Presented with " Popular Wireless," November 9th, 1935.

POPULAR WIRELESS "DATAGRAM" No. 2

Notes on Practical Work

HINTS ON SOLDERING

Soldering is one of the most valuable jobs which the radio constructor can learn to do; but if soldering is employed it must be done properly or it would be better not employed.

* * *

The first important consideration is to see that the " iron " is tinned properly. File it until all pits are removed, and then smooth the surface with fine emery paper. Heat it, and while hot rub quickly with the emery and then dip it into a tin lid containing flux and lumps of solder. An even coating will thus be obtained.

* * *

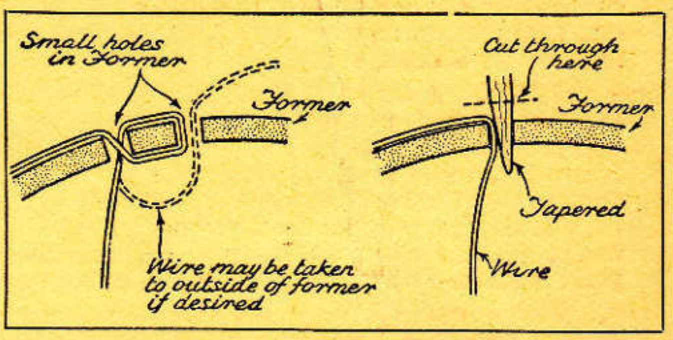
Always have the " iron " properly hot. At the same time do not heat it unnecessarily or you will burn and pit it. The best indication of correct heat is a green tinge to the heating flame. As soon as ever the first sign of this is seen, remove the iron from the flame.

* * *

When joining two metal surfaces it is desirable to tin both heavily before attempting to make the actual joint.

FIXING COIL WINDINGS

The diagram below shows two good methods of fixing off the ends of windings on coils. The holes drilled in the former should only be just large enough for the purpose. If it is desired to bring the wire to the outside of the former, the left-hand method should be adopted, and the wire made to follow the dotted path. A tapered matchstick is used for the right-hand scheme.



PREPARING BATTERY ACID

The table below shows the proportions of acid to water to give various values of specific gravity. Always add the acid slowly to the water—do not pour water quickly on to acid.

Required Specific Gravity at 70° F.	Water	Acid, 1·400 Specific Gravity.
	Parts by Volume.	Parts by Volume.
1·300	4·5	10
1·280	5·5	10
1·275	6·25	10
1·265	6·4	10
1·255	6·65	10
1·250	6·75	10
		Acid. 1·835 Specific Gravity.
1·400	15·6	10
1·350	19·5	10
1·300	24·7	10
1·250	32·2	10
1·225	37·2	10

HINTS ON DRILLING

Ordinary twist drills will serve for most radio drilling operations both for ebonite and metal work. It pays to buy the better class of drills.

* * *

Set panels should, naturally, always be marked out on the back surface, and laid face down on thin tissue paper or cloth while drilling. See that they cannot move while being drilled or the face may be scratched.

* * *

A centre punch is a useful aid to accurate drilling. For large holes a small pilot hole can first be made with a small diameter drill.

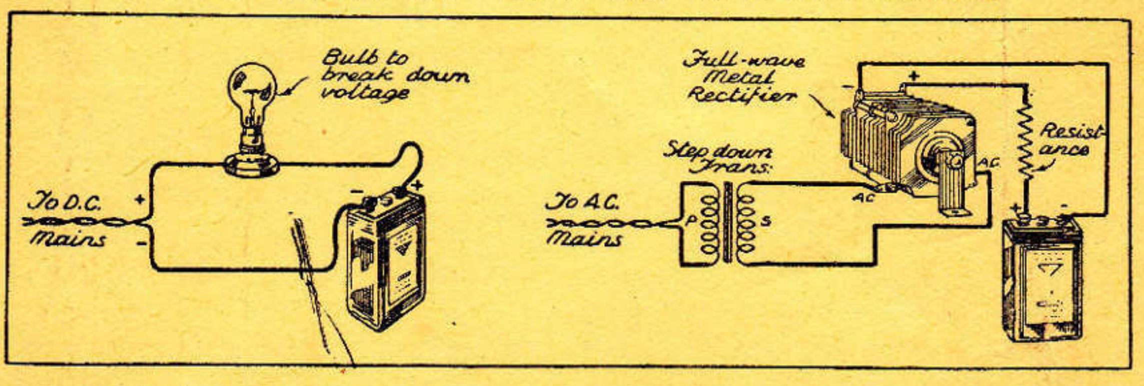
* * *

Take care to keep the drill upright when drilling, and do not use too much pressure on ebonite or you may crack the edges of the holes badly.

* * *

Holes for escutcheons and similar items may be made by drilling a series of small holes around the piece to be cut out, then knocking it out and finally smoothing off with a file. But a fret-saw or key-hole saw will sometimes prove a better way of tackling this type of hole.

CHARGING ACCUMULATORS FROM D.C. AND A.C. MAINS



Those who have mains supplies, either of D.C. or A.C. type, can charge accumulators with very simple apparatus. The two diagrams show the connections for both types of mains. It is very important to see that the accumulator is connected up correctly from the polarity point of view. With D.C mains, a resistance which may conveniently be an electric lamp is needed. In " Datagram " No. 4 will be found a list of lamps with their wattages and voltages, showing the currents they pass. With A.C. mains a transformer and rectifier are required, a Westinghouse metal rectifier being the most practicable. It is not advisable to omit the resistance shown.

USEFUL INFORMATION.

Accumulator Acid. Should you have the misfortune to spill any accumulator acid on a carpet, table-cloth or other valuable article, it can be neutralised if ammonia or a strong solution of washing soda is applied immediately. Incidentally, always be very careful how you handle an accumulator if you have a cut or sore place on one of your hands.

Fuses. A valuable adjunct to any receiver is the provision of one or more fuses. On a battery set the best place is in the negative H.T. lead, close up to the wander-plug (a wander-fuse is obtainable and is a good idea). For maximum safety a fuse should be used in each H.T. plus lead as well. Even G.B. leads may be fused when the voltage is high, for a variable-mu valve, for instance.

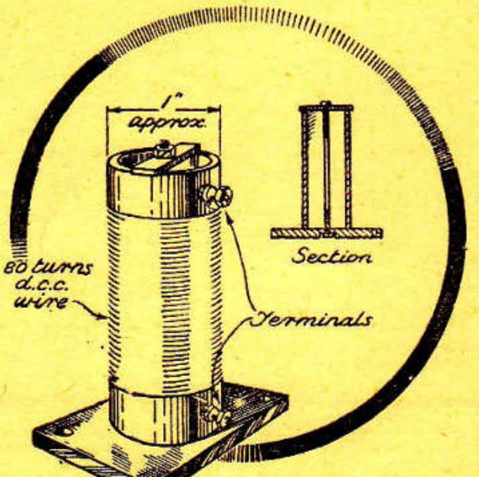
Never change a fuse on a mains set without first disconnecting the mains. And when a mains set (or battery set, too) refuses to work at all, check over the fuses before looking for a more complicated fault.

Taps and Dies. A set of 2, 4 and 6 B.A. taps and dies are not expensive, and will prove very valuable to the home constructor. There is no difficulty at all in their use. Normally, taper taps will serve all purposes. Apart from enabling crossed or damaged threads to be repaired, these taps and dies will prove invaluable for mechanical radio work, making much neater jobs than those obtained with plain nuts and bolts, to be achieved in many cases.

Saws. Fret-saws which are used for cutting ebonite should employ reasonably fine blades, and be well tightened in the frame. A hack-saw of the type in which the blade may be turned at right angles to the plane of the frame will prove helpful when cutting in awkward cases has to be carried out.

MAKING AN H.F. CHOKE.

The sketch below shows the details of an efficient short-wave H.F. choke. None of the details such as turn numbers, size of former or gauge of wire is critical. Any method of mounting may be adopted if the one indicated—a piece of threaded rod down the centre—is not convenient.



THE BEST TIMES TO LISTEN ON THE SHORT WAVES.

This table has been specially prepared by W. L. S. It shows the best times on the various S.W. bands to try for distant reception; local reception is likely to be achieved at any time. But times not mentioned are not *necessarily* unsuitable for D X work. All times are given in the twenty-four-hour-clock scheme and are quoted in G.M.T. (B) indicates broadcast band and (A) amateur.

	16-metre (B)	19-metre (B)	20-metre (A)	25-metre (B)	31-metre (B)	40-metre (A)	49-metre (B)	80-metre (A)
January ..	1200–1600	1100–1900	1200–2000 & 0600–0800	1200–0300	1300–0500	1400–0800	1800–0600	2000–0700
February ..	1200–1700	1100–2000	1300–2100 & 0600–0800	1300–0300	"	"	"	"
March ..	"	1200–2000	1300–2200 & 0500–0800	"	"	"	"	"
April ..	1200–1800	1200–2100	1400–2300 & 0500–0900	1400–0300	1400–0400	1500–0700	2000–0500	"
May	"	"	1400–2400 & 0400–0900	"	"	"	"	2200–0500
June ..	1200–2000	1200–2200	1400–0100 & 0400–0900	1500–0400	1600–0300	1600–0700	2200–0400	"
July	"	1200–2300	1500–0900			1700–0700	2300–0300	2400–0500
August ..	"	"	1500–0900	1800–0600	1800–0200	1900–0700	2200–0400	"
September	1200–1800	1200–2200	1400–2400 & 0400–0900	"	1600–0300	1700–0700	2000–0500	2200–0500
October ..	"	1200–2100	1400–2300 & 0500–0900	1500–0400	"	1600–0700	"	"
November	1200–1700	1200–2000	1300–2100 & 0600–0800	1400–0300	1400–0400	1500–0700	1800–0600	2000–0700
December	"	1200–2000	1200–2000 & 0600–0800	1300–0300	1300–0500	1400–0800	"	"

POPULAR WIRELESS "DATAGRAM" No. 4

Resistance and Resistances

CURRENT PASSED BY VARIOUS LAMPS, IN AMPS.

Wattage.	Voltage 100	110	200	210	220	240	250
40	·4	·36	·2	·19	·18	·17	·16
50	·5	·45	·25	·24	·23	·21	·2
60	·6	·55	·3	·29	·27	·25	·24
100	1	·91	·5	·48	·45	·42	·4
150	1·5	1·4	·75	·71	·68	·62	·6
200	2	1·8	1	·95	·91	·83	·8
250	2·5	2·3	1·25	1·19	1·1	1	1

FINDING THE ANSWER

The formula below is a good way of dealing with Ohm's Law. Simply cover up the wanted value and you know immediately what to do with the known factors to find the desired answer.

$$\frac{V}{C \times R}$$

v = voltage across circuit in volts.
c = current in amps
r = resistance in ohms.

S.W.G.	Eureka Resistance per yd.	Eureka Yards per lb.	Eureka Cur'nt Capacity. Amps.	German Silver Resistance per yd.	German Silver Yards per lb.	German Silver Cur'nt Capacity Amps.
18	·37	48	4·3	·117	51	3·6
20	·66	85	3·0	·315	90	3·5
22	1·10	140	2·2	·520	147	2·0
24	1·77	227	1·5	·844	238	1·2
26	2·64	340	1·0	1·26	349	·65
28	3·91	502	·76	1·85	527	·4
30	5·57	714	·59	2·65	750	·29
32	7·35	943	·47	3·50	984	·25
34	10·13	1300	·37	4·82	1360	·19
36	14·84	1905	·28	7·06	2000	·095
38	23·81	3060	·19	11·33	3295	·076
40	37·18	4761	·15	17·70	4920	·065

TYPICAL RESISTANCE TYPES FOUND IN MODERN SETS

(a) is a power type resistance such as might be found in the main H.T. supply lead of a power pack. (b) represents a typical potentiometer with three connections, one at each end of the resistance and one for the slider. (c) and (d) are two types of fixed resistance, while (e) shows a mains resistance for a universal mains set.

OHM'S LAW

Ohm's Law is probably the most important one in radio calculations—at least, it is certainly the most used. It is not difficult to understand, but will enable you to work out for yourself a large number of things connected with radio circuits.

Ohm's Law states that the resistance of a circuit is equal to the voltage across it divided by the current flowing. As a formula it may be written thus: $R = \frac{E}{I}$, E representing the voltage and I the current.

The chief point to realise about Ohm's Law is that if two of the factors are known the third can always be found. It may be written:

$$I = \frac{E}{R}$$

for cases when resistance and voltage are known and it is desired to find the current flowing.

Then again, when resistance and current are known, we can find the voltage by writing the formula thus: $E = R \times I$.

You will now begin to appreciate the value of Ohm's Law, and it will best be made thoroughly clear if we give one or two practical examples.

FINDING THE VALUE.

Suppose we want to find the right value for an H.T. voltage-dropping resistance. The voltage we wish to drop, we will say, is 20 and the current that is to be passed 10 milliamps. What value of resistance do we use?

We know that resistance equals volts divided by current. So we divide 20 by $\frac{1}{100}$ ($\frac{1}{100}$ because the formula is written for amps and we are dealing with milliamps, of which there are 1,000 to an amp).

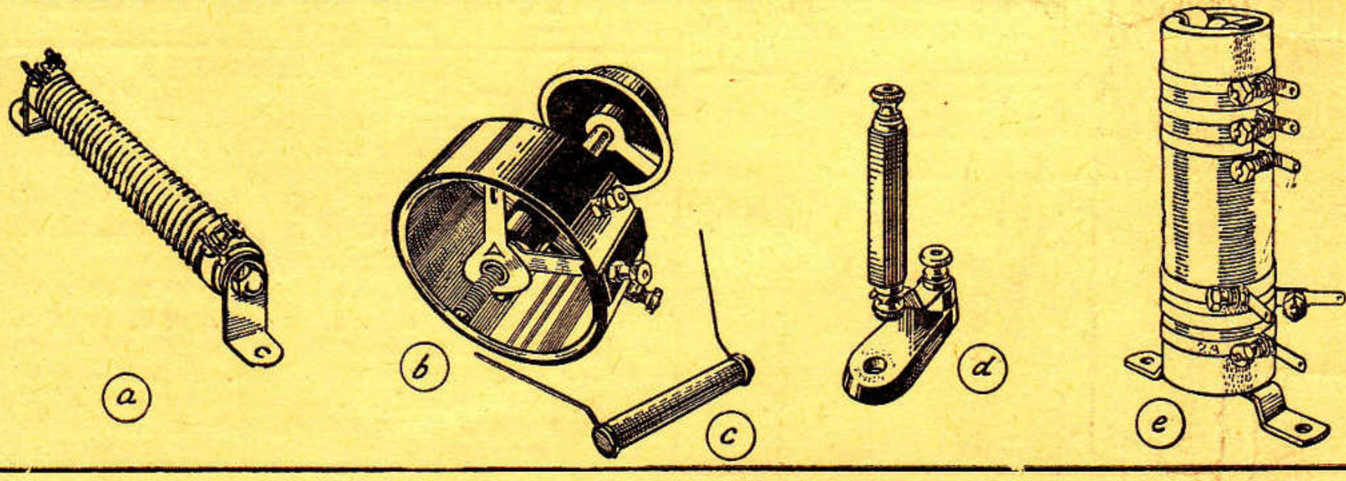
The answer, of course, is 2,000 ohms.

THE CURRENT FLOWING.

For our second example we will presume we are to connect a 400-ohm potentiometer across the 2-volt L.T. battery and want to know how much current it will take. Well, current equals volts divided by resistance—namely, 2 ÷ 400, which is $\frac{1}{200}$ of an amp, or 5 milliamps.

H.T. VOLTAGE DROP.

Finally, we will take the case of an anode resistance of 100,000 ohms, which we find by measurement is passing 1 milliamp. What H.T. voltage drop are we getting across this anode resistance? We know that volts equals current multiplied by resistance, so simply multiply 100,000 by 1 and divide by 1,000 because the current is in milliamps. The answer is 100 volts.



VALUES FOR VOLTAGE-DROPPING RESISTANCES (APPROX.)

Milliamps Flowing	Voltage to be Dropped			
	10	25	50	100
1	10,000	25,000	50,000	100,000
2	5,000	12,500	25,000	50,000
3	3,500	8,000	16,000	30,000
4	2,500	6,000	12,000	25,000
5	2,000	5,000	10,000	20,000
10	1,000	2,500	5,000	10,000
15	600	1,500	3,500	6,500
20	500	1,250	2,500	5,000
30	300	800	1,500	3,500
40	250	600	1,250	2,500
50	200	500	1,000	2,000

PRACTICAL CONSIDERATIONS

It should be remembered that some potentiometers have their resistance element graded so that proportional movements of the slider do not necessarily represent proportional changes in the resistance. The reason for this is that more gradual control is obtained in certain circumstances. Also, it should be noted, a graded potentiometer is not always graded in the same way, the resistance being "crowded" to opposite ends in different cases.

* * *

By ignoring the connection to one end of a potentiometer's resistance element, it becomes an ordinary variable resistance. Quite a good scheme when a potentiometer is used in this way is to join the normally unused terminal to the slider. Should the slider then ever break contact with the resistance element an open circuit will not result. The effect will merely be that the resistance has been adjusted to the all-in position.

* * *

A point about decoupling resistances concerns their values in relation to the value of the decoupling condenser. The smaller the value of resistance the larger the condenser should be for a given degree of decoupling. Thus, should you want to increase decoupling and cannot afford to lose any more anode volts, you can increase the value of the by-pass condenser instead.

* * *

A simple local-distance control for a powerful set used near a local station is a resistance of 100 to 500 ohms connected direct between aerial and earth. A switch may be connected in series with it to open the resistance circuit for distance work.

* * *

Sometimes a peculiar reaction effect is noticed on the long waves when using iron-cored coils. It takes the form of a double oscillation point. A series resistance of about 500 to 1,000 ohms in the reaction circuit will generally completely cure the trouble.

COMPONENT VALUES FOR RESISTANCE CAPACITY COUPLING

Anode Resistance	Grid Leak.	Condenser.
Ohms	Meg	Mfd
250,000	1	·006
200,000	1	·006
100,000	·5	·01
75,000	·5	·01
50,000	·25	·02
30,000	·2	·03
25,000	·1	·05
20,000	·1	·05
15,000	·05	·1
10,000	·05	·1

VENTILATION NEEDED

The temperature of a resistance always rises when it is in operation. The reason for this is that a resistance absorbs power, or rather uses it up. It does this by changing it into heat.

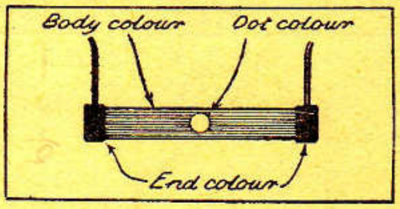
In most radio purposes the wattage absorbed is so small that the change in temperature is unnoticeable. But in power-resistances, such as mains resistances in D.C. and Universal mains receivers a considerable heat may be radiated.

For this reason some means of passing this heat to the air should be provided. Ventilation holes will usually meet the purpose very well.

In no case should such power resistances be placed near other components, particularly such items as fixed condensers. In the latter case there is always the chance of harm being done due to the sealing pitch or wax melting.

STANDARD RESISTANCE COLOUR CODE

Colour	Body	Tip	Dot
Black	0	0	·0
Brown	1	1	0
Red	2	2	00
Orange	3	3	000
Yellow	4	4	0000
Green	5	5	00000
Blue	6	6	000000
Violet	7	7	——
Grey	8	8	——
White	9	9	——



It is quite a common practice these days to mark the value of a fixed resistance by means of colours. The table above shows the numbers represented by the colours and the diagram shows the positions of the colours. Sometimes the end colour is given at one end only and sometimes the dot is given as a band in the centre of the resistance. First of all put down the figure represented by the body colour, then to the right of it the " tip " colour and follow this by the number of " o's " represented by the " dot " colour.

EXAMPLES

(i) Red body, green tip and yellow dot. The value would be 250,000 ohms on $\frac{1}{4}$ megohm.

(ii) Orange body, black tip, orange dot. In this case 30,000 ohms is the value.

(iii) The unlikely value of $5\frac{1}{2}$ megohms would be green all over because body, end and dot colour would all be the same.

WHAT WATTAGE ?

It is important that resistances in radio sets should be of suitable wattage rating for the jobs they have to do. The way to find out the correct wattage of any resistance is as follows:
WATTAGE RATING OF RESISTANCE = Voltage drop in resistance × current flowing in resistance.

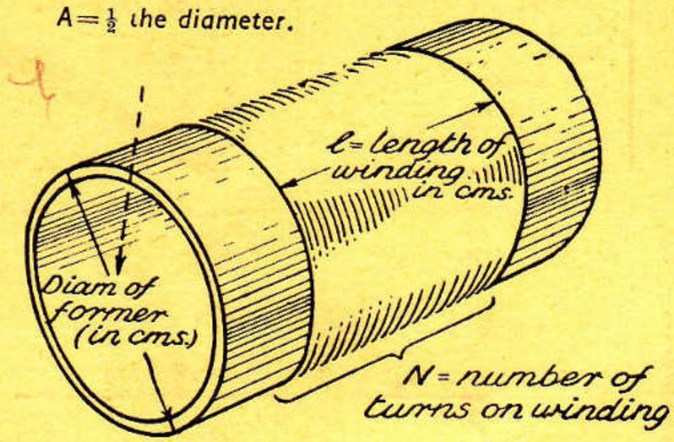
EXAMPLE

A resistance is used to drop the H.T. 10 volts and the valve's current though it is 10 m.a. or $\frac{1}{100}$ amp. Then $\frac{1}{100} \times 10 = \frac{1}{10}$ the minimum wattage rating of the resistance. Always choose the nearest available rating above the figure obtained from your calculation if the exact value is not available.

Presented with Popular Wireless, Nov. 30th, 1935.

POPULAR WIRELESS "DATAGRAM" No. 5

Formulæ and Figures.



FINDING INDUCTANCE OF A COIL

The formula for finding the inductance of a tuning coil in microhenries is $\frac{\cdot 394 \times A^2 \times N^2}{9A + 10l}$ and the above diagram explains just what the various factors are.

PARALLEL AND SERIES

The value of several resistances connected in series, whether of the same value or not, is equal to the total made by the various values.

With condensers it is those in parallel which can be simply added in this way to obtain the total effective value.

When we come to resistances in parallel, or condensers in series the method of finding the effective value is more complicated, although similar in both instances. If two condensers of equal value are joined in series the total effect is halved: similarly, two equal resistances in parallel are halved in effect. The formulæ for odd values of resistances or condensers connected in the above ways are:

$\frac{1}{R} = \frac{1}{r} + \frac{1}{r^1} + \frac{1}{r^2}$ where R = effective resistance and r, r^1, r^2 (etc., if necessary) represent the individual values, and:

$\frac{1}{C} = \frac{1}{c} + \frac{1}{c^1} + \frac{1}{c^2}$ where C = effective capacity and c, c^1, c^2 (etc., if necessary) represent the individual values.

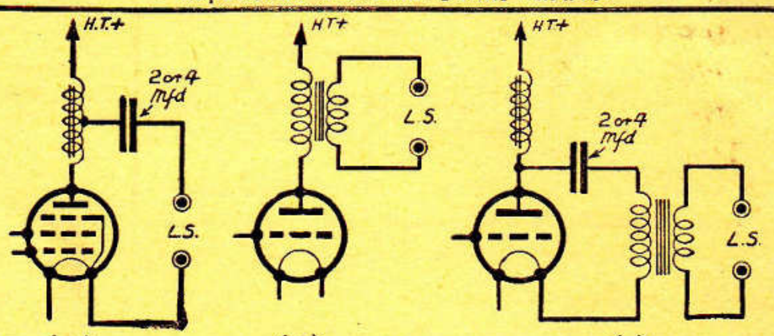
REACTANCES

Reactance is the resistance in ohms offered by an inductance or capacity to the passage of an A.C. current. The formula in the case of inductance is:

$$R = 2\pi \times f \times L,$$

and for capacity it is:

$$R = \frac{1}{2\pi \times f \times C}$$



(a) (b) (c)

THE REACTANCE IN OHMS OF CAPACITIES AND INDUCTANCES

	50 cycles	500 cycles	1,000 cycles	10,000 cycles	200 kc.	900 kc	6,000 kc.
20 henries	6,280	62,800	125,600	1·25 megohms	25 megohms	112·5 megohms	750 megohms
5 henries	1,570	15,700	31,400	·3 megohm	6·25 megohms	28 megohms	187·5 megohms
½ henry	157	1,570	3,140	30,000	·6 megohm	2·8 megohms	18·7 megohms
¼ henry	78	785	1,570	15,000	·3 megohm	1·4 megohms	9·75 megohms
·0005-mfd.	6 megohms	·6 megohm	·3 megohm	31,850	1,500	333	53
·001-mfd	3 megohms	·3 megohm	159,250	16,000	750	166	26
·01-mfd.	·3 meghom	31,850	15,925	1,600	75	16	2·6
·1-mfd	31,850	3 185	1 592	160	7·5	1·6	·3
2-mfd.	1,592	159	80	8	·38	·08	·01

OUTPUT-FILTER SCHEMES

(a) Shows the use of a tapped choke for obtaining the necessary step-down effect, while (b) shows how a transformer may be used for the same purpose. (c) is a combination of output filter and step-down transformer. It has the advantage that it provides decoupling as well as matching, which neither of the preceding schemes can do.

TABLE OF SYMBOLS USED IN WIRELESS AND ELECTRICAL FORMULÆ

Amplification	A
„ factor	μ (Mu)
Ampere	A
Current (R.M.S. value) in Amperes	I
„ (instantaneous) in Amperes	i
Capacity in Farads	C
Energy	W
E.M.F (voltage—R M.S. value)	E
E.M.F. (instantaneous)	e
Farad	F
Henry	H
Impedance	Z
Inductance	L
Mutual inductance	M
Ohm	Ω
Power	P
Resistance	R
Reactance	X
Wavelength	λ
$2\pi f$	ω

USEFUL CONVERSION TABLE

Multiply	*by*	*to obtain*
Diam. of circle	3·1416	Circumference
Metres	1·0933	Yards
Metres	3·28	Feet
Sq Metres	1·196	Sq. Yards
Sq. Metres	10·764	Sq. Feet
Cu Metres	1·308	Cu Yards
Cu Metres	35·315	Cu Feet
Inches	2·54	Centimetres
Sq. Inches	6·45	Sq. Centimetres
Cu Inches	16·39	Cu Centimetres
Feet	·3048	Metres
Yards	·9144	Metres
Miles	1·609	Kilometres
Knots	1·152	Miles per hour
Kilogrammes	2·204	Pounds
Grains	·065	Grammes
Pints	568	Litres
Ounces	28·35	Grammes
Pounds	453·6	Grammes
Litres	1·76	Pints
U.S Gallons	·8333	Imperial Gallons

SOME VALVE FACTS

The amplification of a valve is:

$$\frac{\text{IMPEDANCE} \times \text{MUTUAL CONDUCTANCE}}{1{,}000}$$

The mutual conductance of a valve is:

$$\frac{\text{AMPLIFICATION FACTOR}}{\text{IMPEDANCE}} \times 1{,}000$$

The impedance of a valve is:

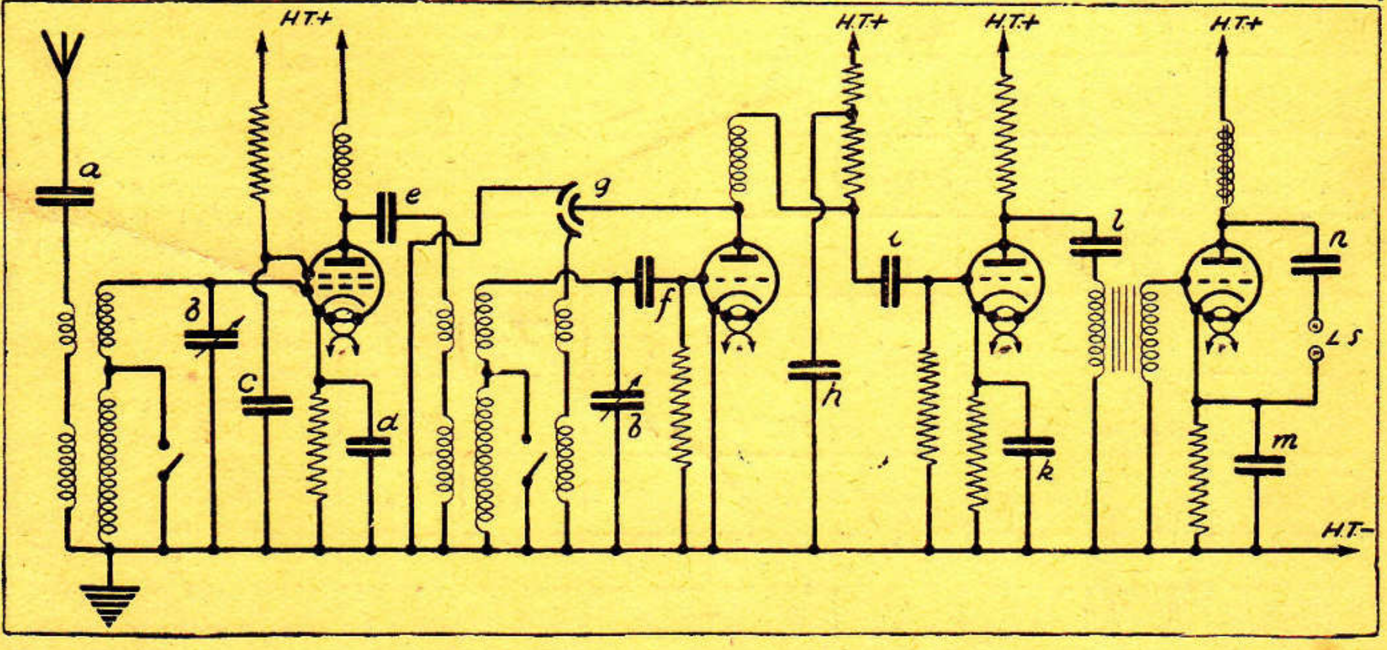
$$\frac{\text{AMPLIFICATION FACTOR}}{\text{MUTUAL CONDUCTANCE}} \times 1{,}000$$

The correct ratio of output transformer to match speaker and output valve is:

$$\sqrt{\frac{\text{OPTIMUM VALVE LOAD}}{\text{LOUDSPEAKER IMPEDANCE}}}$$

TYPICAL VALUES FOR CONDENSERS IN VARIOUS PARTS OF CIRCUIT

a—Series aerial condenser—·0003 mfd.
b—Tuning condenser—·0005 mfd.
c—H.F. bypass—·1 mfd.
d—H.F. grid bias bypass—·1 mfd.
e—H.F. coupling—·0005 mfd.
f—detector grid condenser—·0003 mfd.
g—differential reaction—·0003 mfd.
h—L.F. decoupling—2 mfd.
i—R.C. coupling condenser—·01 mfd.
k—L.F. grid bias bypass—50 mfd.
l—Parallel fed transformer cond.—1 mfd.
m—Power grid bias bypass—50 mfd.
n—Filter condenser—2 mfd.



Presented with "Popular Wireless," December 7th, 1935.

POPULAR WIRELESS "DATAGRAM" No. 6

Miscellaneous Information

OUTSTANDING EVENTS IN RADIO HISTORY

1831	**Nov. 24.** Faraday's discovery of Magneto - Electricity announced.
1896	**Feb. 2.** Marconi arrived in England.
1896	**June 2.** First British patent by Marconi.
1897	**May 13.** Radio communication over 8 miles achieved.
1898	**June 3.** First paid radio-telegram sent from Needles Station.
1901	**Dec. 12.** Signals received in Newfoundland from Poldhu.
1902	**Dec. 17.** First radio telegraph message crosses Atlantic.
1903	**Aug. 4.** First International Wireless Conference in Berlin.
1904	**Jan. 20.** First Press message sent across Atlantic by radio.
1904	**Nov. 16.** Original Fleming valve patent filed.
1906	**Oct. 25.** Lee de Forest filed U.S. patent for triode valve.
1909	**Sept. 29.** P.M.G. takes over British coast stations.
1910	**July 5.** International Radio Convention signed in London.
1914	**Jan. 21.** First presidential address of Wireless Society of London.
1915	**Oct. 26.** Radio telephony achieved from Arlington, U.S.A. to Eiffel Tower.
1920	**Aug. 19.** Telephone subscriber converses with aeroplane on Paris route.
1921	**Aug. 30.** First annual conference of American Radio Relay League.
1922	**Feb. 27.** First Annual Radio Conference held at Washington.
1922	**Oct. 1.** First British Wireless Exhibition.
1922	**Dec. 15.** Registration of British Broadcasting Company.
1924	**Nov. 13.** Two-way amateur telegraphy with Australia conducted.
1925	**Feb. 8.** Amateur telephony between England and Australia.
1927	**Jan. 7.** Opening of transatlantic telephony service.
1927	**April 7.** Television demonstrations by American Telephone and Telegraph Co.
1927	**May 30.** Baird television demonstration over land-line.
1929	**Sept. 16.** Opening of first Regional Station, Brookmans Park
1930	**March 9.** Start of dual transmissions from Brookmans Park.
1930	**March 30.** B.B.C. commence broadcasting television.
1930	**April 30.** Short-wave telephone service opened between Rugby and Australia.
1930	**Sept. 22.** Wireless news service to ships started.
1931	**March 31.** Beam telephony on 18cm. between Dover and Calais demonstrated.

TYPES OF FIXED CONDENSERS AND THEIR USES

Air Dielectric. These are usually only found on short-wave sets, and then generally as series aerial condensers. Low di-electric losses are their chief advantage.

Mica. Most condensers carrying useful H.F. are of the mica insulation type. Generally used for grid condensers in R.C.C. L.F. stages. Also employed for insulating the aerial and earth on a D.C. mains set.

Paper. Ideal for all L.F. decoupling purposes, and also for smoothing purposes in power packs and for output filters, etc.

Non - Inductive. Similar to ordinary paper condensers, but arranged to have no inductance. Intended for H.F. work, such as by-pass and decoupling condensers.

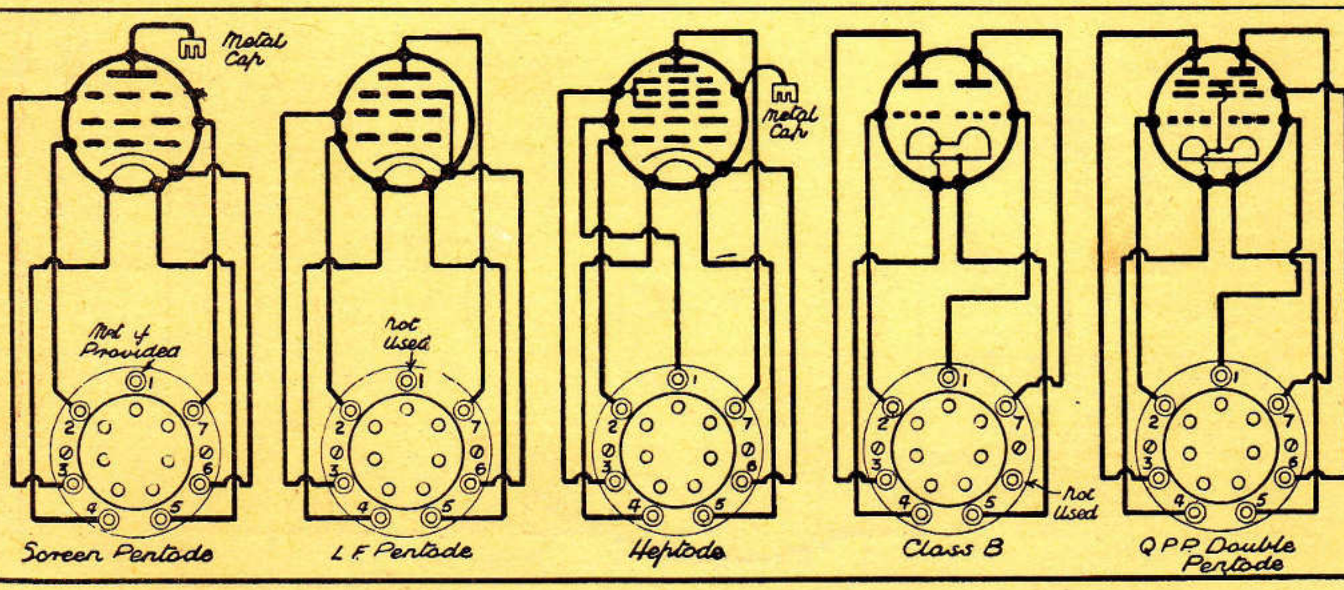
Electrolytic. A compact condenser containing a liquid. Dependent on electrolytic action for its operation. Ideal for smoothing and by-pass purposes.

Dry Electrolytic. Similar to the above, but liquid is replaced by paste. Particularly suitable for automatic - bias - resistance by-passes.

Reversible Electrolytic. Ordinary electrolytics may be damaged if incorrectly connected and are thus unsuitable for D.C. mains sets. In such cases reversible electrolytics will conveniently take their place.

Oil. High-grade condensers for high-voltage working such as in cathode - ray - television apparatus.

COMMON 7-PIN VALVE CONNECTIONS LOOKING DOWN ON HOLDERS



GENERAL FAULT-FINDING CHART FOR RADIO RECEIVERS

No Results at All.	Test batteries. Check over all fuses. Test all valves or try others. Suspect faulty battery, loudspeaker, aerial or earth lead. Look for break or short in internal wiring of the receiver. Finally search for disconnection or short in any component.
Crackling, Bangs, and Intermittent Results.	Look, first of all, for loose connection either inside the set or in external connections. Search for intermittent short, loose terminal, or poor connection in a valve holder. Check aerial by removing. In the case of a mains set noise may be due to mains—try suppressor Finally, experiment with screened down-lead.
Weak Results and Poor Distance Reception.	Check batteries for failing voltage. Change old valves. Remove tuning coils and test for break in windings. Look for disconnection to some component—such as reaction condenser. Suspect contact between valve pins and sockets. Inspect aerial for faulty insulation, and earth for bad contact.
Poor Quality and Lack of Full Power.	Test battery voltages, including grid bias. Check over all voltage settings. Replace power valve. Check over connections to tapped output transformer or choke. Replace other valves. Suspect grid condensers, and grid leak of detector valve Try another loudspeaker.

SOME MODERN RADIO DEFINITIONS

Conversion Conductance. The term applied to superhet frequency changers which is the counterpart of mutual conductance in amplifying valves. It is the ratio of the I.F. component of the anode current to the input grid voltage applied to the frequency changer.

Delayed A.V.C. A form of automatic volume control, in which the control is prevented from coming into action until a certain strength of input is received. It thus ensures maximum sensitivity for the reception of very weak stations.

Di-Pole Aerial. A type of aerial used on short waves, usually without an earth connection. It has two "sides" each exactly ¼ or ½ wavelength long, and joined to the receiver via feeder-lines running close together.

Electron-Coupled Oscillator. This is a term for valves of the heptode or octode variety, and indicates that the feeding in of the local oscillations is entirely via the electron stream instead of via a capacity or inductance.

Heptode; sometimes called a "Pentagrid" is a seven-electrode valve in which five electrodes are in the form of grids. It is for use in superhets, in which it works as combined oscillator and mixer.

Hum-Bucking. A method of feeding out-of-phase A.C. into an energised moving-coil speaker to counteract any trace of A.C. hum that may be present.

Image Rejection. A term describing the use of very selective input or tuning arrangements for superhets, which prevent stations producing any effect except when tuned-in. Carrier whistles and double tuning points are eliminated.

Octode. A valve similar to the heptode, but with an extra grid in the mixer portion, making this act as a screen-pentode instead of screen-grid valve as in the heptode.

Piezo-Electric. The name for a type of crystal which changes its shape when voltages are applied to it, and also produces potentials when it is compressed. The latter feature is made of use in piezo-electric type pick-ups.

Q.A.V.C. This denotes "quiet" automatic volume control, and indicates that provision is made to prevent the set working at all until a minimum strength of input is reached. Stations below "programme value" are thus eliminated.

Time-Base. A circuit employing valves which supplies the necessary voltages to a cathode-ray tube to cause the spot to move backwards and forwards on the fluorescent screen. The device which produces scanning in cathode-ray tube television apparatus.

THE FREQUENCY RANGES OF PIANO, OTHER INSTRUMENTS AND THE VOICE