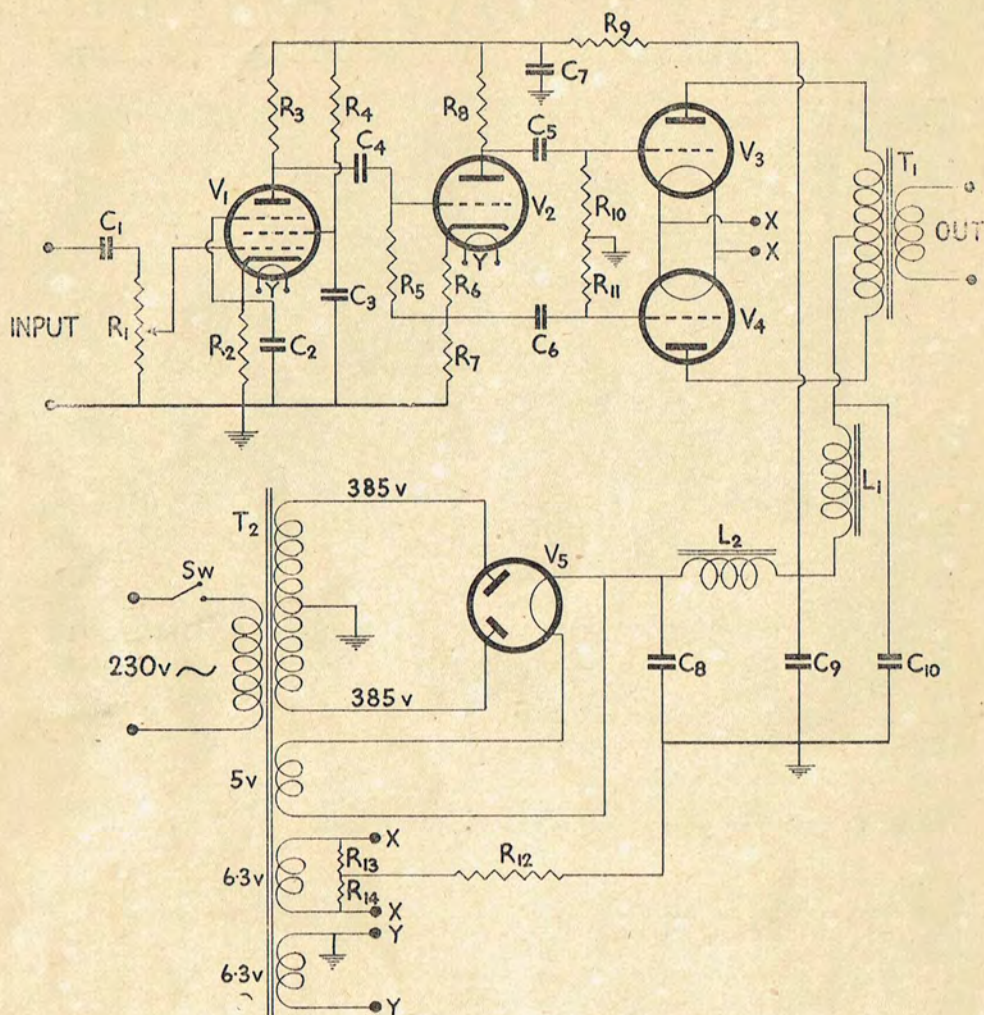
FULLY DESCRIBED IN "RADIO AND ELECTRONICS," APRIL, 1946



This is an excellent amplifier for those who do not want anything very elaborate and yet want better than average quality. It can be used, as can most of the following circuits, either as a gramophone amplifier or as part of a complete set. It can also be used as a driver for a Class B high-powered amplifier. The power output is great enough to drive most Class B tubes rated to deliver 100 watts of audio. In this application, the only modification to the amplifier circuit would be to replace the output transformer by a Class B input transformer, which would feed the grids of the Class B stage.

This amplifier was designed when electro-magnetic speakers were available, and it will be noted that the second smoothing choke in the power supply filter has been specified as a 750-ohm field winding. These days, E.M. speakers are the exception rather than the rule, and most constructors will wish to replace the field winding with a second choke. This can be done quite successfully, as long as a resistor is used in series with it so that the total resistance (choke plus resistor) is 750 ohms. If this is not done, the H.T. voltage will be rather on the high side. An alternative arrangement is to use a different power transformer, of only 320-volts-a-side. In this case, no extra resistance will be needed in series with the second choke.

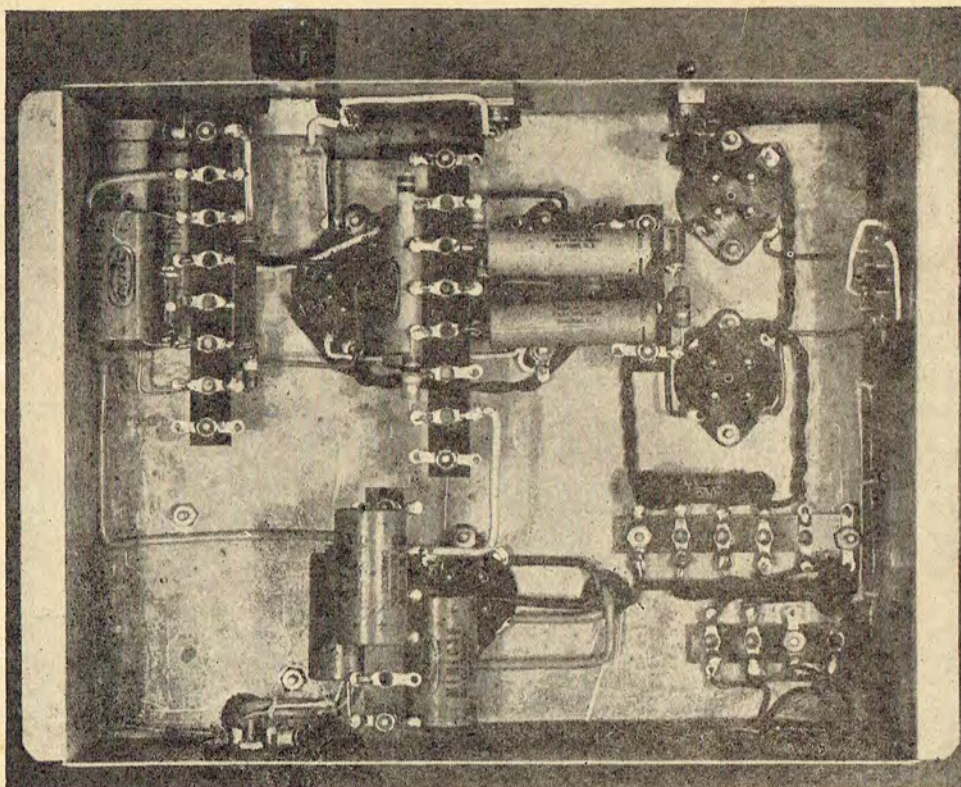




COMPONENT LIST

C1, C4, C5, C6, 0.1 600v.
 C2, 50 μ f. 25v. electrolytic.
 C3, 1 μ f. 600v.
 C7 to C10 inclusive, 8 μ f. 450v. electrolytic.
 V1, 6SJ7.
 V2, 6C5.
 V3, V4, 6A3.
 V5, 5Z3.
 L1, 1000 ohm speaker field.
 L2, 120 ma. 30 H choke.

T1, output transformer to match 5000 P-P to voice-coil.
 T2, Power transformer, 120 ma.
 R1, 1 meg. pot.
 R2, 500 ohms.
 R3, 100k.
 R4, R10, R11, 500k.
 R5, 1 meg.
 R6, 10k.
 R7, R8, 100k.
 R9, 25k.
 R12, 750 ohms 10 watts, wire-wound.
 R13, R14, each made up of two 50-ohm $\frac{1}{2}$ -watt resistors in parallel.



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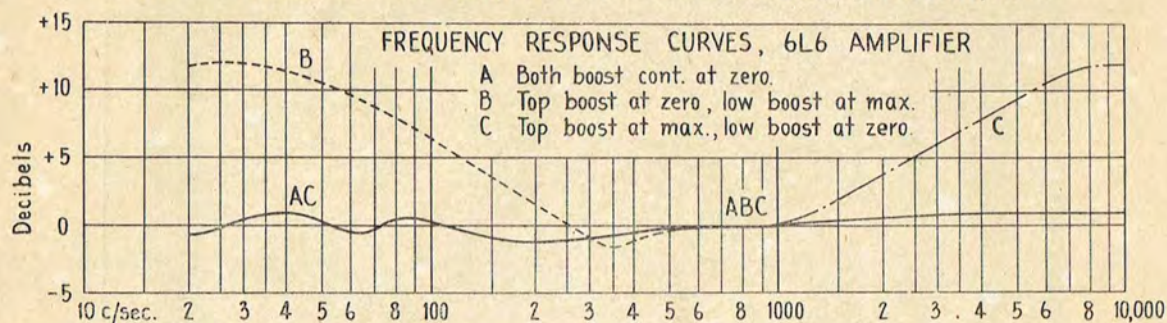
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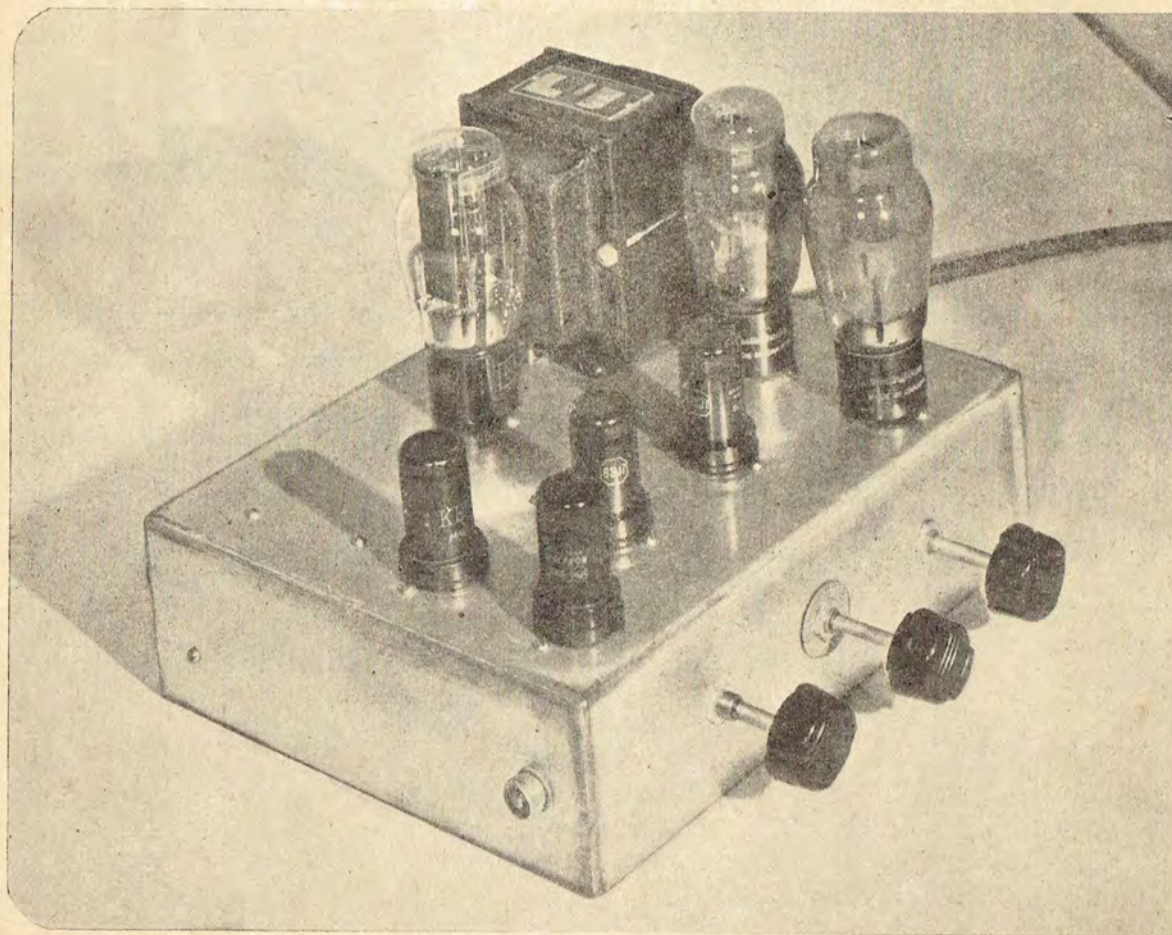
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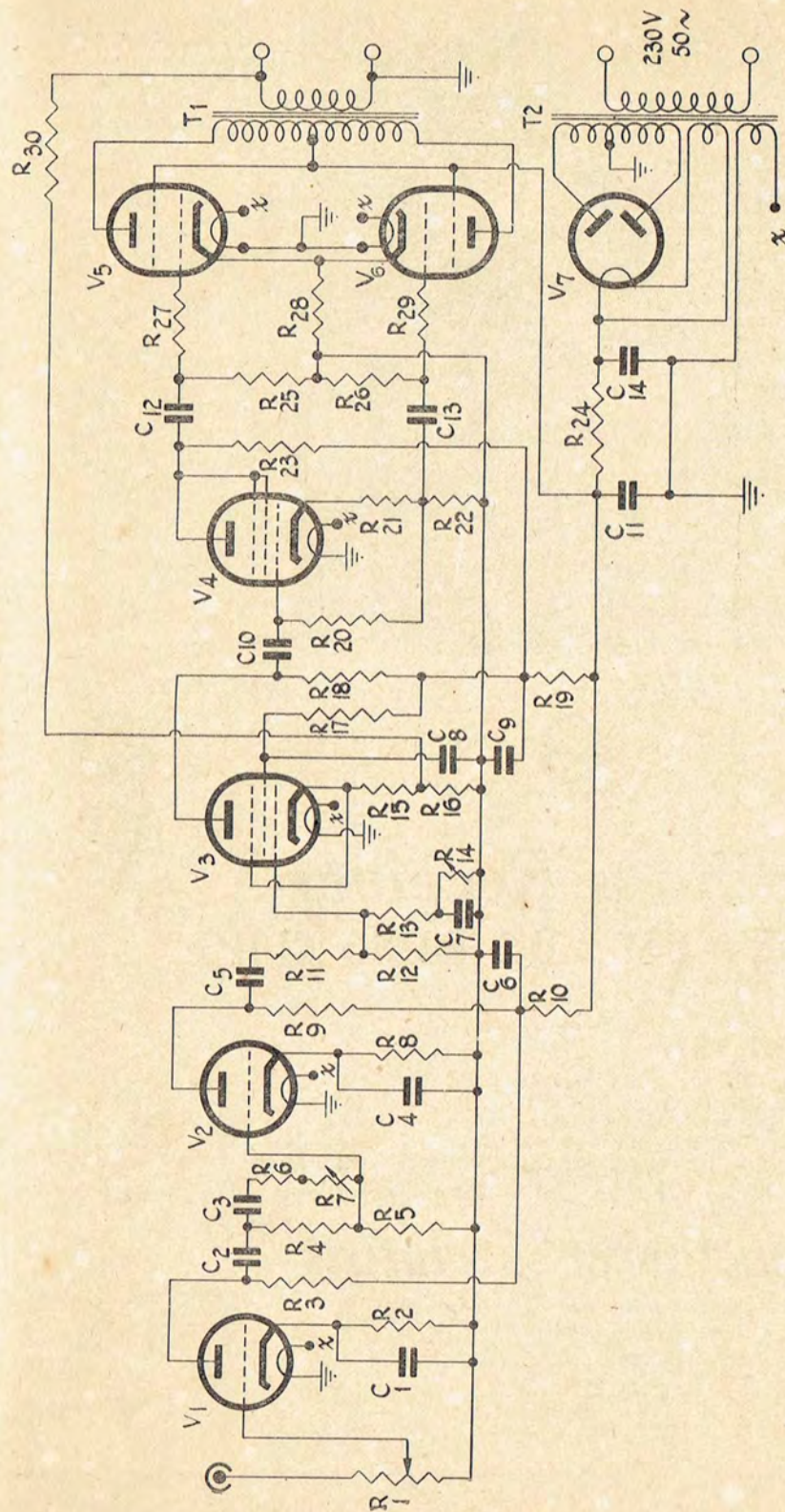


Response curves of the amplifier, taken on loud speaker load.

This amplifier fills the requirement for one with independent bass and treble boost controls. The response curves above show the different types of response that can be got with the controls at their maximum positions. Of course, intermediate settings

will give intermediate degrees of boost between the flat curve and the maximum boost curves. The controls act in such a way as to leave the overall volume unaffected when the controls are manipulated.





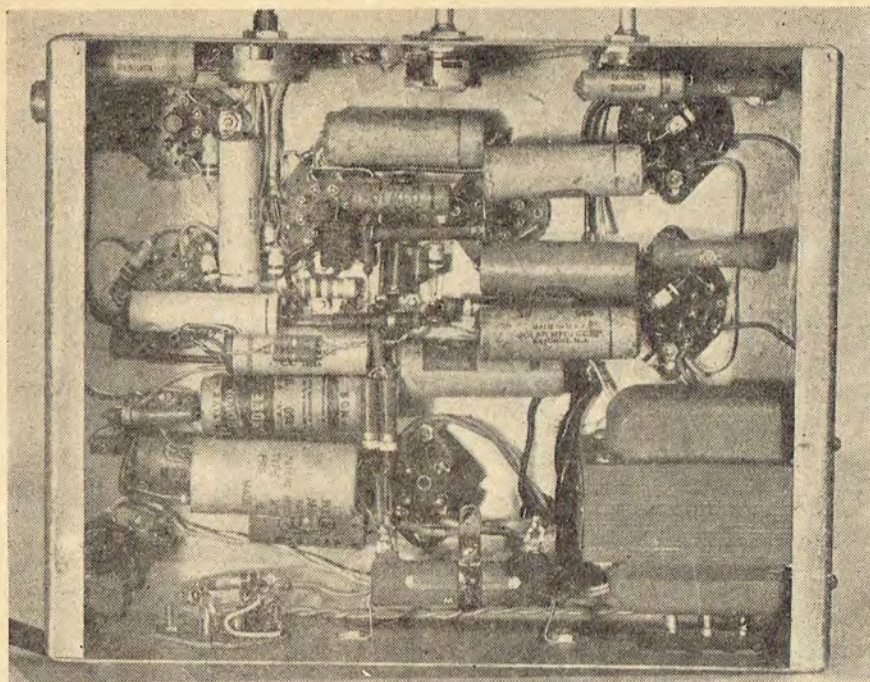
COMPONENT LIST

V1, V2, 6C5.
 V3, V4, 6SJ7.
 V5, V6, 6L6-G.
 V7, 5Z3.
 R1, 0.5 meg. pot.
 R2, R8, 2.5k.
 R3, R9, R18, R22, R23, R27, R29, 100k.
 R4, R11, R12, R17, R20, R25, R26, 500k.
 R5, R13, 50k.
 R6, 25k.
 R7, R14, 2 meg. pot.

R10, 100k, 1 watt.
 R15, 1500 ohms.
 R16, 10 ohms.
 R19, 50k, 1 watt.
 R21, 1000 ohms.
 R24, 1000 ohms 20 watt.
 R28, 125 ohms 10 watt.
 R30, 250 ohms.
 C1, C4, 25 μ f, 25v. electro.
 C2, C5, 0.1 μ f, 600v.
 C3, 250 μ f.

C6, C9, 16 μ f, 350v. electro.
 C7, C10, 0.01 μ f, 600v.
 C8, 0.5 μ f, 600v. paper.
 C11, 50 μ f, 350v. electro.
 C12, C13, 0.25 μ f, 600v.
 C14, two 8 μ f, 450v. electros. in series, each shunted by 1 meg.

T1, output transformer 5000 ohms p-p to voice coil.
 T2, 400-0-400v. 150 ma.; 5v. 3 amp.; 6.3v. 4 amp.



Under-chassis view of the amplifier, showing how the output transformer is mounted in the right-hand corner of the chassis.



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The Enlarged 6A3 Amplifier

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JUNE, 1947

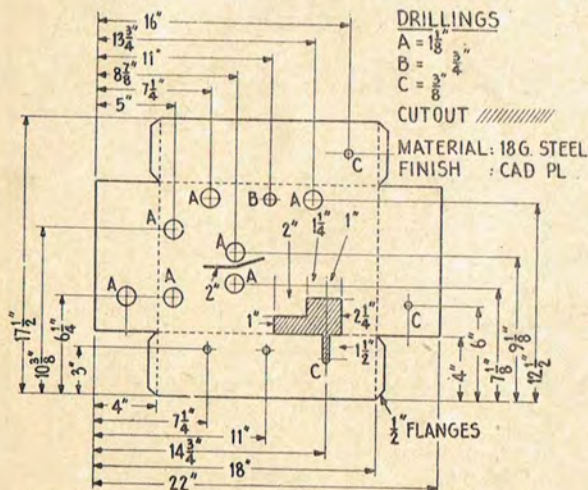
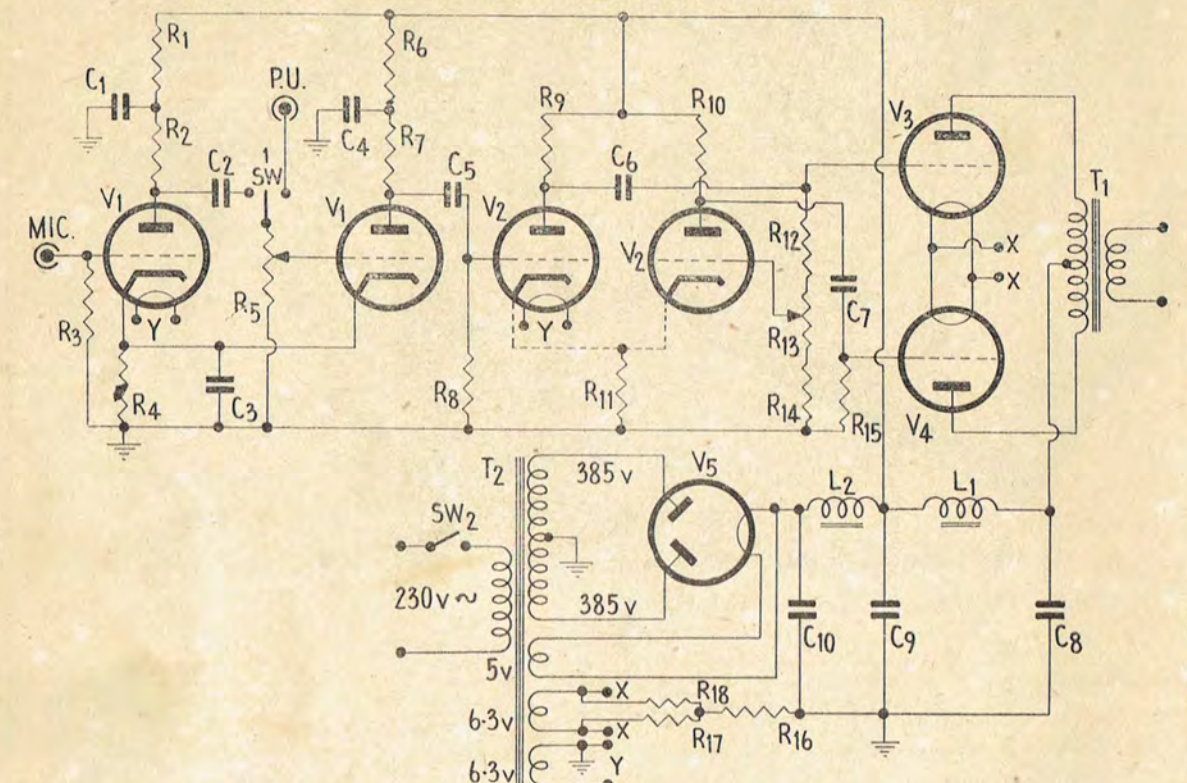
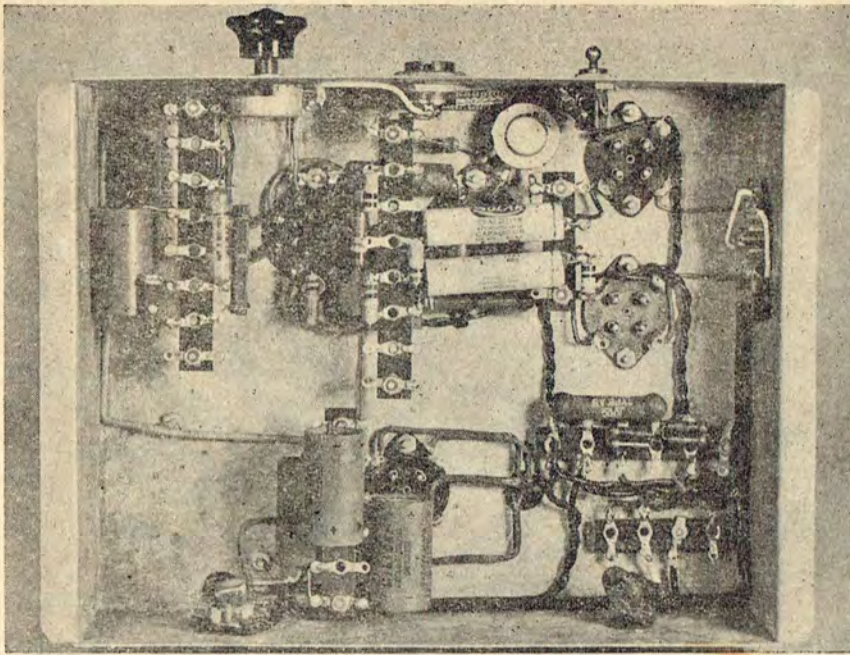


Diagram showing dimensions for this amplifier.

This amplifier has two input connections, one at low gain, for a radio tuner or gramophone pick-up, and the other, at high gain, for a low-level microphone. No mixing circuit is used, but instead a switch is incorporated so that either channel can be selected at will. The 750-ohm speaker field can be

- R1, R2, R6, R7, R9, R10, 100k. $\frac{1}{2}$ w.
 R3, R8, 250k. $\frac{1}{2}$ w.
 R4, R11, 1500 ohms $\frac{1}{2}$ w.
 R5, 250k. pot.
 R12, R15, 500k. $\frac{1}{2}$ w.
 R13, 25k. pot.
 R14, 10k. $\frac{1}{2}$ w.
 R16, 750 ohms 10w. wire-wound.
 R17, R18, each two 50 ohms $\frac{1}{2}$ w. in parallel.
 C1, C4, C8, C9, C10, 8 μ f. 450v. electro.
 C2, 0.01 μ f.
 C3, 50 μ f. 50v. electro.
 C5, C6, C7, 0.1 μ f.
 T1, output transformer, 5000 ohms p-p to V.C.
 T2, power transformer, 380-385v. 120 ma., 5v. 3 amp., 6.3v. 3 amp., 6.3v. 4 amp.
 L1, 750-ohm speaker field.
 L2, 20-30H. 120 ma.
 V1, 6SN7-GT.
 V2, 6N7.
 V3, V4, 6A3.
 V5, 5Z3.
 SW1, S.P.D.T. toggle switch.
 SW2, A.C. on/off switch.

replaced by a second choke if a permanent-magnet speaker is to be used, but resistance should be placed in series with the second choke to bring its total resistance up to 750 ohms. Unless this is done, the H.T. voltage will be rather on the high side,



Under-chassis view of the amplifier on the previous page. The use of strips to mount the small parts contributes to the clean and even empty-looking appearance of the chassis and to the ease with which access is gained to every part should servicing be necessary at any time.

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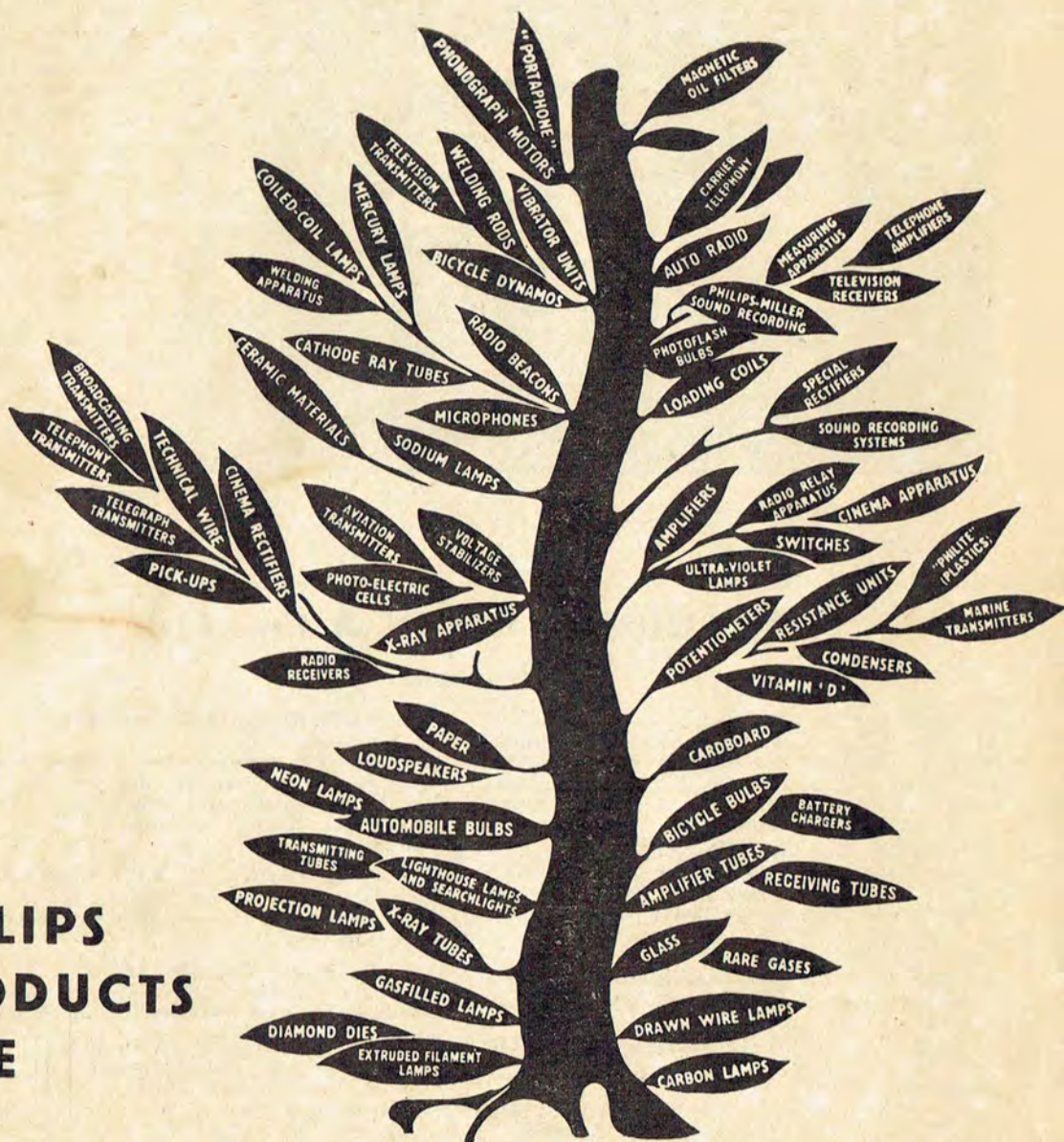
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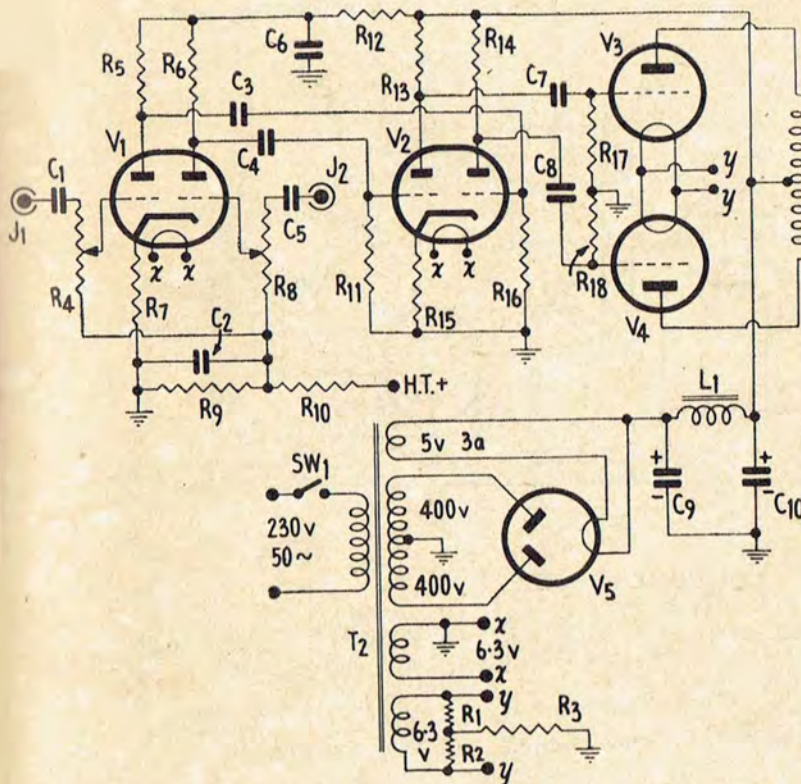
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A New Triode Audio Amplifier

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JUNE, 1948



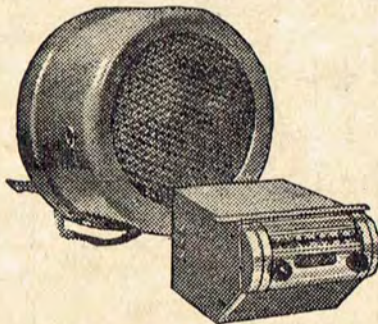
COMPONENT LIST

- C1, C5, 0.05 μ f.
- C2, C6, 8 μ f. 350v. electro.
- C3, C4, C7, C8, 0.1 μ f.
- C9, C10, 16 μ f. 450v. electro.
- R1 + R2, 20 ohms, centre-tapped, wire-wound.
- R3, 750 ohms 10 watt, wire-wound.
- R4, R8, $\frac{1}{2}$ meg. pot.
- R5, R6, R9, R13, R14, 100k.
- R7, R12, 50k. 1 watt.
- R10, R11, R16, R17, R18, 250k.
- R15, 1500 ohms.
- L1, 20-30H. 100 ma.
- T1, output transformer, 5000 ohms to voice-coil.
- T2, power transformer, windings as shown.
- V1, V2, 6N7.
- V3, V4, 6A3.
- V5, 5Z3.
- SW1, (single-pole on/off.
- J1, J2, single conductor shielded input sockets.

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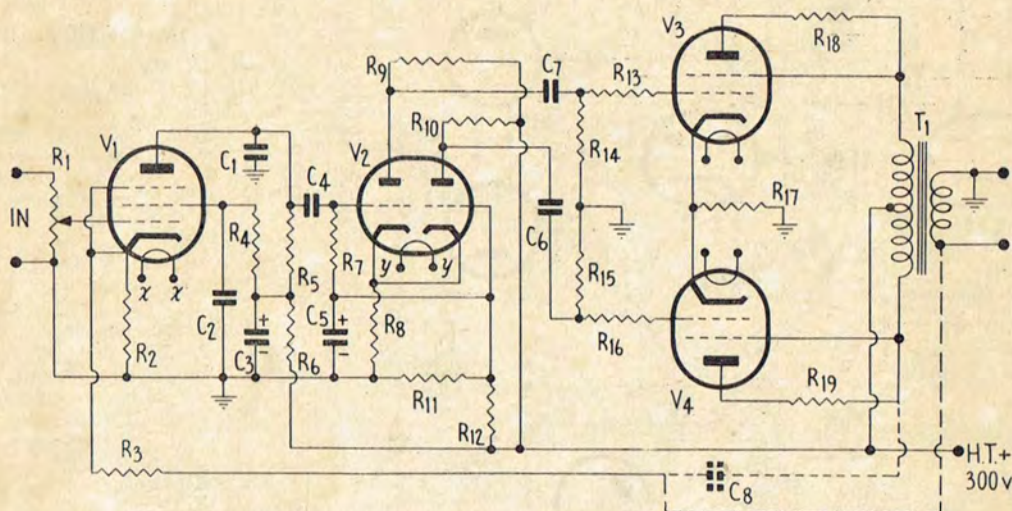
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Some Tested Circuits For 807's As Audio Amplifiers

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," SEPTEMBER, 1948

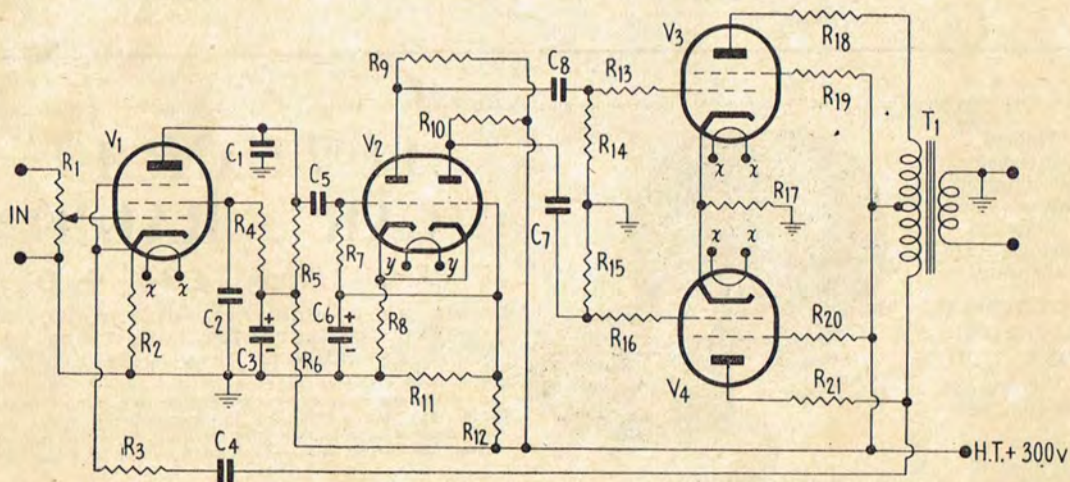


COMPONENT LIST

R1, 1 meg. pot.
R2, 1600 ohms.
R3, 250k. (min.) (see text).
R4, R7, 250k.
R5, R9, R13, R16, 100k.
R6, R11, 25k.
R8, 20k.

R10, 120k.
R12, 50k.
R14, R15, 275 ohms 2 watts.
R18, R19, 50 ohms.
C1, 100 μ mf.
C2, 0.5 μ f.
C3, C5, 8 μ f. 450v. electro.

C4, 0.05 μ f.
C6, C7, 0.1 μ f.
C8, 4 μ f. 500v. oil-filled.
V1, 6J7 or EF37.
V2, 6SN7.
V3, V4, 807.
T1, 9000 ohms to voice-coil.



COMPONENT LIST

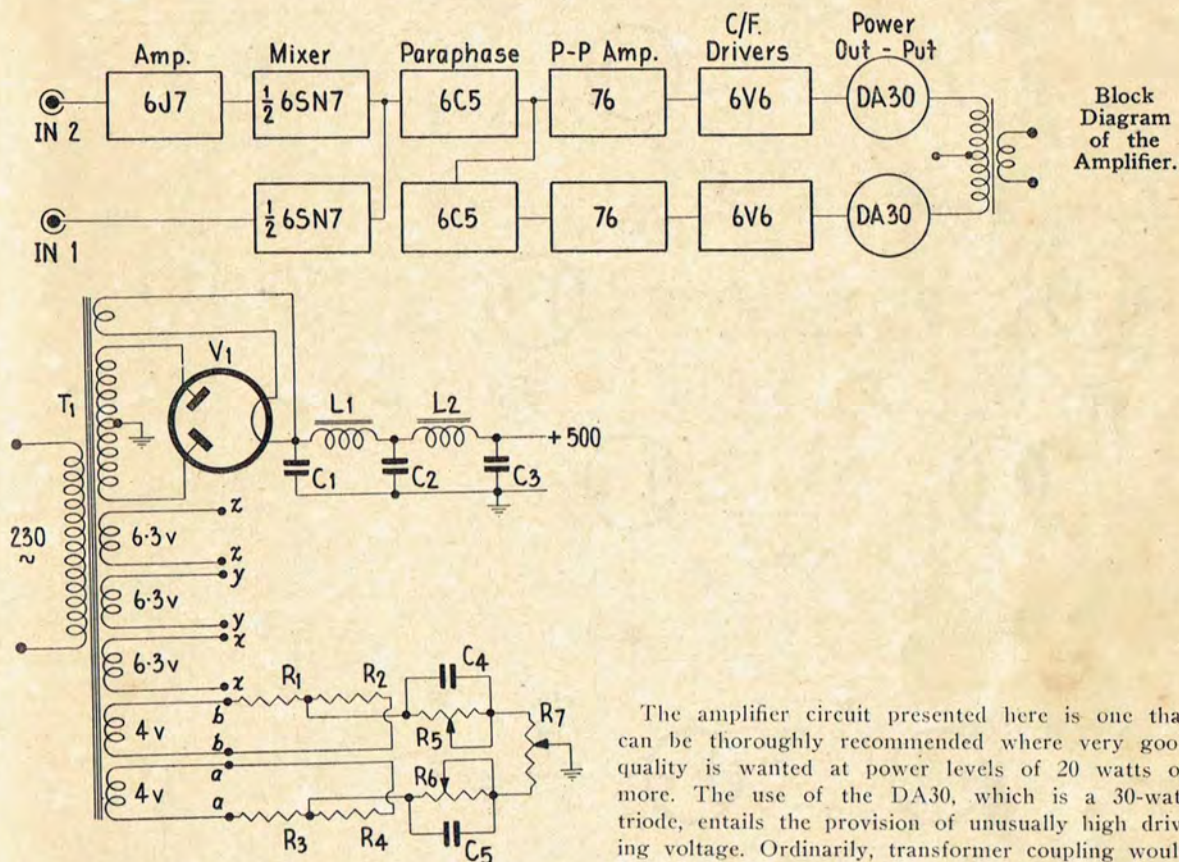
R1, 1 meg. pot.
R2, 1600 ohms.
R3, 250k. min. (see text).
R4, R7, 250k.
R5, R9, R13, R16, 100k.
R6, R11, 25k.
R8, 20k.
R10, 120k. (see text).

R12, 50k.
R14, R15, 500k.
R17, 120 ohms 2 watts.
R18, R19, R20, R21, 50 ohms
V1, 6J7 or EF37.
V2, 6SN7.
T1, 4750 ohms to voice-coil.
V3, V4, 807.

C1, 100 μ mf.
C2, 0.5 μ f.
C3, C5, 8 μ f. 450v. electro.
C4, 0.05 μ f.
C6, C7, 0.1 μ f.
C8, 4 μ f. 500v. oil-filled.

A Very High-Quality 20-Watt Amplifier

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," AUGUST, 1947



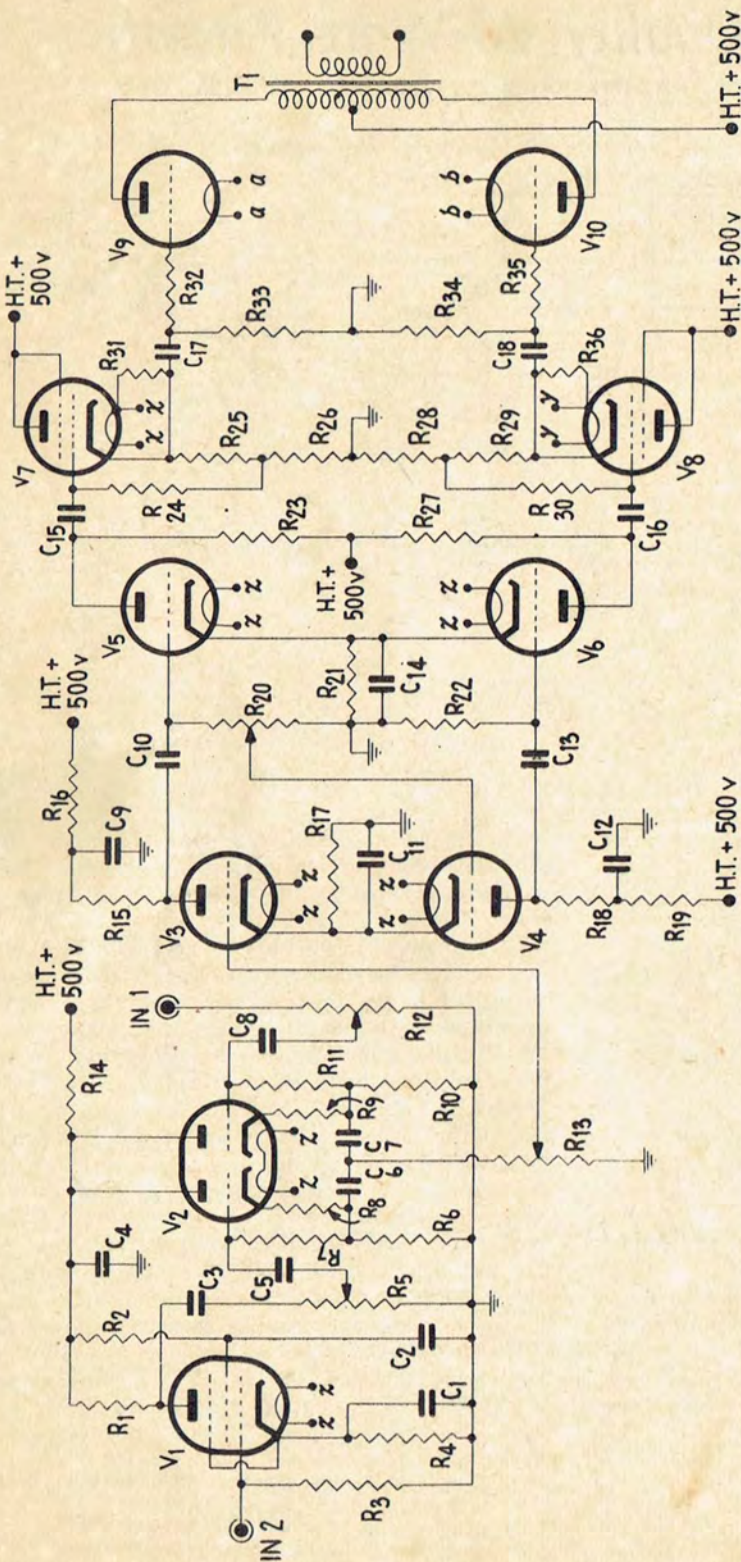
Circuit of the power supply. Note that C₄ and C₅, the bias bypass condensers, should have been returned to earth, and not to the ends of R₇ in this diagram.

two DA308's. However, these are generally sold in matched pairs, so that separate adjustments are not always needed. Note also that separate heater windings are used for the 6V6's, so as to prevent having a high D.C. voltage between the heaters and cathodes of these valves.

It is suggested that the output transformer for this amplifier should be of the highest obtainable quality so that the best advantage can be taken of the excellence of the amplifier itself. Hum level in the amplifier is exceedingly low, and should meet the most stringent requirements.

The amplifier circuit presented here is one that can be thoroughly recommended where very good quality is wanted at power levels of 20 watts or more. The use of the DA30, which is a 30-watt triode, entails the provision of unusually high driving voltage. Ordinarily, transformer coupling would be needed to get the 134 volts peak signal that is needed for each side of the push-pull output stage, but here the difficulty is overcome by using a pair of 6V6's as cathode follower buffers between the DA30's and the last voltage amplifier. An ingenious use of the cathode follower enables a distortionless audio mixing circuit to be incorporated so that microphone and gramophone pick-up can be used simultaneously for special effects, such as are often needed in sound-recording. The amplifier does not use negative feedback, and probably represents the best possible in the way of resistance-coupled amplifiers of 20 watts output rating without such feedback.

On this page is a block-diagram of the whole arrangement, together with a suitable power supply circuit. It will be noticed that arrangements have been made for separately adjusting the bias on the

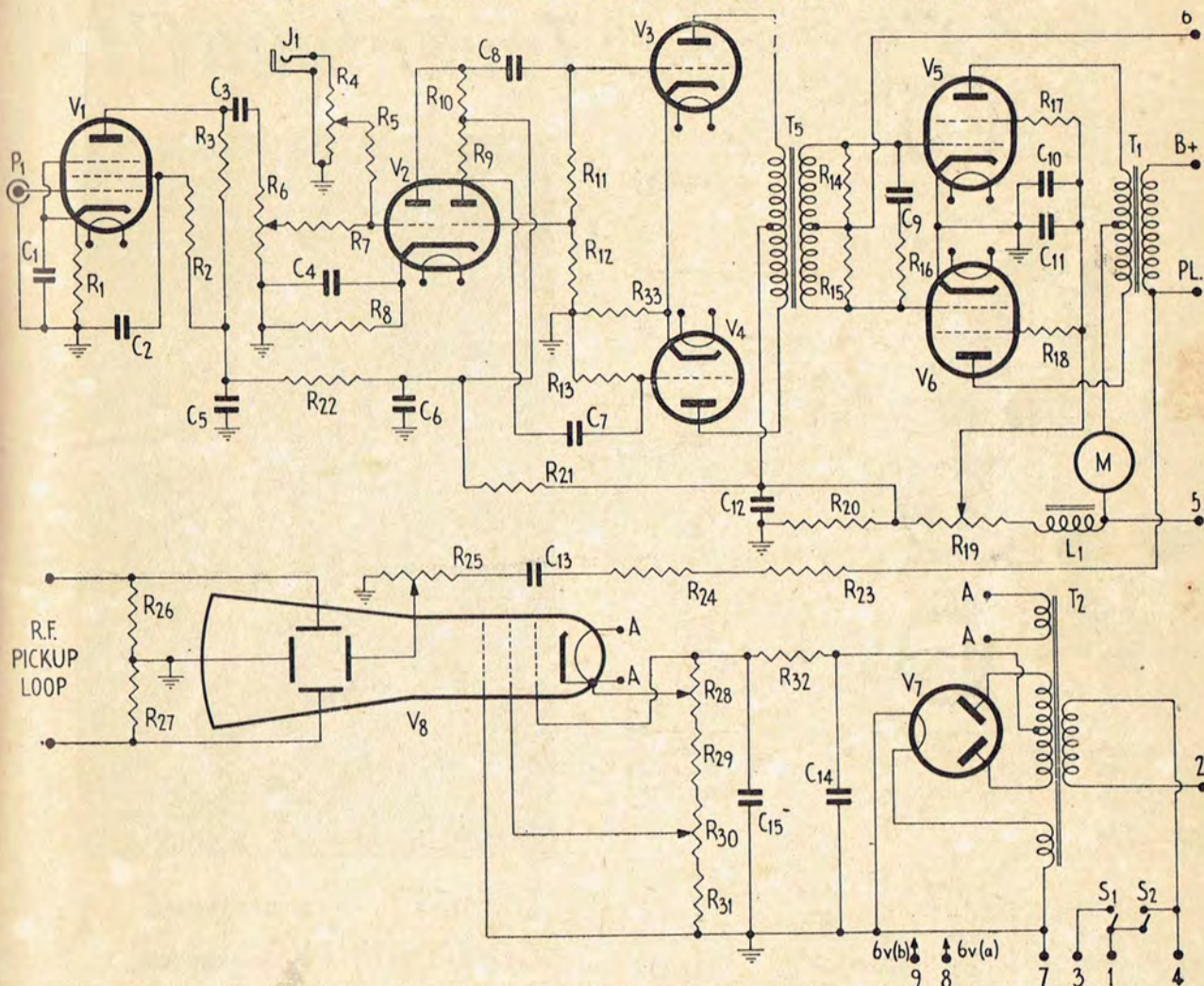


COMPONENT LIST

R1, 250k.
 R2, R3, R7, R11, R24, R30, R31, R36, 1 meg.
 R4, 1200 ohms.
 R5, R12, 250k. pot.
 R6, R10, R15, R16, R18, R19, 50k.
 R8, R9, 1500 ohms.
 R13, R20, 100k. pot.
 R14, R22, R23, R27, R33, R34, 100k.
 R25, R29, R32, R35, 1000 ohms.
 R26, R28, 150k.
 R17, 1250 ohms.
 R21, 3750 ohms.
 C1, C11, C14, 25 μ f. 25v. electro.
 C2, C10, C13, C17, C18, 0.5 μ f. 600v. paper.
 C3, 0.004 μ f. 600v.
 C4, C9, C12, 8 μ f. 450v. electro.
 C5, C8, C15, C16, 0.05 μ f. 600v. paper.
 C6, C7, 1 μ f. 600v. paper.
 V1, 6SJ7.
 V2, 6SN7-GT.
 V3, V4, 6C5.
 V5, V6, 76.
 V7, V8, 6V6.
 V9, V10, 6A30.
 T1, high-fidelity output transformer 9000 ohms to voice-coil.

A 50-Watt Amateur's Modulator Using P-P 807's

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," AUGUST, 1946



COMPONENT LIST

R1, R8, 1000 ohms.
R2, R23, R24, R26, R27, 1 meg.
R3, R11, R13, R34, R35, 250k.
R4, R6, R25, 50k. pot.
R5, R7, 500k.
R9, R10, R22, 100k.
R12, R14, R15, R21, 10k.
R16, 5k.
R17, R18, 100 ohms.
R19, 5k. 20w., adjustable.
R20, 20k. 20w.
R28, 25k. w-w pot.
R29, R32, 20k.
R30, 50k., w-w pot.
R31, 150k.
R33, 500 ohms.

R33 (on power supply circuit), 1000 ohms w-w pot.
C1, C4, 25 μ f. 25v. electro.
C2, C3, C7, C8, C13, 0.01 μ f. 600v.
C5 + C6, dual 10 μ f. 450v. electro.
C9, 0.005 μ f.
C10, 0.01 μ f. mica.
C11, C12, C18, C19, 8 μ f. 450v. electro.
C14, C15, 0.5 μ f. 600v.
C16, C17, 50 μ f. 50v. electro.
T1, mod. transformer (see text).
T2, 385v.-a-side receiving transformer, with 4v. heater winding, A-A.
T3, main H.T. transformer, 690v.-a-side 400 ma.
T4, heater and bias transformer; windings as indicated.
T5, driver transformer.

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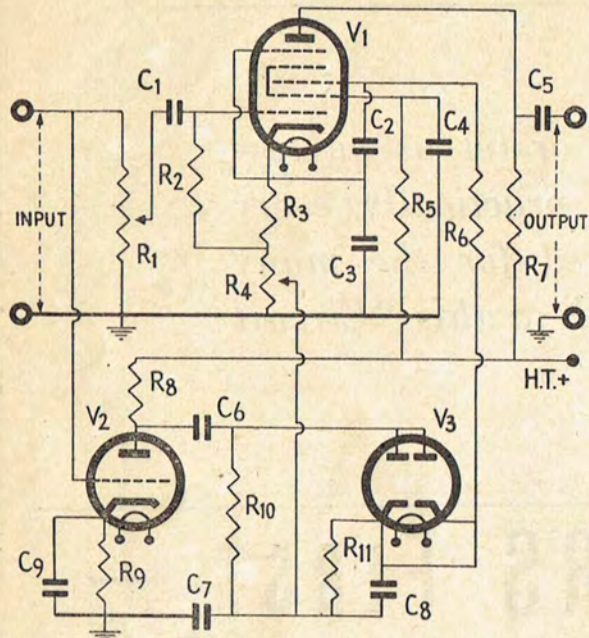
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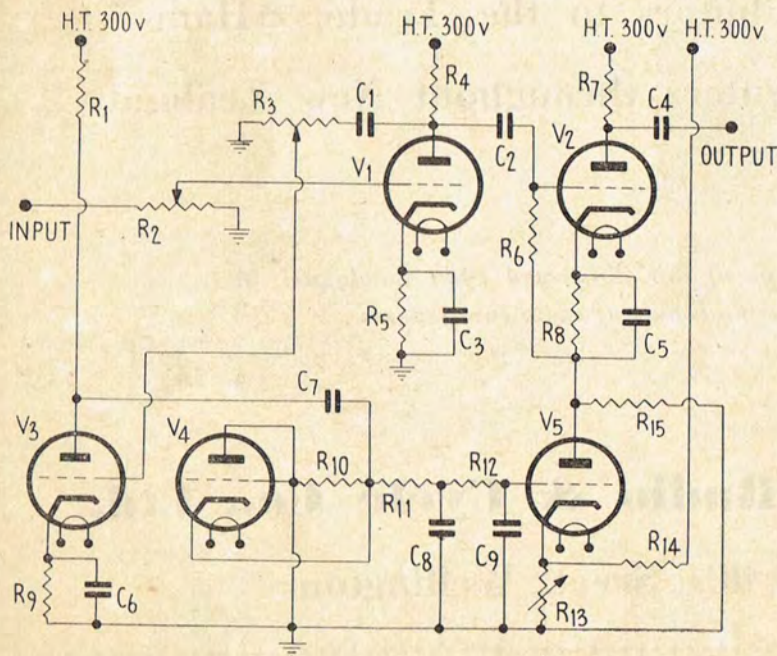
No. 1.—FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JUNE, 1946



COMPONENT LIST

V1, 6L7.
V2, 6C5.
V3, 6H6.
R1, 0.5 meg. pot.
R2, R6, R11, 0.5 meg.
R3, 400 ohms.
R4, 2000 ohms pot.
R5, 50k.
R7, 20k.
R8, R10, 100k.
C1, C5, 0.1 μ f.
C2, C8, 0.25 μ f.
C3, C7, 25 μ f. 25v. electro.
C4, C9, 0.5 μ f.
C6, 0.05 μ f.

No. 2.—FULLY DESCRIBED IN "RADIO AND ELECTRONICS," NOVEMBER, 1948



COMPONENT LIST

R1, R4, R7, R10, 100k.
R2, R3, 1 meg. pot.
R5, 5k.
R6, R11, R12, 500k.
R8, R9, 2k.
R13, 2k. w-w pot.
R14, 50k. 2w.
R15, 125k.
C1, C2, C4, 0.05 μ f.
C3, C5, C6, 25 μ f. 25v. electro.
C7, 0.02 μ f.
C8, C9, 0.1 μ f.
V1, 6C5.
V2, V3, V4, V5, 6SN7.
V2 and V5, 6SN7.
V3 and V4, 6SN7.

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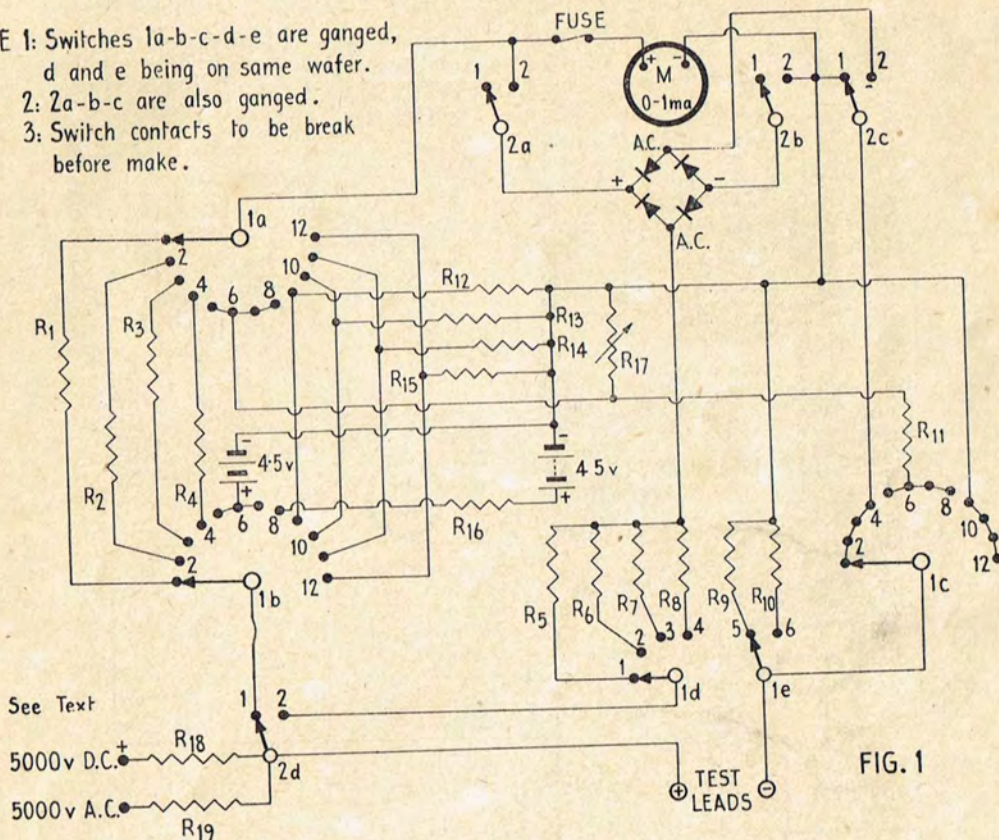
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DUNEDIN

An AC/DC 24 Range Multi-meter

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," AUGUST, 1946

- NOTE 1: Switches 1a-b-c-d-e are ganged, d and e being on same wafer.
 2: 2a-b-c are also ganged.
 3: Switch contacts to be break before make.



COMPONENT LIST

- R1, 10k.
 R2, 100k.
 R3, R7, 500k.
 R4, R8, 1 meg.
 R5, 8k.
 R6, 98k.
 R9, 34.6 ohms.
 R10, 396 ohms.
 R11, 3550 ohms.
 R12 to R15, shunts for current ranges.
 R16, 31.95k.
 R17, 500 ohms pot.
 R18, R19, 4 meg.
 S1a-S1e, main selector.
 S2a-S2c, A.C./D.C. switch.

SWITCH POSITIONS

Position	S1 Range
1	10v.
2	100v.
3	500v.
4	1000v.
5	$R \div 100$.
6	$R \div 10$.
7	$R \times 1$.
8	$R \times 10$.
9	1 amp.
10	500 ma.
11	100 ma.
12	10 ma.

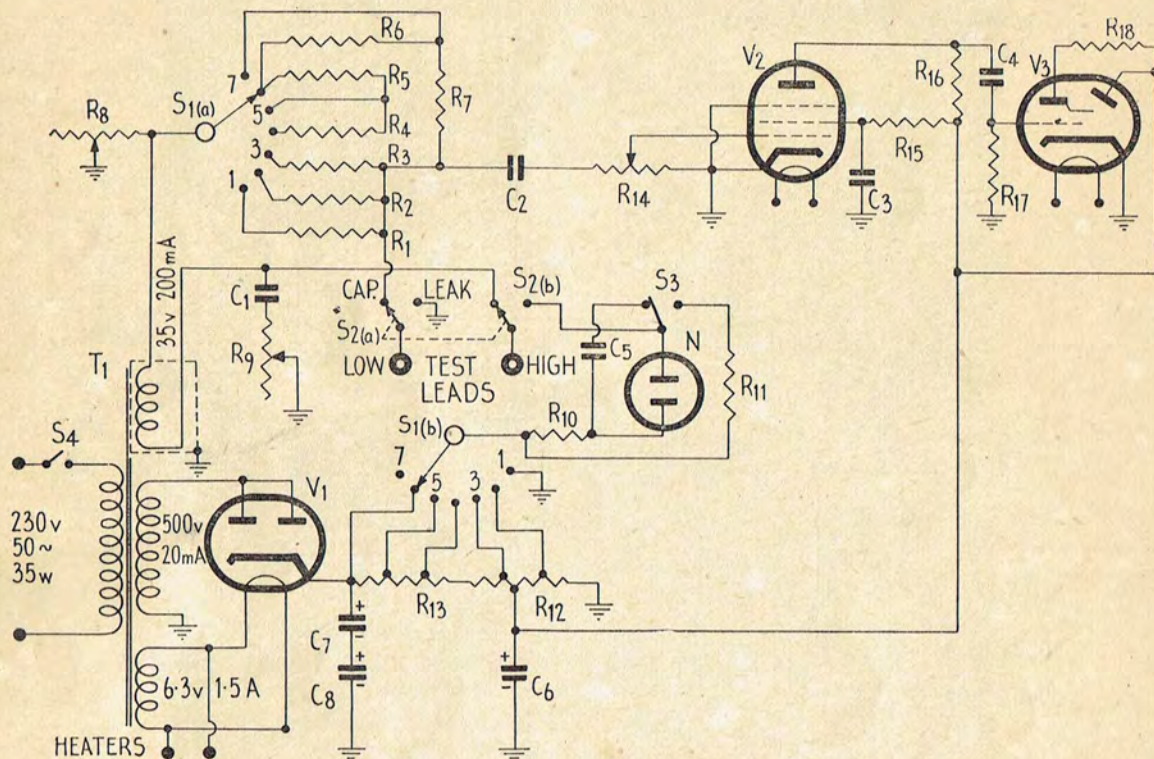
Position	S2 Range
1	D.C. volts-ma.-ohms
2	A.C. volts.

A Bridge-type Capacity Analyser

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," SEPTEMBER, 1946

This capacity analyser measures capacity, with a bridge circuit, and also tests for power factor and leakage. A neon lamp is used in the latter function,

and indicates the goodness of the dielectric by the rate of flashing. Full details are given in the original article, to which intending builders are referred.



COMPONENT LIST

T1, power transformer (windings as indicated).

V1, 6X5.

V2, 6J7.

V3, 6E5.

N, 1-watt neon lamp.

S1(a) and S1(b), range switch.

S2(a) and S2(b), leakage/capacity switch.

S3, paper or mica/electrolytic switch.

S4, on/off switch on R14.

R1, R18, 1 meg.

R2, 100k.

R3, 10k.

R4, 900 ohms.

R5, 90 ohms.

R6, 9 ohms.

R7, 0.9965 ohms.

R8, 10k. w-w pot.

R9, 15k. w-w pot.

R10, 120k.

R11, 30k.

R12, R13, 25k. voltage divider, two taps.

R14, 1 meg. pot.

R15, 2 megs.

R16, R17, 500k.

C1, 0.099 μ f.

C2, C4, 0.01 μ f.

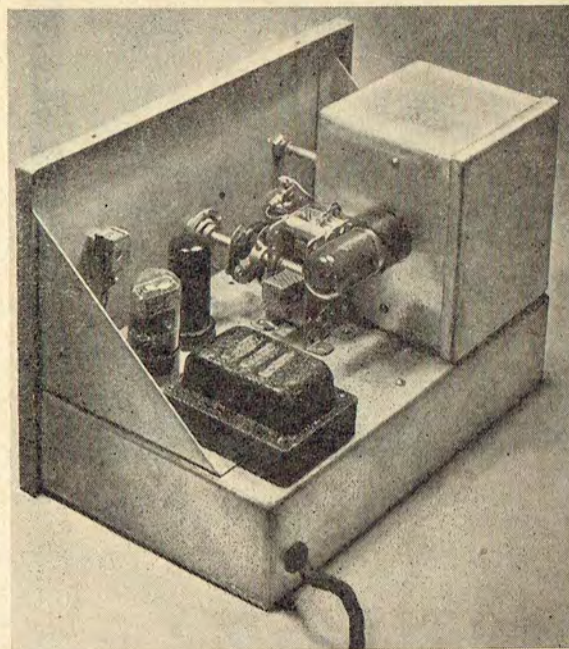
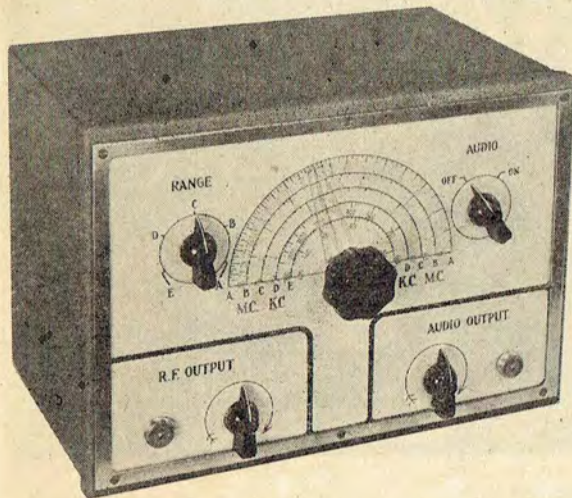
C3, 0.25 μ f.

C5, 0.5 μ f.

C6, C8, 8 μ f. 450v. electro.

The Radel Service Oscillator

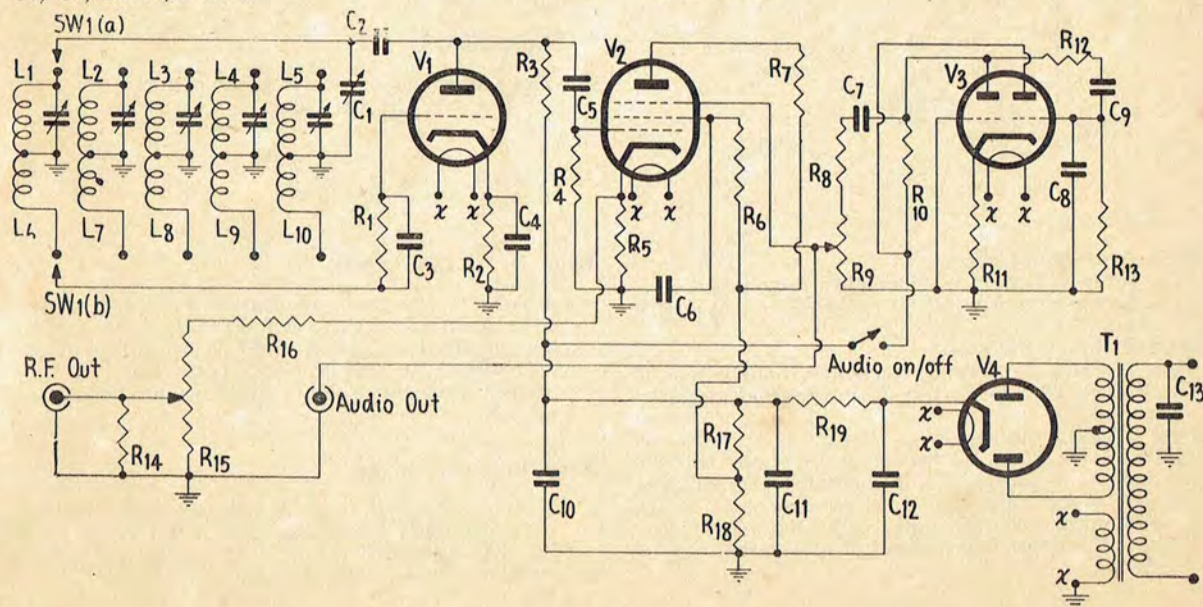
FULLY DESCRIBED IN "RADIO AND ELECTRONICS," JULY, 1947



COMPONENT LIST

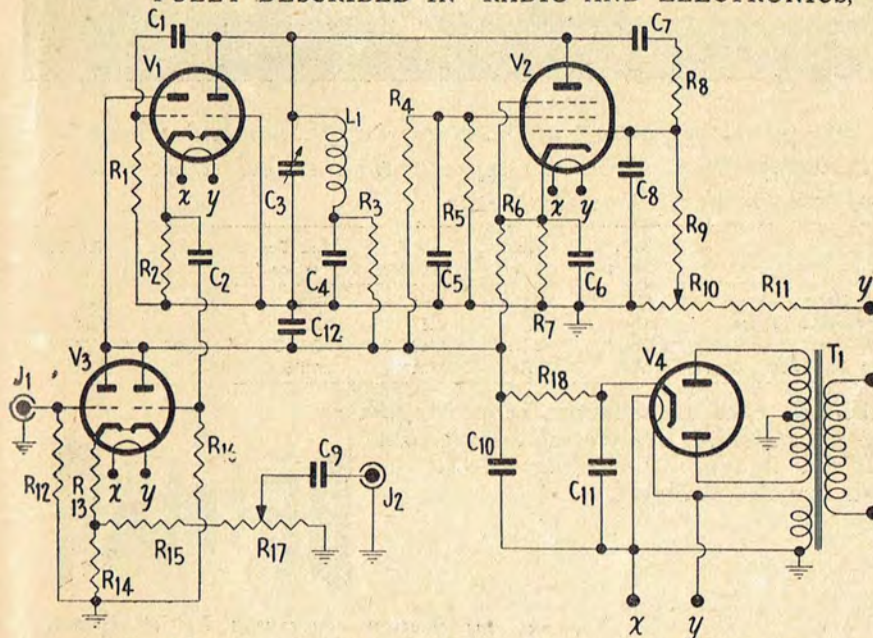
R1, R12, R13, R18, 25k. R8, R9, 50k
 R2, 500 ohms. R10, R17, 15k
 R3, 10k. R11, 250 ohms.
 R4, 100k. R14, 50 ohms.
 R5, R15, 1000 ohms. R19, 10k. 25w. w-w.
 R6, 500k. L1 to L10, see text.
 R7, R16, 5k. SW1, 2-bank 11-position wafer switch (see text).
 C1, 350 μ f. max. variable.
 C2, C3, 50 μ f. mica.
 C4, C7, C10, 0.01 μ f. paper.
 C5, 25 μ f. mica.
 C6, 100 μ f. mica.
 C8, C9, 0.004 μ f. mica.

C11, 8 μ f. 450v. electro.
 C12, 40 μ f. 450v. electro.
 C13, 0.1 μ f. paper.
 T1, 250-0-250v., 6.3v. power transformer.
 V1, 6V6-GT (screen tied to plate).
 V2, 6J7.
 V3, 6N7.
 V4, 6X5-GT.



A Frequency-modulated Test Oscillator for use with an Oscilloscope

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," FEBRUARY, 1948



COMPONENT LIST

- R1, 50k.
- R2, R3, 3k.
- R4, R5, R6, R8, 25k.
- R7, 350 ohms.
- R9, 1 meg.
- R10, R17, 1000 ohms pot.
- R11, R12, R15, 10k.
- R13, R14, 5k.
- R18, 2500 ohms 10 watt.
- C1, 10 μ f. mica.
- C2, 100 μ f. mica.
- C3, 50 μ f. variable.
- C4, C5, 0.1 μ f.
- C6, 0.25 μ f.
- C7, 250 μ f. mica.
- C8, 300 μ f. mica.
- C9, 0.01 μ f.
- C10, C11, 16 μ f. 450v. electro.
- V1, V3, 6N7.
- V2, 6SK7.
- V4, 6X5.

A Vacuum-tube Voltmeter For D.C. Measurements

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," NOVEMBER, 1946

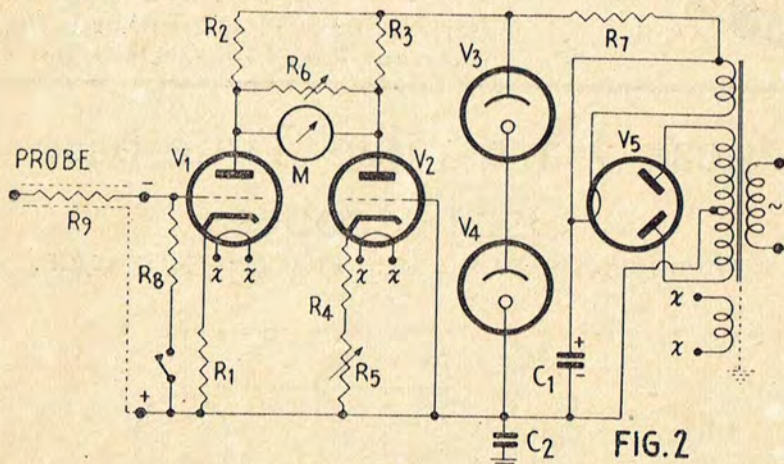


FIG. 2

COMPONENT LIST

- R1, 500 ohms.
- R2, R3, 50k.
- R4, 250 ohms.
- R5, 500 ohms w-w pot.
- R6, 200 ohms w-w pot.
- R7, 4500 ohms 5w. w-w.
- R8, 200k. (for 0-50v. range).
- R9, 5 meg.
- C1, 16 μ f. 450v. electro.
- C2, 1 μ f. 600v.
- V1, V2, 6AC7/1852, screen and suppressor tied to plate.
- V3, VR105/30.
- V4, VR150/30.
- M, 0-1 ma. moving-coil meter.
- Power transformer, 300-0-300v. 40 ma.

New VALVE TYPES HAVE BEEN ADDED AND WE *Can* SUPPLY



The Brimar valve factory at Standard Telephones and Cables Ltd., London, have added new types to their range. Here is a list of some of the types available now.

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1.4-volt Battery Types	1T4	1R5	1T4	1U5	3V4	—
6.3-volt Octal Types	7H7	7S7	7H7	7K7	7C5	7Z4
6.3-volt Octal Types	6K7GT	6K8GT	6K7GT	6B8GT	6V6GT	5Y3GT
6.3-volt All Glass Types	6BA6	6BE6	6BA6	6AT6	—	6X4

Additional types in the above ranges together with other British Brimar made American replacement types, including 12-volt octals are also available.

BRIMAR

For any information concerning British Brimar Valves, write without obligation to:

STANDARD TELEPHONES & CABLES

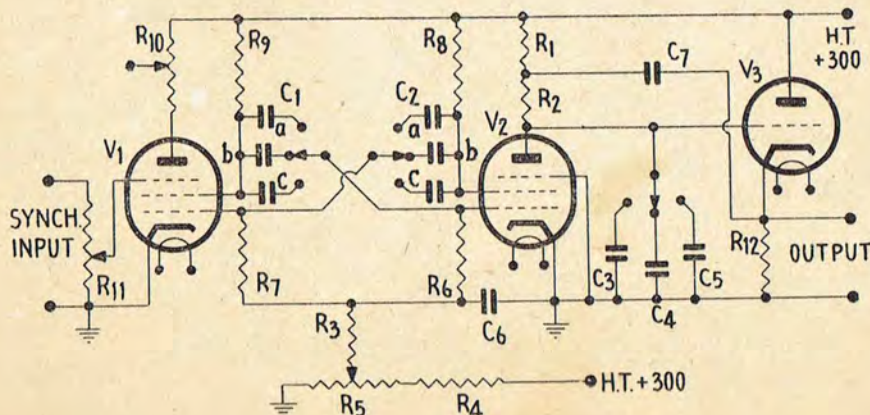
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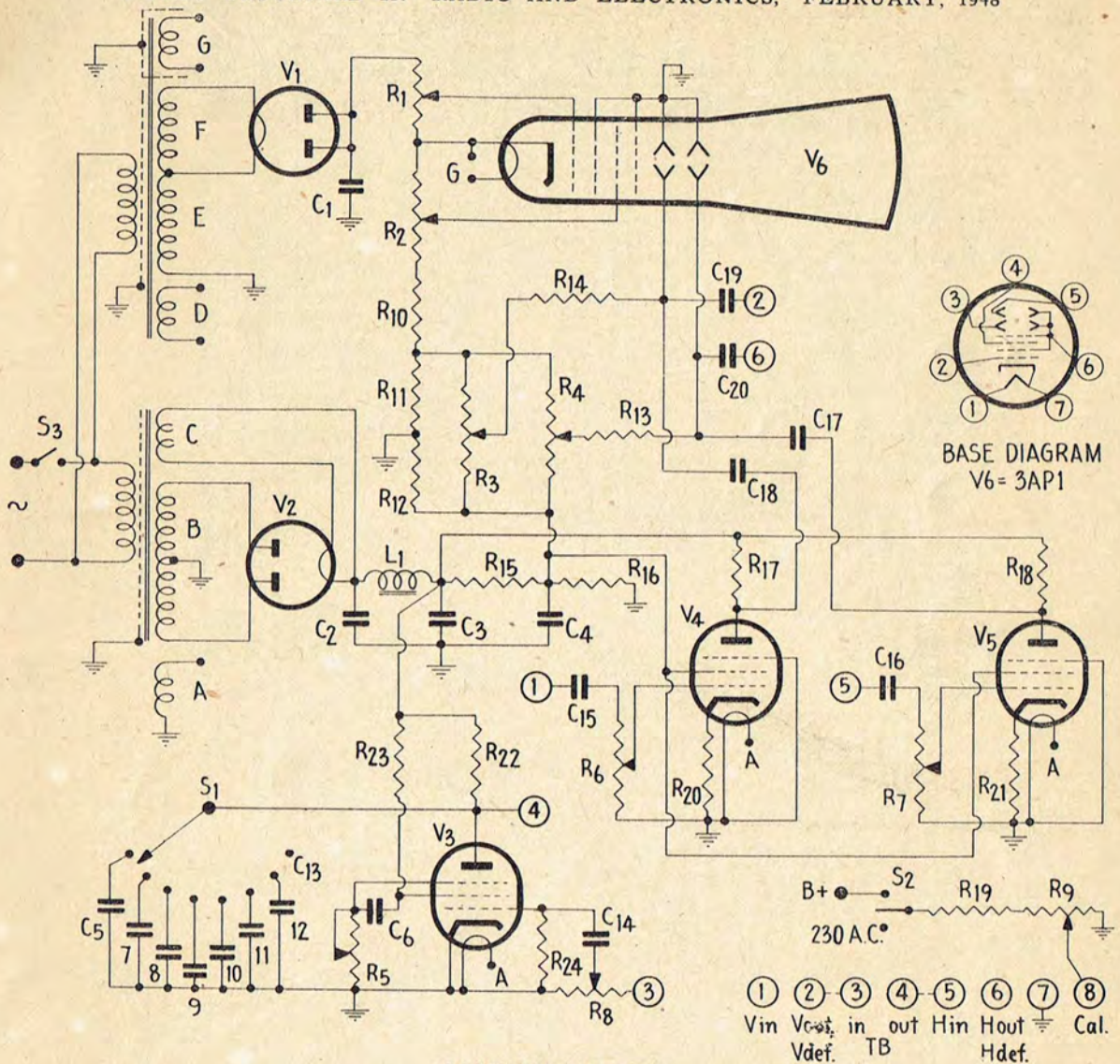
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- R1, R2, R3, 50k.
- R4, R8, R9, 25k.
- R5, 100k. pot.
- R6, 1 meg.
- R7, R12, 100k.
- R10, 50k. pot.
- R11, 500k. pot.
- C1a, C2a, 0.01 μ f.
- C1b, C2b, 0.001 μ f.
- C1c, C2c, 0.0001 μ f.
- C3, 0.5 μ f.
- C4, 0.05 μ f.
- C5, 0.005 μ f.
- C6, C7, 1 μ f.
- V1, V2, V3, 6AC7/1852

A 3" Service Oscilloscope

FULLY DESCRIBED IN "RADIO AND ELECTRONICS," FEBRUARY, 1948



COMPONENT LIST

C1, 1 μ f. 1000v.
C2, C3, C4, 8 μ f. 450v. electro in parallel with 0.5 μ f. paper.
C5, C6, 1 μ f. 600v.
C7, 0.25 μ f. 600v.
C8, C19, C20, 0.05 μ f. 600v.
C9, 0.01 μ f. 600v.
C10, 0.002 μ f. 600v.
C11, 0.0005 μ f. mica.
C12, 0.0001 μ f. mica.
C13, stray capacities.
C14, C15, C16, C17, 0.1 μ f. 600v.
C18, 0.004 μ f. mica.
V1, V2, 80.

V3, V4, V5, 6AC7/1852.
V6, 3AP1 or 906.
R1, 50k. pot.
R2, 0.25 meg. pot.
R3, R4, R5, 2 meg. pot.
R6, R7, R8, 0.5 meg. pot.
R9, 1 meg. pot.
R10, 250k. $\frac{1}{2}$ w.
R11, R12, 100k. $\frac{1}{2}$ w.
R13, R14, 2 meg. $\frac{1}{2}$ w.
R15, R16, R19, 20k. 2w.
R17, R18, 15k. 2w.
R20, R21, 150 ohms 1w.
R22, 150k. 1w.

R23, 100k. 1w.
R24, 50k. $\frac{1}{2}$ w.
S1, single-pole 11 position.
S2, S.P.D.T.
S3, S.P.S.T.
L1, 50ma. smoothing choke.
Transformer windings.
A, 6.3v. 2 amp.
B, 300-0-300v. 60 ma.
C, 5v. 2 amp.
D, 6.3v. 1 amp.
E, 750v. 5 ma.
F, 5v. 2 amp.
G, 2.5v. 2.5 amp. (not used).

A 5" Service Oscilloscope

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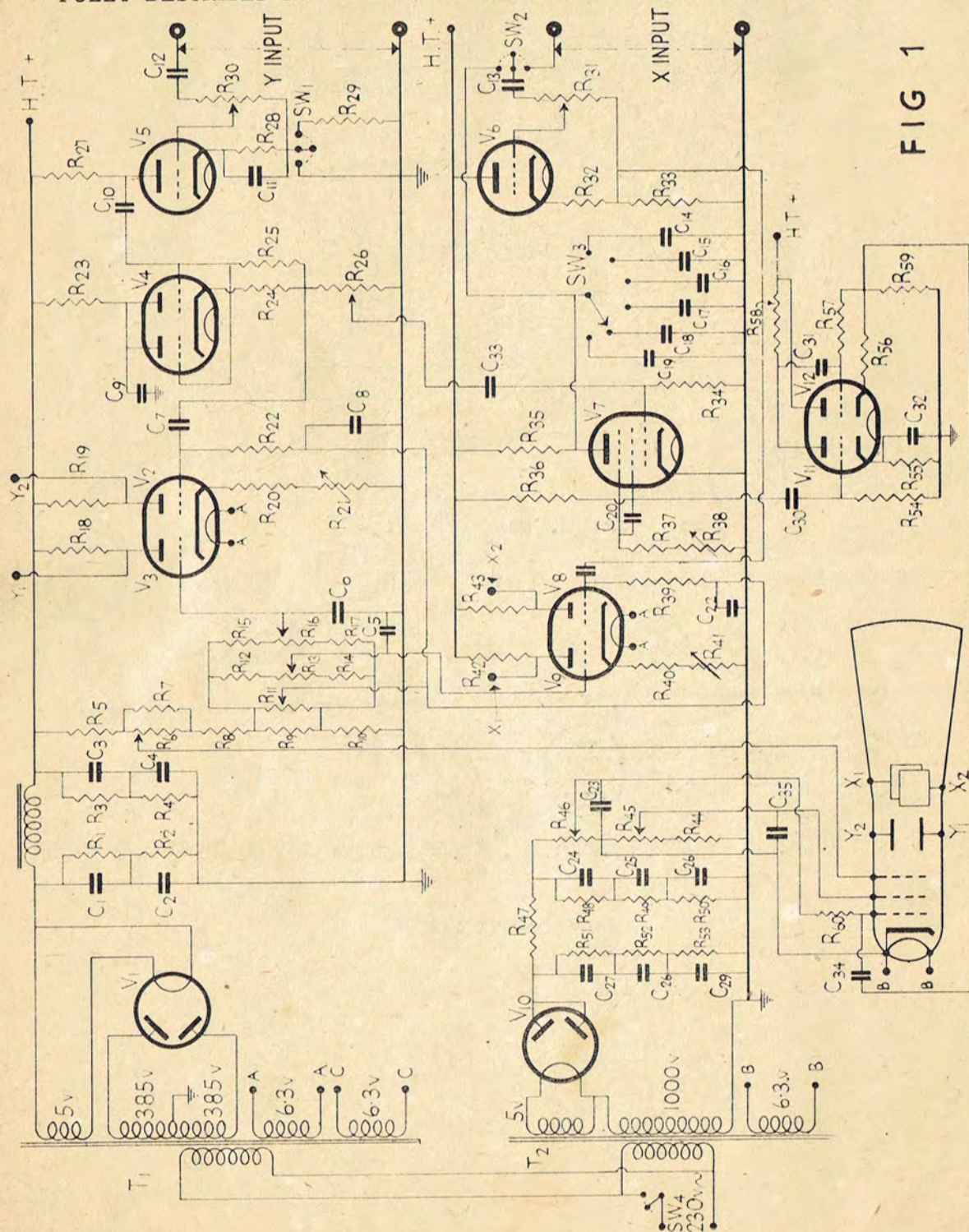
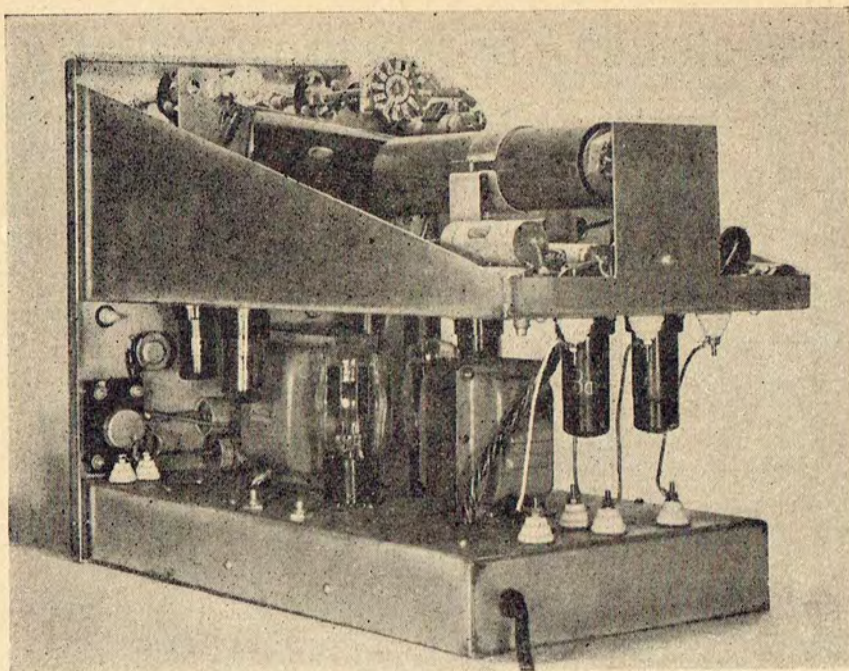


FIG 1



COMPONENT LIST

C1 to C4, 16 μ f. electrolytic.
 C5, C6, C14, C20, C23, C24 to C29, 1 μ f. 600v. paper.
 C9, 8 μ f. electrolytic.
 C11, C32, 50 μ f. 50v. electrolytic.
 C15, 0.25 μ f. 600v.
 C16, 0.05 μ f. 600v.
 C17, C33, 0.01 μ f. 600v.
 C13, C30, C31, 0.1 μ f. 600v.
 C18, 0.002 μ f. mica.
 C19, 0.0005 μ f. mica.
 C34, 0.25 μ f. 1200v. (see text).
 R1 to R4, R22, R25, R39, R44, R54, R57, R60, 1 meg.
 R5, R8, 10k.
 R9, R10, R12, R15, 25k.
 R14, R17, R34, R37, R55, R58, R59, 50k.
 R18 to R20, R27, R29, R33, R36, R40, R42, R43, R47, 100k.
 R23, 75k.
 R24, R28, R32, 5k.
 R35, 150k. 2w.
 R48 to R53, 5 meg.

R56, 600 ohms.
 V1, V10, 80.
 V2 + V3 V4, V8 + V9, 6N7.
 V5, V6, 6J5.
 V7, 6AC7/1852.
 V11 + V12, 6SN7.

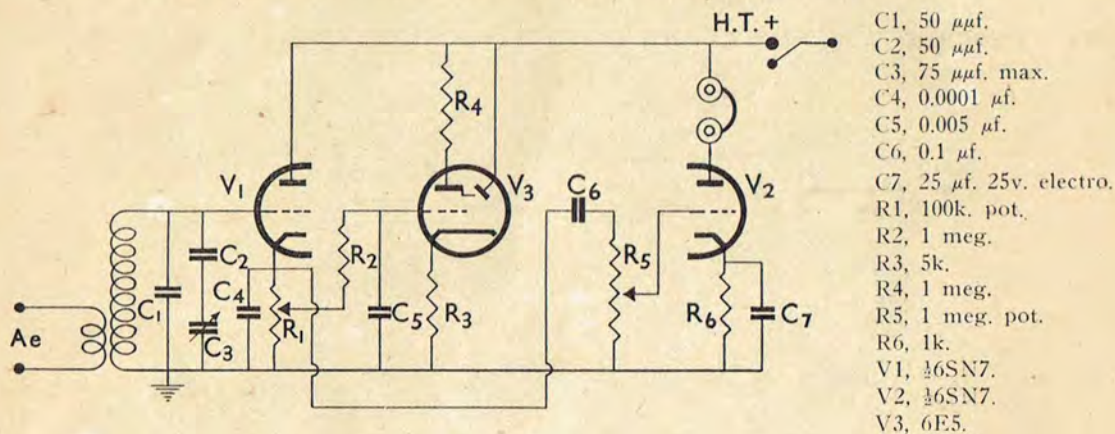
POTENTIOMETERS

R6, R11, 0.5 meg.
 R13, R16, 50k.
 R21, R26, R41, 25k.
 R30, R31, R38, 2 meg.
 R45, 1 meg.
 R46, 1 meg. pot. with 100k. fixed, in parallel.

T1, power transformer, 385v.-a-side.
 T2, high voltage transformer.
 SW1, Y gain switch.
 SW2, X input switch.
 SW3, coarse freq. selector.
 SW4, on/off switch.

A Sensitive Absorbtion Wavemeter

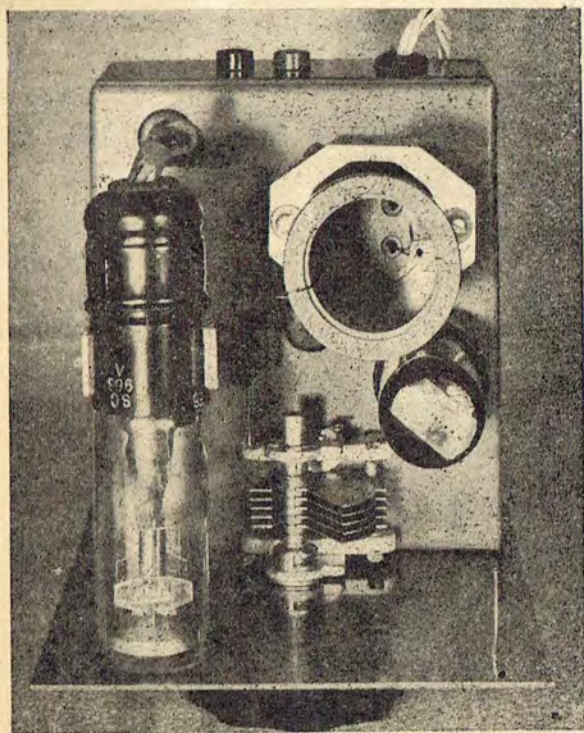
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This little unit can be used as a wave-meter, phone monitor, and carrier-shift over-modulation indicator.

Note that the magic eye works backwards. That is, increased signal **opens** the eye instead of closing it. The control in the magic-eye grid circuit alters the

sensitivity by enabling the shadow to be set at any convenient closure without signal applied. The condenser values enable 100 per cent. bandspread to be had on the 80m. band, but, as with other wave-meters, any convenient tuning condenser can be used with a range of plug-in coils to suit all bands.



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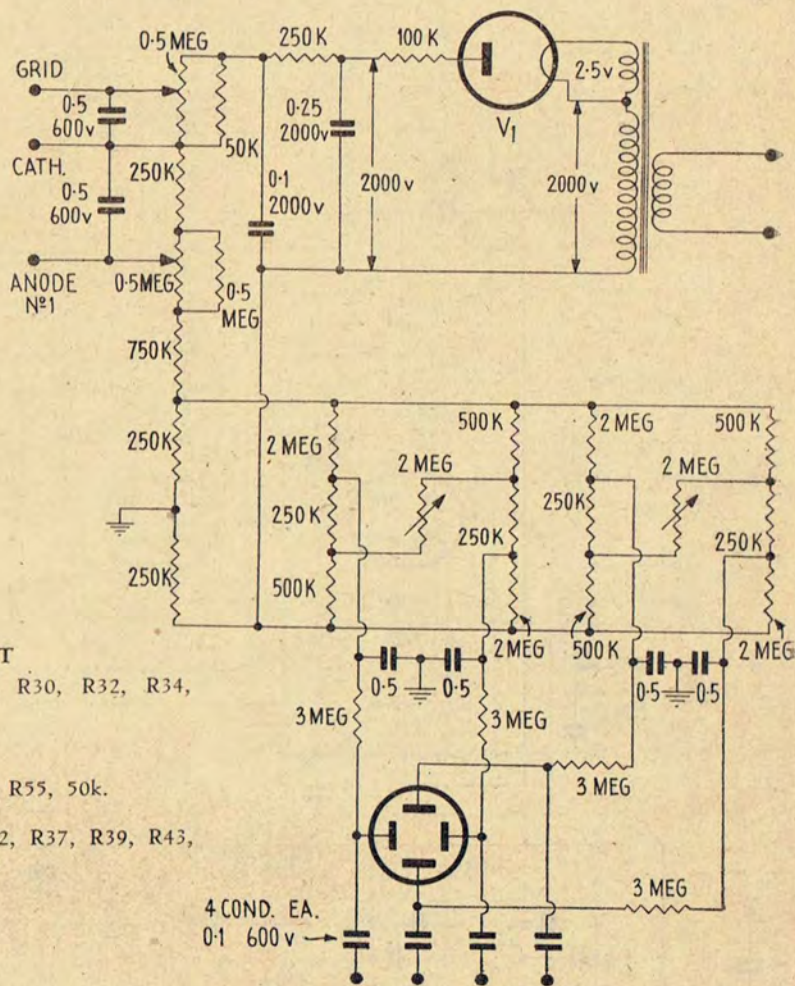
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44-265

A 5" Oscilloscope Employing Unit Construction

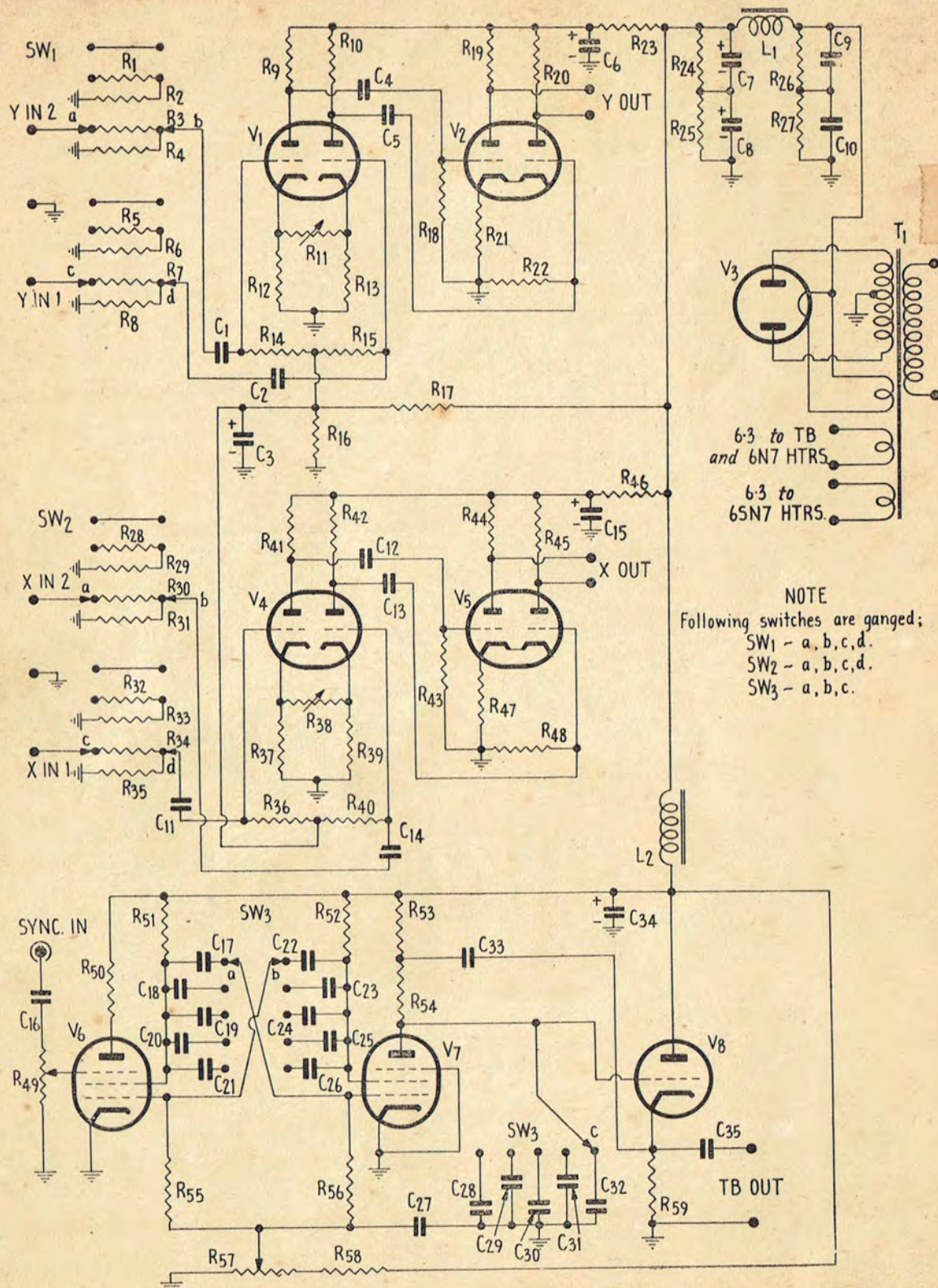
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1948, and JANUARY, 1949



COMPONENT LIST

- R1, R3, R5, R7, R14, R15, R28, R30, R32, R34,
R36, R40, 2 meg.
R2, R6, R29, R33, 200k.
R4, R8, R23, R31, R35, R46, 20k.
R9, R10, R41, R42, R50, R53, R54, R55, 50k.
R11, R38, 500k, pot.
R12, R13, R17, R18, R19, R20, R22, R37, R39, R43,
R44, R45, R48, R59, 100k.
R16, R51, R52, R58, 25k.
R21, R47, 1000 ohms.
R24, R25, R26, R27, 250k.
R49, 2 meg. pot.
R56, 1 meg.
R57, 100k. pot.
C1, C2, C11, C14, C30, C35, 0.1 μ f. 600v.
C3, C6, C15, C34, 8 μ f. 450v. electro.
C4, C5, C12, C13, 0.5 μ f. 600v.
C7, C8, C9, C10, 16 μ f. 450v. electro.
C16, C20, C25, 0.02 μ f. 600v.
C17, C22, 100 μ mf.
C18, C23, 500 μ mf.
C19, C24, 0.003 μ f.
C21, 0.05 μ f.
C26, 0.25 μ f.
C27, C28, C33, 1 μ f. 600v.
C29, 0.5 μ f.

- C31, 0.03 μ f. 600v.
C32, 0.005 μ f. 600v.
V1, V4, 6SN7.
V2, V5, 6N7.
V3, 80.
V6, V7, 6AC7 or 6SJ7.
V8, 6AC7.
T1, power transformer; heater windings as indicated
H.V. winding 385v.-a-side, 80 ma.
L1, L2, smoothing chokes, 50 ma.
SW1, SW2, each two two-pole, three position wafers
actuated from the same shaft.
SW3, three-pole, five positions.



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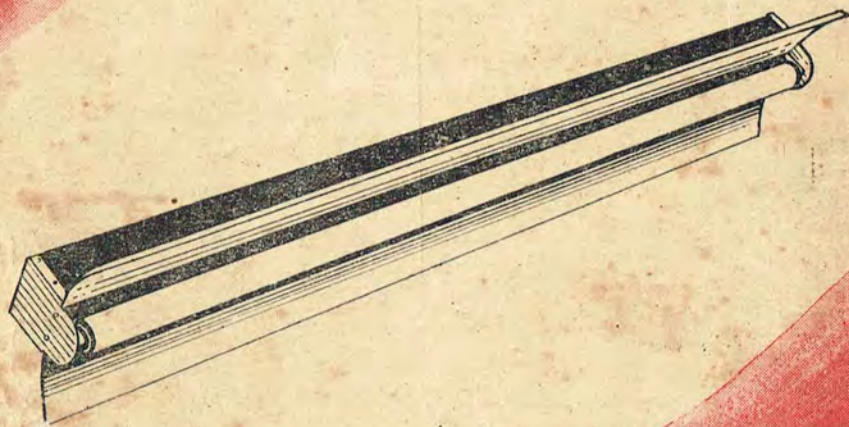
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