

A BROADCASTING MAP OF THE WORLD FREE!

Popular Wireless

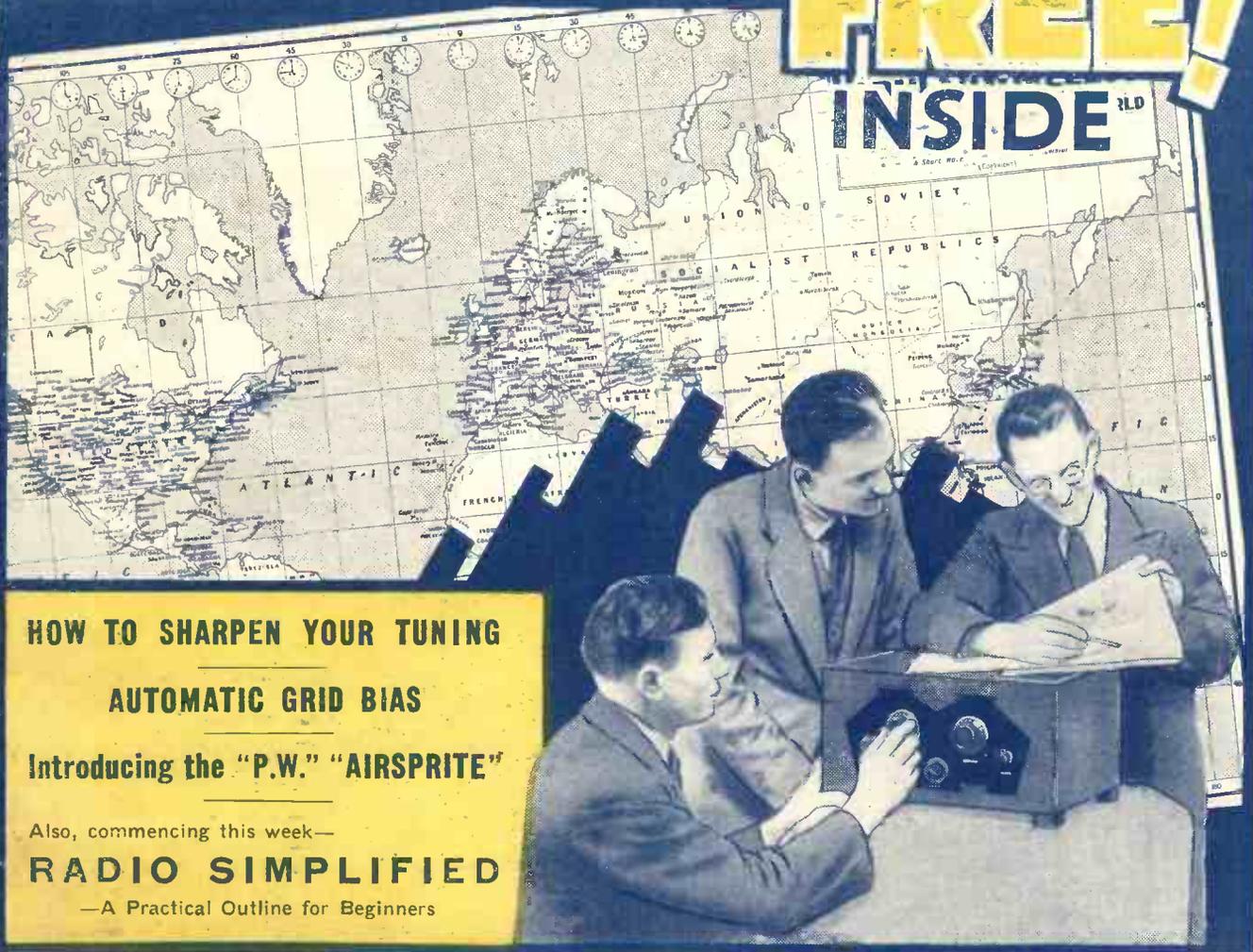
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INCORPORATING
" WIRELESS "

No. 556. Vol. XXII.

January 28th, 1933.

THIS SPLENDID GIFT **FREE!**



HOW TO SHARPEN YOUR TUNING
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Introducing the "P.W." "AIRSPRITE"

Also, commencing this week—
RADIO SIMPLIFIED
—A Practical Outline for Beginners

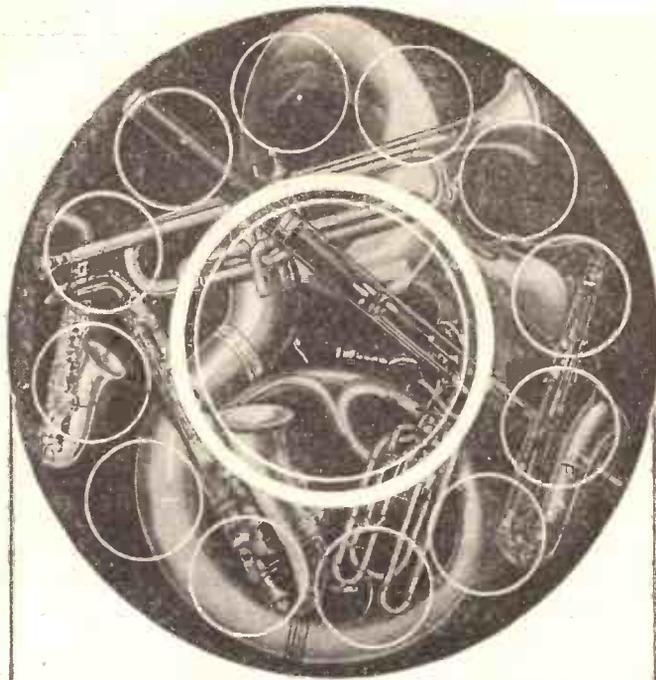
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Or whether it's built,
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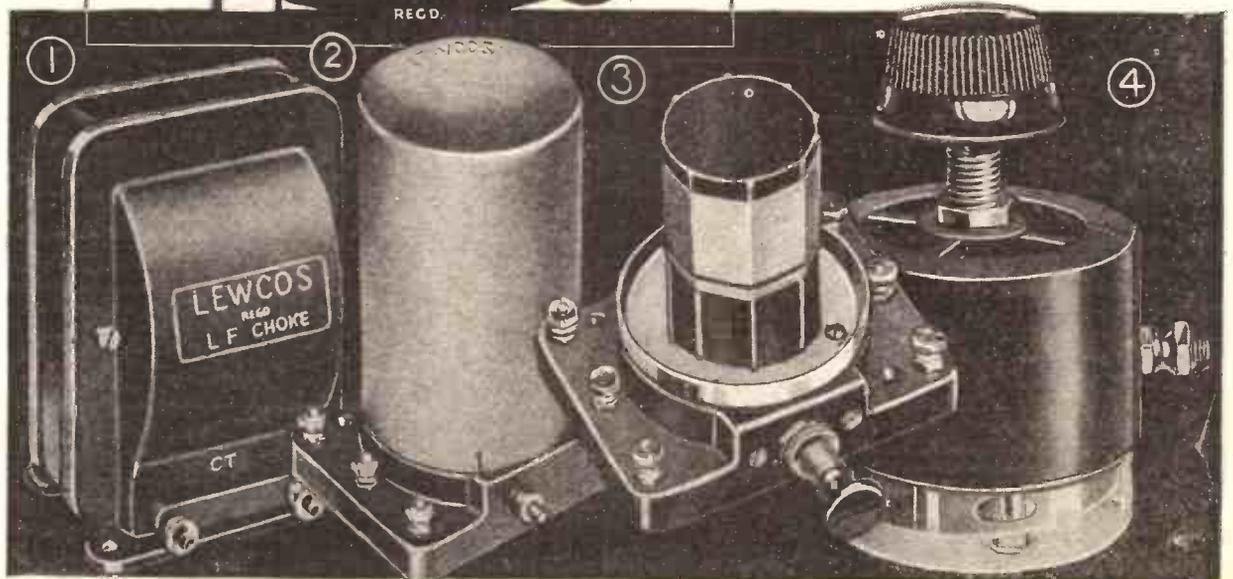
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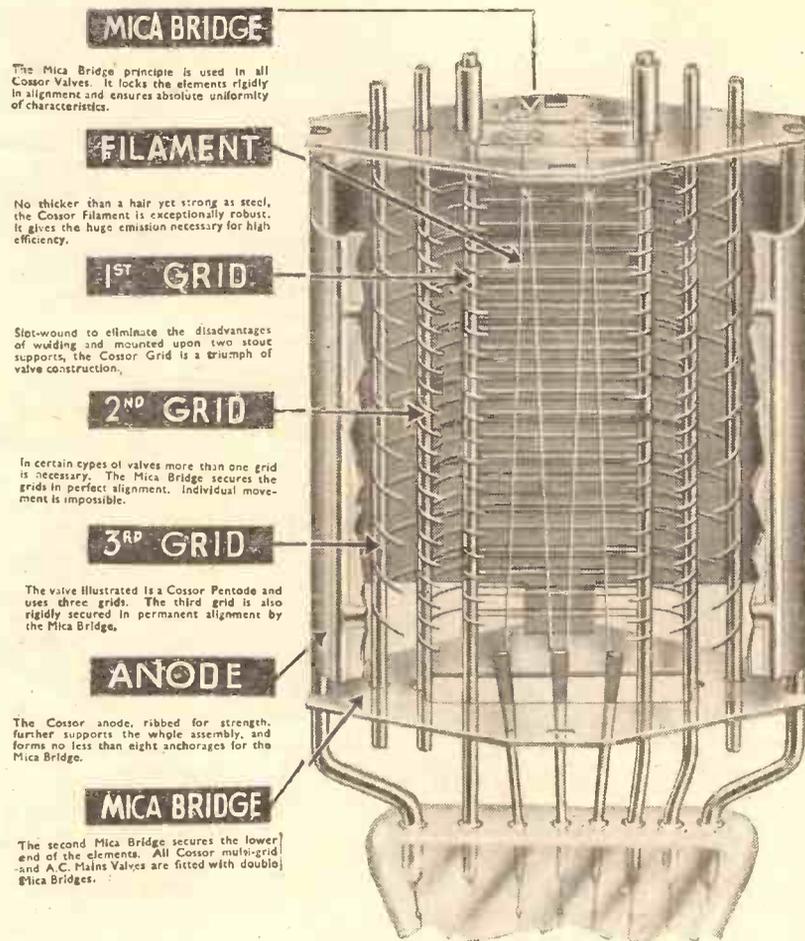
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THE LONDON ELECTRIC WIRE COMPANY AND SMITHS, LIMITED. (Section P), CHURCH RD., LEYTON, E.10

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MICA BRIDGE

The Mica Bridge principle is used in all Cossor Valves. It locks the elements rigidly in alignment and ensures absolute uniformity of characteristics.

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No thicker than a hair yet strong as steel, the Cossor Filament is exceptionally robust. It gives the huge emission necessary for high efficiency.

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Slat-wound to eliminate the disadvantages of winding and mounted upon two stout supports, the Cossor Grid is a triumph of valve construction.

2ND GRID

In certain types of valves more than one grid is necessary. The Mica Bridge secures the grids in perfect alignment. Individual movement is impossible.

3RD GRID

The valve illustrated is a Cossor Pentode and uses three grids. The third grid is also rigidly secured in permanent alignment by the Mica Bridge.

ANODE

The Cossor anode, ribbed for strength, further supports the whole assembly, and forms no less than eight anchorages for the Mica Bridge.

MICA BRIDGE

The second Mica Bridge secures the lower end of the elements. All Cossor multi-grid and A.C. Mains Valves are fitted with double Mica Bridges.

The characteristics of a valve are determined by the spacing of its elements. To ensure uniformity its elements must be spaced with absolute accuracy. In a complicated structure such as the up-to-date valve the attainment of this accuracy is a difficult problem. But it is a problem that has been solved. The development of the Mica Bridge principle by Cossor engineers has made possible a hitherto unheard of precision in mounting the elements. The Mica Bridge principle is now applied to all Cossor Valves and, because it secures the elements in permanent alignment, it ensures absolute uniformity of characteristics.

Send for a free copy of the 40-page Cossor Valve and Wireless Book which contains a wealth of interesting and useful information including Radio Definitions—Useful Circuits—List of Stations, etc., etc. Please use the Coupon.

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P.W. 28/1/33

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THE FIRST AND FOREMOST RADIO WEEKLY

Scientific Adviser: **SIR OLIVER LODGE, F.R.S.** Chief Radio Consultant: **Capt. P. P. ECKERSLEY, M.I.E.E.**
 Editor: **N. F. EDWARDS.**
 Technical Editor: **G. V. DOWDING, Associate I.E.E.**
 Assistant Technical Editors: **P. R. BIRD and K. D. ROGERS.**

The Paper that Made Wireless Popular

**TECHNICAL EXCELLENCE
THE B.I.F.
OLD ORIGINALS.
FRENCH RADIO**

RADIO NOTES & NEWS

**RELAY WRECKED
"EMPIRE" RESULTS
TALKING ON LIGHT
FOR THE BLIND**

B.B.C. Technical Excellence.

THE engineering work of the B.B.C. has never failed to maintain a very high standard of excellence, and is one of the aspects of the Corporation which has never caused adverse criticism. During 1932 there were 58,163 hours of transmission for all stations, and the average breakdown time was only 0.023 per cent, as against 0.03 per cent for 1931.

Considering the kind of plant used by broadcasting stations—more complicated than that of electrical power stations, for example—I suggest that this showing is highly creditable.

Copying Papa.

THE "Buy British" campaign here has attracted a lot of attention in the U.S.A., but I was rather surprised to see in an American radio trade paper an account of a "nation-wide" appeal of the Hygrade Sylvania Corporation, who are makers of valves and lamps, for a "Buy American" campaign.

That the U.S.A. should ever import valves or lamps is a horrible thought, which, I suppose, only the trade returns can confirm. Well, if we cannot supply them with "tubes," we have at least given them an idea and a slogan.

Proving Charts Wrong.

AN unexpected result of the use of the latest Marconi marvel, the Echowmeter, has been the correction of charts of the ocean bed. This apparatus, which takes soundings of the depth of the sea, replacing the old-fashioned "lead line," was tested on the trawler "Umberti Lupi" off West Africa, and disclosed a number of errors in existing charts.

As this may reflect adversely upon that greatest of ocean cartographers, the British Navy, one should remember that the seabed is liable to alter considerably, more particularly near the coast.

British Industries Fair.

THIS Fair, the nineteenth, which opens on February 20th, is expected to be larger and more varied than ever before. The space required by exhibitors is twenty per cent larger than at the last Fair.

Talking of Fairs—as I am—the Radio Manufacturers' Association Component Exhibition is to take place at the Central Hall, Westminster, February 8th to 10th. The applications for space have been heavy.

Old Original Rooters.

I AM proud to report that on the strength of "the great interest he takes in other people's business," your "Ariel" has been made a member of "The Old Original Rooters Club," of Hyde, Cheshire. These

broadcasting receivers, which works out to some eight shillings per annum, at par. The dealers don't like this and are protesting. An interesting point is that the Royal Canadian Mounted Police have been employed as "pirate" hunters, for the Government needs all the money it can get, in order to establish national broadcasting.

Radio for the Himalayas.

FOUR monks of the Alpine monastery of St. Bernard are on their way to found a monastery and hospice, complete with some of their famous dogs, nearly 15,000 feet up in the Himalayas near the juncture of India, Tibet and China, at a place called Si La. The Marchese Marconi has offered to install a short-wave wireless station at the new hospice so that the monks may be able to keep in touch with Europe, and, in addition, a study is being made of plans for the application of wireless to the particular kind of rescue work which is associated with the name of St. Bernard.

The New

French Radio Proposals.

BESIDES a proposed licence fee of twelve shillings for valve sets and three-and-sixpence for crystal sets, the French authorities have proposed an *ad valorem* tax on French valves.

Further, the French Post Office Parliamentary Commission has put forward a suggestion for a Bill to provide that makers of and dealers in electrical apparatus likely to cause interference with radio reception must equip their goods, before delivery, with an anti-interference device, and that apparatus already in use must be made non-interfering within a certain time.

A Prophecy Fulfilled.

SIR AMBROSE FLEMING has pointed out, apropos the B.B.C.'s Christmas broadcast of the King's message to the Empire, that in a book of his which was published ten years ago he said: "Wireless
(Continued on next page.)"

FREE NEXT FREE
WEEK!

**A DOUBLE-SIDED SHILLING
BLUEPRINT of 1933's STAR SET**

The "P.W." "AIRSPRITE"

FOR BATTERY OPERATION *Don't Miss It!* **FOR A.C. MA-NS**
Order To-day.

Rooters meet on Sundays, at a hostelry, and concoct ways and means of relieving those in distress.

Evidently they include some "P.W." readers in their ranks. Last year they dealt with forty-two cases of acute distress, and made grants to all kinds of hospitals, etc.

A membership card costs a penny, and you can give what you like for it to The Treasurer, The Rooters Club, Star Hotel, George Street, Hyde, Cheshire.

Canada and Licence Fees.

AS has been often suggested for this country, Canada has decided to make dealers and manufacturers responsible for the collection of the licence fee for

ARIEL CONTINUES HIS RUNNING COMMENTARY ON RADIO

telephony is indeed a marvellous application of scientific discoveries and has before it a vast field of usefulness. It is wonderful to think that at some future time, perhaps not far distant, a single human voice may be able to address listeners scattered over the whole surface of our globe."

For all practical purposes the King's speech may be said to have brought that dream true.

B.B.C. Records.

THE B.B.C. make enormous use of the Blattnerphone system—a method of recording which to me seems little short of miraculous, because I don't understand it.

SILENCE



Did you hear that programme, broadcast on January 13th, of outside broadcasts which cannot be repeated, covering the year 1932?

Mildly interesting to us, but how deeply interesting they will be when broadcast in 1980 by the grandsons of the B.B.C. officials!

Radio Relay Wrecked.

THE radio relay station situated in the hills of Aberdare was wrecked just before Christmas. Overhead wires had been cut, and the apparatus had been wholly smashed when the operator arrived.

This must have been either lunatic frenzy or personal spite. One hesitates to believe that a commercial opponent of the radio relay business would stoop to such a degraded posture. Luckily the proprietor had duplicate plant elsewhere.

The Empire Broadcasts.

UP to January 4th the B.B.C. had received some three hundred cablegrams and 1,500 letters, all reporting on the reception of Empire Broadcasting since the first tests in November. In general the results are satisfactory, and good reception has been reported also from many points outside the five zones intended to be served.

It is of interest to learn that in the initial test of the Canadian zone about 90 per cent of the reports came from the West Indies!

Sinbad the Sailor.

I HAVE received a remarkable letter, scrawled on the back of a grocer's wrapper, from somebody called Ali Mohammed Gari. I presume that Ali got some kindly person to act as his letter-writer. The missive is not dated, and the address is "Sailors Hom"; the postmark is Cardiff.



"Dear Sir,—If you are the man who does the wire-

less why don't you tell Government to send a message to our captain to tell him to tell us darbys and which won. I give chief fireman five rupee for darbys but he woud

give me no money for win because the dog say captain wont give wireless darbys news to crew, and so no have got nothing for five rupee." I'll ring up Sir John at once!

New Wireless Rules.

ON January 1st there came into force a new Statutory Wireless Telegraphy Rule which requires that all passenger ships of 5,000 tons gross and upwards shall be equipped with direction-finding apparatus before the beginning of 1935. Whilst the new rules do not alter the tonnages of ships which must be fitted with radio apparatus, the classification of vessels for the purpose of wireless watch-keeping will be based on gross tonnage instead of the number of persons carried.

Passenger ships of 3,000 tons gross and over, and cargo ships of over 5,300 tons gross must now keep a continuous watch.

Talking on Light.

THE process of using a beam of light as a telephone line is fairly old, but so far as I know has not been turned into practical channels. But it still attracts

SHORT WAVES.

Smith (looking at the ads. in "P.W.") : By Jove, old man, look at this—"Batteries for Radio Fans."

Jones : Well, what about it ?

Smith : Fancy being able to work fans by radio. Whatever next will the wireless be able to do ?

The B.B.C.'s new short-wave Empire Broadcasting Station, it is stated, carries British wireless to Tropical Africa.

Will there be fat stock prices for cannibals ?

STOUT ELECTRESSES.

"We think that the 'wireless' must also receive a good deal of the credit, this probably contributing largely to the heavy women's vote."—Financial Paper.

"Punch."

A talk on "Bacon and Eggs" has been broadcast.

The B.B.C. seems to be getting rasher.

"An ALL-WOOL horn gives you a clear, rich, natural tone," runs an advertisement in the Detroit News.

Well, it might suit the American ear, but we're not too keen on that "woolly" accent over here.

"Popular Wireless" ! How true are these words

That appear on our cover each week. The whole world is flocking to listen in herds When funny loudspeakers loudspeak. Husbands all stay at home. Wives spend the day at home. Joining the radio clique.

scientists, and the latest bit of work on these lines was done by the G.E.C. of New York, when their Mr. J. B. Taylor succeeded in carrying on a conversation over a search-light beam for a quarter of an hour. The beam had to hit a target of thirty inches—on a mountain twenty-five miles distant.

Cathode Rays and Cancer.

A VERY different sort of target is to be the objective of some very different rays with which two German scientists have been working. Reports from German sources are to the effect that Drs. Brasch and Lange have succeeded in splitting the atoms of six elements, including lead, with 2,400,000 volts applied to a cathode tube.

Co-operating with the Cancer Research Institute of Berlin University these scientists are now testing the effect of the resultant rays on a human cancer patient, after preliminary tests on bacteria, blood and cancerous growths in animals. The result cannot yet be judged.

Radio for the Blind.

SINCE the inception in 1929 of the "Wireless for the Blind" Fund, about 21,500 have been supplied by the Fund, of which 3,000 were distributed during 1932. Over £46,000 has been subscribed and the cost of the sets has been over £43,000.

There is, however, now an overdraft of £1,750, and altogether £5,300 is wanted to provide receivers in many outstanding cases. Why not revive an old custom and put a money-box on Sunday's dinner-table, at the same time instituting a penny fine for every slang word used during the meal ?



Surgery With Valves.

IF the Marconi Company's new apparatus is adopted by the professional surgeons, our old friend the valve will displace its predecessor in the radio world, the spark, as the means by which bloodless operations can be performed. Diathermy, or heat passing, has been used for some years by surgeons, the cutting being done by high-frequency current instead of the knife, thus coagulating the blood, but the apparatus has been worked by an electric spark. The new device employs thermionic valves. In the tests the engineers used steak.

Television Development.

I UNDERSTAND that a German company has evolved a cinema-television apparatus which can take an open-air scene as a "movie," and radiate it as a televised picture in less than half a minute.

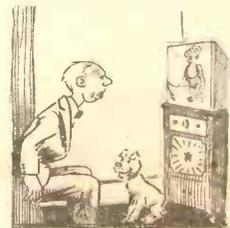
This is not what one might call "straight" television, but it may furnish an excellent substitute, because it offers a route round the "scanning" difficulty.

Name for Televisionisers.

PEOPLE are still wondering what to call themselves when they become radio lookers as well as listeners. I suggested "seers"—which has provoked

A.N.R. (Glasgow) to write, proffering, "watcher," "onlooker," "kiker," "squinter," "leerer," and "gazer."

Have it how you please ! When I watch the television screen and look on at radio plays, I hope that I shall be able to kiki at them without squinting or leering. I do not like "gazer" ; it is too reminiscent of star-gazing or of a crowd gazing at a man cleaning windows eight storeys high.





HOW TO USE "P.W.'s" GREAT GIFT MAP.

NAME OF STATION.	Wavelength in Metres.
Aalesund (Norway) ..	447.1
Aberdeen ..	214.3
Algiers (North Africa) ..	363.3
Almeria (Spain), EAJ18 ..	252
Ankara (Turkey) ..	1533
Augsburg (Germany) ..	560
Barcelona, Radio Barcelona (Spain), EAJ1 ..	348.8
Barcelona, Association National, EAJ15 ..	252
Barcelona (Radio Club) ..	50
Basle (Switzerland) ..	244.1
Belfast (N. Ireland) ..	242.3
Belgrade (Yugoslavia) ..	430.4
Bergen (Norway) ..	30
Berlin Relay (Germany) ..	384
Berlin (Witzleben) ..	283
Berne (Switzerland) ..	419.5
Beziers, Radio (France) ..	246
Boden (Sweden) ..	240
Bodø (Norway) ..	1229.5
Bogota (Columbia) ..	453.2
Bogota (Columbia) ..	48.35
Bogota (Columbia) ..	39.7
Bolzano (Italy), IBZ ..	368.1
Boras (Sweden) ..	207
Bordeaux (Lafayette) PTT (France) ..	304
Bordeaux - Sud Oues (France) ..	237.2
Bound Brook (U.S.A.) ..	49.18
Bound Brook (U.S.A.) ..	46.69
Bournemouth ..	238.5
Bowmanville (Canada) ..	49.22
Bowmanville (Canada) ..	25.4
Bratislava (Czechoslovakia) ..	279
Bremen (Germany) ..	270
Breslau (Germany) ..	325
Brno (Czechoslovakia) ..	342
Brussels (No. 1) (Belgium) ..	509
Brussels (No. 2) (Belgium) ..	338.2
Bucharest (Romania) ..	394
Bucharest (Romania) ..	50
Budapest (No. 1) (Hungary) ..	550
Buenos Aires (Argentina) ..	28.98
Buenos Aires (Argentina) ..	14.47
Cadiz (Spain) ..	335
Calcutta ..	49.1
Cardiff ..	309.9
Cartagena (Spain) ..	246
Casablanca (Morocco) ..	48
Cassel (Germany) ..	246
Chapultepec (Mexico) ..	51.22
Chapultepec (Mexico) ..	25.5
Chapultepec (Mexico) ..	20.5
Chatelineau (Belgium) ..	216
Chicago (U.S.A.) ..	49.33
Chicago (U.S.A.) ..	49.34
Christiansand (Norway) ..	235.5
Cincinnati (U.S.A.) ..	49.5
Constantine (Algeria) ..	45
Copenhagen (Denmark) ..	281
Cork (I.F.S.) ..	224.4
Cracow (Poland) ..	312.8
Danzig (Free City) ..	453.2
Daventry National Stn. (Gt. Britain) ..	1554.4
Daventry (GSA) ..	49.59
Daventry (GSB) ..	31.55
Daventry (GSC) ..	31.3
Daventry (GSD) ..	25.53
Daventry (GSE) ..	25.28
Daventry (GSF) ..	19.82
Daventry (GSG) ..	16.88
Daventry (GSH) ..	13.97
Dresden (Germany) ..	319
Drummondville (Canada) ..	49.96
Dublin (Ireland) ..	413
Eskilstuna (Sweden) ..	246
Falun (Sweden) ..	307

NAME OF STATION	Wavelength in Metres.
Fécamp (Radio Normandie) (France) ..	223
Florence (Italy) ..	500.8
Frankfurt-on-Main (Germany) ..	259
Fredrikstad (Norway) ..	367.6
Freiburg-im-Breisgau (Germany) ..	57.0
Funchal (Madeira) ..	26.83
Gävle (Sweden) ..	204
Geneva (Radio-Geneve) (Switzerland) ..	760

NAME OF STATION	Wavelength in Metres.
Kalundborg (Denmark) ..	1153
Karlskrona (Sweden) ..	198
Karlstad (Sweden) ..	217
Katowice (Poland) ..	408
Kaunas (Lithuania) ..	1935
Khabarovsk (U.S.S.R.) ..	70.2
Khar'kov (Russia), RV20 ..	937.5
Kiel (Germany) ..	232.2
Kiev (Russia) ..	1034.5
Kiruna (Sweden) ..	246
Klagenfurt (Austria) ..	453.2

NAME OF STATION	Wavelength in Metres.
Lwów (Poland) ..	381
Lyons (La Doua) (France), PTT ..	465.8
Lyons (Radio Lyons) (France) ..	287.6

NAME OF STATION	Wavelength in Metres.
Madrid (Union Radio) (Spain), EAJ7 ..	424.3
Madrid (Radio España) (Spain) ..	424.3
Madrid (Spain) ..	43
Madrid (Spain) ..	30.3
Magdeburg (Germany) ..	283
Malmö (Sweden) ..	436
Malmö (Sweden) ..	231
Marseilles (France), PTT ..	315
Maracaibo (Venezuela) ..	76
Maracaibo (Venezuela) ..	48.95
Medellin (Colombia) ..	50.6
Melbourne (Australia) ..	31.55
Mexico City (Mexico) ..	49.8
Mexico City (Mexico) ..	48.65

What station was that? Where is it situated? How far from where you're listening? Questions like these are asked in every home every day. Our Gift Map, together with the information on this and the next page, will answer your queries—and provide you with amusement as well as useful and instructive data.

NAME OF STATION	Wavelength in Metres.
Genoa (IGE) (Italy) ..	312.3
Gleiwitz (Germany) ..	253
Göteborg (Sweden) ..	322
Graz (Austria) ..	352.1
Grenoble (France) PTT ..	566
Halifax (N. Scotia) ..	49.59
Halmstad (Sweden) ..	213
Hälsingborg (Sweden) ..	231
Hamar (Norway) ..	560
Hamburg (Germany) ..	372

NAME OF STATION	Wavelength in Metres.
Königsberg (Germany) ..	217
Königs Wusterhausen (Zeeseen, Germany) ..	1635
Kosice (Czechoslovakia) ..	293
Kristinehamn (Sweden) ..	203
Lahti (Finland) ..	1798
Langenberg (Germany) ..	473
Lausanne (Switzerland) ..	680
Leipzig (Germany) ..	339.8
Leningrad (Russia) ..	857.1

NAME OF STATION	Wavelength in Metres.
Madrid (Spain) ..	43
Madrid (Spain) ..	30.3
Magdeburg (Germany) ..	283
Malmö (Sweden) ..	436
Malmö (Sweden) ..	231
Marseilles (France), PTT ..	315
Maracaibo (Venezuela) ..	76
Maracaibo (Venezuela) ..	48.95
Medellin (Colombia) ..	50.6
Melbourne (Australia) ..	31.55
Mexico City (Mexico) ..	49.8
Mexico City (Mexico) ..	48.65
Midland Regional Stn. (Gt. Britain) ..	398.9
Milan (Italy) ..	381.5
Montpellier (France) ..	236
Moravská-Ostrava (Czechoslovakia) ..	263.8
Moscow (Old Komintern) RV1 ..	1491
Moscow (Trades Union) ..	1304
Moscow (Popoff) ..	1200
Moscow (Experimental) ..	720
Moscow (U.S.S.R.) ..	50
Moscow (U.S.S.R.) ..	45.38
Moscow-Stalin ..	424.3
Motala (Sweden) ..	1349
Munich (Germany) ..	533



NAME OF STATION	Wavelength in Metres.
Hanover (Germany) ..	536
Havana (Cuba) ..	49.5
Heilsberg (Germany) ..	276.5
Helsinki (Finland) ..	368.1
Hilversum (Holland) ..	298.1
Hörby (Sweden) ..	257
Hudiksvall (Sweden) ..	226
Huizen (Holland) ..	1875
Innsbruck (Austria) ..	283
Istanbul (Turkey) ..	1200
Johannesburg (S. Africa) ..	49.2
Jönköping (Sweden) ..	201.3
Kaiserslautern (Germany) ..	560
Kalmar (Sweden) ..	247.7

NAME OF STATION	Wavelength in Metres.
Leningrad (Russia) ..	348.8
Liège (Belgium) ..	280
Liège Experimental (Belgium) ..	242.7
Lille (France) PTT ..	265.4
Limoges (France) ..	293
Linz (Austria) ..	246
Lisbon (Portugal) ..	31.25
Lisbon (Portugal) ..	282.2
Ljubljana (Yugoslavia) ..	574.7
London (Regional) ..	356
London (National) ..	261.6
London (Ontario) ..	62.56
London (Ontario) ..	46.87
London (Ontario) ..	34.68
Long Island (U.S.A.) ..	62.5
Long Island (U.S.A.) ..	34.68
Lodz (Poland) Experimental ..	235

NAME OF STATION	Wavelength in Metres.
Nairobi ..	49.5
Naples (Italy), INA ..	310
Newcastle ..	211.3
Nice (Juan-les-Pins) (France) ..	249
Nimes (France) ..	237.2
Norrköping (Sweden) ..	232.2
North National Stn. (Gt. Britain) ..	301.5
North Regional Stn. (Gt. Britain) ..	430
Notodden (Norway) ..	447.1
Novosibirsk (Russia) RA33 ..	1330
Nuevo Laredo (Mexico) ..	39.4
Nürnberg (Germany) ..	239
Odessa (Russia) ..	453.2
Osrebró (Sweden) ..	237.2
Ornskoldsvik (Sweden) ..	206
Oslo (Norway) ..	1033
Ostersund (Sweden) ..	770
Oviedo (Spain) ..	267.6
Palermo (Italy) ..	542
Paris (Ecole Supérieure) (France), PTT ..	447.1
Paris (Eiffel Tower), FLE ..	1445.7
Paris (Eiffel Tower) ..	32.5
Paris (Radio Colonial) ..	25.63
Paris (Radio Colonial) ..	25.2
Paris (Radio Colonial) ..	19.68
Paris (Poste Parisien) ..	328.2
Paris (Radio LL) ..	370.4
Paris (Radio Paris), CFR ..	1725
Paris (Radio Vitus) ..	312.8
Petrozavodsk (Russia) ..	779.2
Philadelphia (U.S.A.) ..	49.5
Philadelphia (U.S.A.) ..	31.28
Pittsburgh East (U.S.A.) ..	49.86
Pittsburgh East (U.S.A.) ..	25.27
Pittsburgh East (U.S.A.) ..	19.72
Plymouth ..	218.5
Pori (Björneborg) (Finland) ..	221.4
Porsgrund (Norway) ..	453.2
Poznan (Poland) ..	335
Prague (Czechoslovakia) ..	488.6
Prague (Czechoslovakia) ..	53
Rabat (Morocco) ..	416

(Continued on next page.)

LOCATE THOSE FOREIGNERS ON THE MAP!

NAME OF STATION	Wavelength in Metres.
Rabat (Morocco)	32-26
Rabat (Morocco)	23-38
Rennes (France)	272
Reykjavik (Iceland)	1200
Riga (Latvia)	525
Rio de Janeiro (Brazil)	31-58
Rjukan (Norway)	447-1
Rome (Italy), IRO	441
Rome (Italy), I2RO	80
Rome (Italy)	48-2
Rome (Italy)	25-4
Rostov/Don (Russia)	848-7
Säffe (Sweden)	246
Salamanca (Spain), EAJ22	453-2
San Sebastian (Spain), EAJ8	453-2
Schenectady (U.S.A.)	31-48

NAME OF STATION	Wavelength in Metres.
Schenectady (U.S.A.)	19-56
Schweizerischer Landessender (Beromünster) (Switzerland)	459
Scottish National	288-5
Scottish Regional	378-4
Seville (Spain), EAJ5	368-1
Skamlebaek (Denmark)	31-51
Smolensk (Russia)	631-6
Sofia (Rodno-Radio) (Bulgaria)	319
Springfield (U.S.A.)	31-35
St. Quentin (France)	175
Stavanger (Norway)	249-6
Stettin (Germany)	283
Stockholm (Sweden)	438
Strasbourg-Brunmath (France)	345
Stuttgart (Mühlacker) (Germany)	360-5
Suisse Romande, Radio (Sot-tens) (Switzerland)	403
Sundsvall (Sweden)	542
Swansea	245-9
Sydney (Australia)	31-28

NAME OF STATION	Wavelength in Metres.
Tallinn (Reval) (Estonia)	298-8
Tartu (Estonia)	465-8
Tashkent (Russia)	1170
Teguicalpa (Honduras)	49-96
Tenerife (Canary Is.)	41-6
Tiflis (Russia)	1071-4
Tiraspol (Russia)	358
Toulouse (France) PTT	255
Toulouse (Radio du Midi) (France)	385
Trieste (Italy)	247-7
Trolhättan (Sweden)	252
Tromsø (Norway)	453-2
Trondjhelm (Norway)	493-4
Turin (Italy)	273-7
Turko (Abo) (Finland)	246
Uddevalla (Sweden)	229
Umea (Sweden)	231
Uppsala (Sweden)	453-2

NAME OF STATION	Wavelength in Metres.
Valencia Radio (Spain)	267-6
Vancouver (Brit. Columbia)	49-43
Varberg (Sweden)	249-6
Vatican City (Italy)	50-20
Vatican City (Italy)	19-84
Vienna Experimental (Austria)	1237
Vienna (Rosenhügel) (Austria)	517
Vienna (Experimental)	49-4
Viipuri (Viborg) (Finland)	291
Warsaw, No. 1 (Poland)	1411
Wilno (Poland)	583
Winnipeg (Canada)	48-8
Winnipeg (Canada)	25-6
Zagreb (Yugoslavia)	307
Zeesen (Germany)	31-38
Zeesen (Germany)	19-73

THE TIME ABROAD

Making use of the clock-face indicators.

RADIO is said to annihilate distance. If it does that, it certainly annihilates time as well, a fact which was strikingly brought home by the Christmas Empire Broadcasts.

We heard messages from those whose Christmas was over while we lingered over the Christmas pudding. These time differences are an important item in radio reception over large distances, and for this reason they have received special attention on the POPULAR WIRELESS Broadcasting Map of the World.

Other Parts of the World.

Along the top of the map you will find twenty-five clock faces, all reading a different time (except, of course, the two end ones, which are the same time since they are on the same line of longitude). As a matter of fact, it is these lines of longitude which govern the time of all places on them, in relation to the times in other parts of the world.

Starting with the line which passes through Greenwich and which is called O, you will see that there is a change of one hour in the time for every 15 degrees change in longitude. As you travel east from Greenwich the time gets later and later,

while as you travel to the west the time gets earlier.

When you reach 180 degrees from both directions you will find the two times are 24 hours or one day out of step! Why is this? Well, it is simply a matter that while you have been travelling the world has turned round once completely.

You will get a vivid picture of the effect if you roll your map into a large cylinder shape with the two 180 degree lines coinciding, and with the clocks at the top. As the sun rises in the east, people at a spot east of another will get daylight earlier, and so start their day earlier.

Of course people don't gradually get up earlier as you go eastwards, for there are certain local standardised times like Greenwich Mean Time and Eastern Standard Time, which cover large areas.

Importance to Radio.

With your map rolled up as suggested you will find New Zealand just about opposite London, so that they are twelve hours different from our time.

When it is 7 in the evening over here and we are settling down for our evening broadcasting, their alarm clocks are just about jingling.

And that is where the importance of this time difference to radio comes in.

If you hope to hear stations in that part of the world, say Sydney in Australia, on short-

waves, you want to listen early in the morning. That is, neglecting any special-time transmissions that may take place.

Similarly if you hear the 8 o'clock evening programmes of New York or stations in that vicinity, you will receive them about 1 o'clock in the early hours of the morning, because they are five hours behind us in time.

Add or Subtract.

Another useful feature of these clocks is that they enable you to find the time in any part of the world corresponding to a given time in London. It is just a matter of simple addition or subtraction.

Going east from London, the time shown on the clock tells you how many hours to add to G.M.T., and going west from London, the hour hand points to the number to subtract. Thus p.m. on the clock means add, and a.m. means subtract.

If you remember "p" as standing for plus, you will not add when you should subtract or vice versa. Let's give just one example.

It is 3 o'clock in the afternoon in London, what time is it in Tiflis? Tiflis is just about on 45 degrees east of London and the clock on that longitude shows 3, so 3 + 3 is 6, and it is 6 o'clock in the evening in this eastern town.

CONCERNING RADIO DISTANCES

Finding out the number of miles the programmes have travelled.

WHEN one goes in for long-distance reception, one likes to know the approximate distance of a received station, and not merely that it is distant. Along the bottom of this page you will find a list of the distances of certain stations from London.

These stations have been picked out chiefly because they represent approximately the distance of certain districts as well as of specific transmitters. Thus, when you have a station which is not actually mentioned on the list, you have merely to pick a near-by station on the map that is in the list, and you can see at a glance the approximate distance of the station in question.

The Near Stations.

Naturally the nearer home you get, the more critical you become in knowing the distance of the received station. A few hundred miles in a total of a few thousand will not worry you, but a few hundred when the total distance is almost in hundreds alone, counts a lot more.

For this reason we have given many more distances to stations representing European districts than those representing, say, American districts.

Algiers	1,030
Barcelona	707
Basle	441
Belgrade	1,055
Bergen	647
Berlin	579
Bratislava	800
Breslau	743
Brno	752
Brussels	200
Bucharest	1,300
Budapest	900
Buenos Aires	5,509
Copenhagen	594
Cork	358
Cracow	878
Dublin	283
Fécamp	125
Frankfurt	396
Geneva	468
Genoa	645
Göteborg	641
Graz	764
Grenoble	515
Hamburg	449
Hanover	425

HOW MANY MILES?

Some representative distances from London.



Helsinki	1,131	Langenberg	311
Hilversum	232	Leningrad	1,306
Istanbul	1,553	Lwów	1,055
Kaunas	1,016	Lyons	458
Kiel	470	Madrid	736
Kosice	962	Marseilles	624
Lahti	1,175	Moscow	1,552

Motala	768
Munich	570
Naples	1,003
Oslo	716
Palermo	1,130
Paris	214
Pittsburgh	3,320
Poznan	728
Prague	640
Rabat	1,252
Rennes	248
Reykjavik	1,175
Riga	1,042
Rome	890
San Francisco	5,000
San Sebastian	569
Schenectady	3,000
Seville	1,013
Stockholm	886
Sydney	10,500
Toulouse	552
Vienna	767
Warsaw	899
Zagreb	830

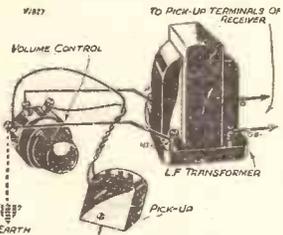


PICK-UP AMPLIFICATION.

ALTHOUGH a two-valve amplifier is all that is required for most gramophone pick-ups, there are some which require a little more amplification.

This can be obtained by connecting the pick-up across the primary of a low-frequency transformer, the secondary of which is connected to the pick-up terminals of the receiver or amplifier.

If a volume control is used, it should be connected as shown in the diagram. Should there be any sign of instability, connect an earth lead, as shown in the sketch by dotted lines.

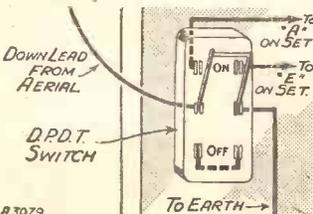
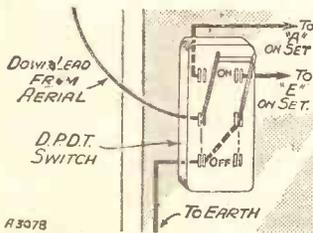


A use for an idle transformer which will increase the amplification of your pick-up.

EARTHING THE AERIAL.

THE arrangement sketched in the first drawing appears to me to be a far better way of wiring the D.P.D.T. switch for the earth and aerial system than the more usual method illustrated below.

In this way, when the switch is down there is practically a direct run from aerial to earth, while at the same time the set is completely isolated from the outside.



An unusual method of switching.

If the switch is wired in the usual way it is a very roundabout path from the aerial to the earth.

I cannot at any time ever remember the first method being suggested.

IMPROVED

METALLISING.

SOME receivers of to-day make use of metallised valves. Here is a good wrinkle to remember, should one of these valves "go west."

WE PAY FOR YOUR IDEAS!

Readers are invited to send in a short description, with sketch, of any original and practical radio idea of their own.

Each week £1 ls. will be paid for the best "Wrinkle" from a reader and others published will be paid for at our usual rates.

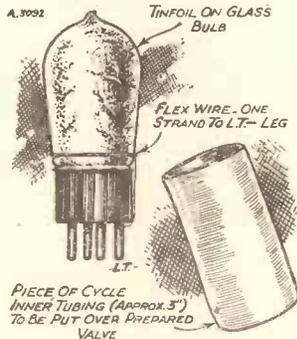
Each hint must be on a separate sheet of paper, written on one side of the page only. Send your idea to-day, marking the envelope "Recommended Wrinkles," Tallis House, Tallis Street, E.C.4.

This week our guinea is paid to Mr. H. Collingwood, 13, Chain Walk, Lollis, Birmingham, for the "wrinkle" entitled "Cone Experimenting."

Obtain a piece of tinfoil, such as from a half pound slab of chocolate, wrap the glass bulb of any spare valve on hand in same, solder or bind one strand of flex wire round tinfoil, and attach this to the J.T.—valve leg.

To overcome the possibility of the foil coming apart, procure a 2½ or 3-in. piece of cycle inner tubing and slip this over the entire valve.

Provided that the valve is in good condition before this operation, you



This idea is often a cure for microphonic noises.

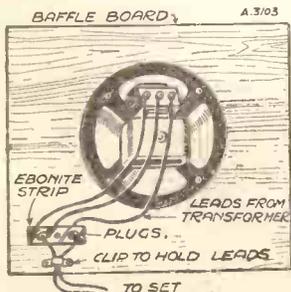
have now an improved metallised valve with a number of uses. I have found this idea is sometimes a good cure for mains noises, etc.

EASY SPEAKER TAPPINGS.

IT sometimes happens that with a tapped transformer on a moving-coil speaker the pentode tapping works best with some power valves.

The diagram shows how it is possible to try this out with all tappings (to get the best results) without interfering with the transformer terminals.

An ebonite strip with sockets is fixed to the baffle board. The connections can be made from the transformer, and then, with two plugs on end of leads, to the set, and the different tappings can be tried in a moment.



Experiment for best results.

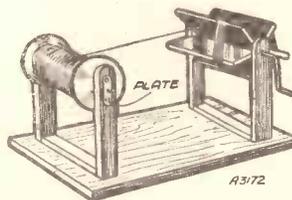
COIL WINDING IS NOT DIFFICULT.

I DON'T think there are many amateurs who wind their own coils; perhaps the chief reason being that it is too much trouble; after all, it is a laborious job and one that requires quite a lot of patience.

Half the difficulty can be overcome by making a simple apparatus as shown in sketch. All you have to do is to obtain a piece of wood about 8 ins. by 5 ins., and fasten the four uprights, as shown, the strips on the base are merely for holding the uprights by means of screws. The rods—mine were off old cycle mudguards—one of which should be bent to form a handle should be fixed near the top of the uprights; also, it is best to fix plates to form bearings.

With regard to fastening the coil formers and bobbins, the best way is to slide the bobbin on and wedge it. The former is more formidable at first sight as it has no hole down the centre, but it can easily be fastened with string. A strip of wood on the opposite side to the axle will help.

A better way is to bore a small hole through both axle and former and bolt them together. Anyhow, details of that nature won't hinder the enthusiastic amateur.



This apparatus is entirely home-made, but does professional work.

There are not many who shy at simple jobs like this, perhaps the experimentally-minded person will employ a small electric motor for driving, which incidentally are quite cheap.

EMERGENCY RECEPTION.

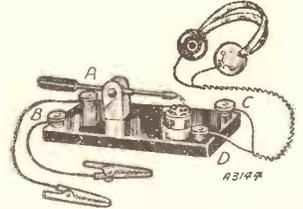
ALTHOUGH modern receivers are as reliable as scientific construction can make them, they can break down and usually choose to do so when their owners are particularly desirous of listening to a special item. Then the cry goes up: "I'd have given anything to have heard A. J. Alan to-night."

Well, anyone who likes to give themselves the trouble of searching the junk-box for an old crystal detector, four terminals, and a pair of 'phones, can at least make sure of headphone reception while their aerial remains standing. The components are assembled and wired as in the sketch.

One of the clips is attached to one terminal of the first (if more than one) tuning condenser of the main receiver.

The other clip goes to the remaining condenser terminal.

The valves (or, at any rate, the detector and H.F. ones), are removed from the set, and the headphones donned. Reception of the local station should then be easily achieved by tuning the set's first condenser.

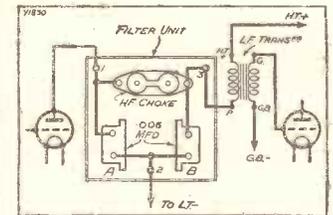


Don't despise the humble crystal—it comes in useful in emergencies.

The wiring of the detector unit is as follows: Connect terminal B and D together. Connect terminal A to one terminal of the crystal detector. Connect remaining crystal detector terminal to terminal C.

EASILY BUILT FILTER.

A HETERODYNE filter is comparatively simple to construct, and often the few components required may be found on hand.



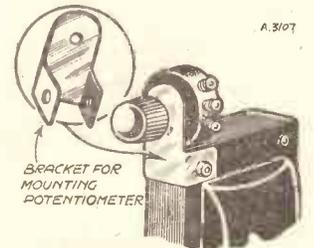
A filter for cutting out heterodyne whistles is well worth building.

Its efficiency depends to a large extent upon the choice of right values, and for a cut off at about 4,500 cycles those shown in the sketch should be used.

When an output filter is employed the arrangement may be used between the set and speaker. B in this case should be .01-mfd., and 1 and 2 will be connected to the normal speaker terminals of the set, and the speaker leads to the points marked 2 and 3.

SPACE ECONOMY.

A PIECE of aluminium sheet bent to fasten around the sides of the L.F. transformer and secured by the bolt which passed through the metal shrouds can be used as a very successful



Economy in space is sought to-day by all enthusiastic constructors.

means of holding volume controls, switches, etc., when panel space is inadequate or one does not wish to spoil the symmetry of the panel.

(Continued on next page)

Capt. Echersley's QUERY CORNER

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.



Don't address your letters direct to Capt. Echersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

BIASSING THE DETECTOR.

D. W. B. (Brighton).—"I am about to add a pick-up to my receiver by incorporating a radiogram switch in the grid lead of the detector valve, but note that when working gramophone about 1½ volts grid bias must be applied to this valve. Yet if the radio functions satisfactorily without biasing the detector, why should it be necessary for the gramophone?"

The radio detector only functions because, being a grid-leak detector, grid current flows. You will recollect how the leaky grid detector works—first the signal voltages make the grid go positive and so

EXTRA AERIAL.

A. V. M. (Eltham).—"At present I am using a single wire 'T' type aerial, but understand from the induction principle that if three parallel wires were used instead of one, the aerial pick-up would be trebled. Is this so?"

No and no and no! What induction principle?

Wireless phenomena are not explainable in terms of pure induction. Induction—Faraday's induction—was a phenomenon of short distance linking of lines of force. "Wireless" communication is explained in terms of a wave motion conception. Besides which, if you had three parallel wires having induced currents produced in them, the voltages at the ends of all wires would be the same, and if in parallel there would be no more volts than if one were used—more power, yes. I'm sorry—fundamental principles take such a lot of explanation and there isn't room—but don't expect much more from an aerial with three wires in parallel instead of one wire.

The slightly extra capacity might, if the earth and tuning coils of the set were very good, produce a slightly better effective aerial height and so a slightly louder signal. But a twist on the reaction handle is worth lots and lots of extra aerial.

WHERE DO VOLTS GO?

A. C. C. (Islington).—"When current passes through a resistance a certain number of volts are lost. What becomes of these 'lost' volts? Do they cause some change to take place in the resistance?"

When water passes through a long thin pipe connected at one end to a high-up reservoir, and at the other to a tap, some of the pressure of the water is lost. Put in a 2-ft. diameter pipe instead of a ¼-in. diameter, and try, even though you use the same tap, and measure the same pressure per given area. The water, constricted by the thin pipe, loses energy in rubbing against the side of the pipe.

The electric current makes the electrons in the resistance wire "rub up against things," and thus the pressure reduces as we go along the resistance, since its force is lost due to this wastage. *The wire gets hot.* This is the change which takes place in the wire as the pressure is lost.

SWITCHING OUT THE S.G.

J. N. L. (Dalston).—"I have a four-valve receiver, screened grid, detector, L.F., and output, and being close to

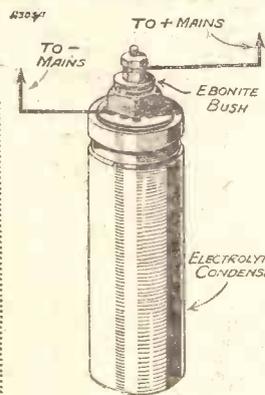
Brookmans Park, I wish to switch out the H.F. valve and change the aerial over to the tuned anode by means of a double-pole double-throw switch. In this way I could use three valves only when only the local station is required.

"I understand, however, that the use of such a switch would cause the set to be unstable when the four valves are brought into service, due to capacity coupling between the switch terminals. Do you think this is only a theoretical 'snag' or something to be seriously regarded in practice?"

I fear the snag to be a very real one. You see the "screened"-grid valve was invented because the capacity in a triode between grid and anode, even if the tuned circuits were completely screened from one another apart from the valve, was quite enough to produce instabilities.

So they got rid of a large part of that capacity by the "screen" in the valve itself. I can see a way of doing what you want by putting a capacity consisting of largish plates on either side of the screen, but it is only a theoretical idea and it is doubtful whether it could be worked out in practice.

THE ELECTROLYTIC CONDENSER



Electrolytic condensers are not of universal application. This type of condenser must have D.C. volts across its terminals which are marked for polarity. Incorrect connection is liable to destroy the condenser. Since it is so easy to connect D.C. mains "the wrong way round", electrolytic condensers should be used with great care.

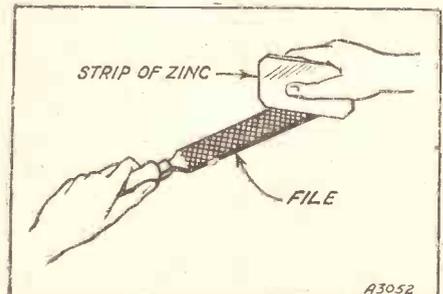
attract electrons to it, but second these try and return to the filament, and third there is a very high resistance—leak—grid leak—in the way, and the signal voltage collected electrons stay on the grid, and so, fourth, the grid is swung negative by the signal and nothing happens except that it doesn't take any more electrons.

But the signal tries to swing the grid positive again, and does so and collects more electrons, which again fail to leak away quickly until this process, repeated a million more or less times a second, the grid is negatively charged by signals collected and the resistance preventing leaking away of electrons.

The negative charge, due to the grid leak, is proportional to the signal, and so the valve conducts less for the big and more for the small signal.

But when it's a question of using the detector valve simply as a "note" magnifier, you don't want any grid-leak effect, and so you have to prevent grid current, and so you have to insert a battery to ensure linear amplification.

RENOVATING THE FILE



A file used for cleaning a soldering iron soon accumulates particles of soft solder in its ridges so that it refuses to "bite" when used on harder metals. A method of cleaning the file is to employ a piece of zinc which, being pliable, fits easily into the ridges. Zinc is, however, slightly brittle and does not, therefore, clog the grooves.

★-----★
THE MIRROR OF THE B.B.C.

STRONGER ENTERTAINMENT ORGANISATION

Too much Work?—Stars for "Hassan"—Building on Salt—Railways and Roads—The Other Albert Hall—A Cotton Play.

★-----★

ALTHOUGH nothing definite has been stated, I believe it is true that the breakdown of the negotiations between the B.B.C. and the G.T.C. will lead to the formation shortly of a considerably strengthened entertainment organisation at Broadcasting House.

One hears, for instance, that Holt Marvel, otherwise known as Eric Maschwitz may be persuaded to give up all his other work in order to concentrate on the light entertainment of broadcasting. Then Mr. Gerald Cock is mentioned as a possible recruit, along with Mr. Filson Young and Mr. Compton Mackenzie.

Too Much Work?

The sudden illness of Mr. John Watt on his visit to Manchester to find new talent has called attention again to the pressing problem of giving more opportunity for rest and recuperation to those whose main work is the originating of programmes.

I gather that this idea has been discussed several times amongst the heads of the B.B.C., but is being allowed to drift. This seems a pity because some very good material is in danger of burning itself out.

Stars for "Hassan."

Henry Ainley and Leon Quartermaine have been booked by the B.B.C. in connection with the special radio production of "Hassan" in the spring.

The number of talks during the summer period this year will be far less than ever before in proportion to music. This is a reform long overdue.

Building on Salt.

The B.B.C. is somewhat scared, to my mind quite unnecessarily, of Press reaction

to the Corporation's decision to re-build the Daventry National and Midland Regional transmitters in the vicinity of Droitwich. It fears that the point will be raised that it is unwise, to say the least, to spend

PRODUCING NOISE EFFECTS



The production of noise effects for radio plays by natural means is fast being replaced by records and artificial methods which often reproduce more naturally than the real thing.

about £300,000 in a salt-mining area, where subsidences are liable, and the surface value of land is recognised to be governed entirely by the ownership of what is beneath.

Another, and even more curious fact, is the disposition of the Corporation to say as little as possible about the situation of the actual site, which, as most people have read by now, is at Wychbold, some few miles outside Droitwich, on the Birmingham main road.

Railways and Roads.

I understand that the British railway groups are giving serious consideration to the question of using the ether not only for ordinary publicity purposes, but if necessary to direct attention to their side of the story in the ceaseless fight against road competition. Such a use of broadcasting can, of course, only come about through sponsored programmes radiated from some continental station, like Radio Paris or Fécamp, although I should not be surprised if some co-operation is not brought about between the railway companies and the B.B.C., whereby the national aspects of the situation can be brought to the notice of listeners. This will naturally entail an invitation to the motor-coaching organisations to participate.

The Other Albert Hall.

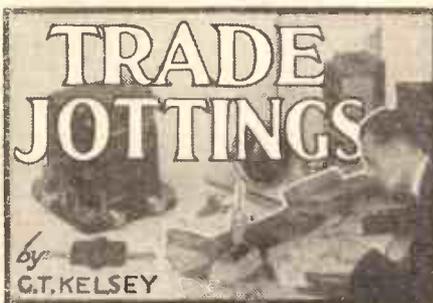
The Rev. D. R. Morgan, head of one of the group of Selly Oak Colleges which trains women missionaries, is preaching at the service to be relayed from Birmingham Cathedral on Sunday, February 5th. On the same evening Marion Keighley-Snowden and Bernard Johnson are including Saint-Saëns' Concerto in C Minor in their piano and organ recital which is being broadcast from the Albert Hall, Nottingham.

A Cotton Play.

The story of the man who became famous for his inventions of machinery used in the cotton industry is the subject of a play to be broadcast to North Regional listeners on Monday, February 6th. The story begins in a barber's shop in Bolton where Richard Arkwright amassed a little fortune which enabled him to retire about the year 1767 and devote himself to his ambition of perfecting Hargreave's spinning-jenny.

Despite the difficulties due to lack of

(Continued on page 1092.)



LISTENERS whose choice is restricted to receivers of the battery-operated type will no doubt be interested to learn that another fine set has recently been added to the range produced by Messrs. H. Clarke & Company.

The new set, which is known as the Atlas "Lambda" receiver, is a three-valve built up around the popular circuit sequence of variable-mu S.G., detector and output. The instrument is completely self-contained with the exception, of course, of the aerial and earth, and the speaker

is one of the special "Atlas" permanent-magnet moving-coil models.

A model of this new set is at present undergoing tests in our Technical Department, and a detailed report will be published in due course. Meanwhile, to keep strictly to my side of the fence, eulogistic comment both with regard to appearance and reputed performance seems to be very well merited, especially since by some miraculous means or other the designers have succeeded in keeping the total H.T. consumption down to 6-7 milliamps.

I look forward with more than usual interest to the report of our technical staff, although past experiences with the products of this enterprising organisation do not leave very much room for doubt concerning the efficiency of this, their latest achievement.

* * *

I imagine that there must be very few of my readers who failed to hear that memorable broadcast by His Majesty The King on Christmas Day. No better time and no more appropriate sentiments could

★-----★
 "P.W.'s" postcard literature scheme saves you time and money! Week by week in these columns reviews are given of all the latest catalogues and leaflets appertaining to every aspect of radio, and if you want any or all of the literature to which reference is made you need only send a postcard giving the numbers of those in which you are interested, and the required literature will be sent off to you free of charge, except where otherwise stated. The reference numbers in each case are given at the end of the appropriate paragraph, and applications need not be limited to any one particular issue of "P.W." Postcards, on which your name and address should be printed in block capitals, should be sent to G. T. Kelsey, at Tallis House, Tallis Street, London, E.C.4.
 ★-----★

possibly have combined to promote an Empire reaction of goodwill.

Now comes the interesting news that His Majesty has given permission for the release of a record that was made on that memorable occasion. The record was made under conditions of the utmost secrecy through a private telephone wire to the Abbey Road Studios of "His Master's Voice," and the secrecy was preserved until

(Continued on page 1086.)

Introducing the P.W. "AIRSPRITE" OUR 1933 STAR SET

By G.V. DOWDING, ASSOCIATE I.E.E.

IN exactly seven days from the time these words appear in print, the full details of the P.W. "Airsprite" will be disclosed to the world. But I can say here and now that the public's verdict is going to be unanimously favourable.

This is not merely an expression of our own confidence; far from it. We have the cream of the radio industry behind us to render our prediction cast-iron.

We took the bold steps of placing our new star set in the hands of the chief engineers and other responsible executives of leading British radio companies and corporations, and of inviting these impartial and highly informed critics to give us their candid opinions on it.

More Exacting Test Impossible.

It would be impossible for the human mind to conceive of a more exacting test for a piece of wireless apparatus, than that.

The representatives of our highly organised wireless undertakings do not examine a set claimed to have new features with only the eyes of scientists. Of course, they are scientists, but they are *industrial* scientists—a very important qualification.

It means to say they are intensely practical in their outlook.

Originality of concept may extract their grudging admiration, but novelty without practicability is to them an edifice without foundation.

If we were not supremely confident that in the P.W. "Airsprite" we had something of outstanding value free from snags, we might well have trembled in our shoes when, for example, it was undergoing its paces under the eagle eyes of the managing director, works manager and the chief engineer and his assistant of one particularly progressive firm of radio manufacturers. And you can be sure it was not merely a case of connecting the set up to an aerial and tuning in one or two stations.

That sort of test cuts no ice with radio engineers. There had to be exacting meter tests under scientifically controlled conditions.

Unqualified Praise.

And the result of all these tests, in which firms representing millions of pounds' worth of capital were represented? You shall read a selection of their full reports.

You will have the quite unique experience of seeing in black-and-white a chorus of praise from men whose praise can only be gained by notable accomplishment and who never before have in unison made such glowing statements.

Industrial radio engineers have little or no radio romance in their make-up; they are

hard-bitten, one might almost say cynical critics looking for and ever ready to pounce upon snags.

They couldn't hold down their extremely responsible jobs if they did not, for upon their judgment rests vital and weighty decisions. A little over-enthusiasm, a moment of oversight, and they might plunge their factories into a cataract of wasted expense. Modern mass production demands microscopic accuracy of judgment.

And it is the men in whose hands these judgments rest who have gathered to give unanimous praise to "P.W.'s" star set.

And as you will be shown, their praise is unqualified.

I must not allow this occasion to pass without expressing my sincere thanks to the engineers and others who have contributed to this greatest-ever set test. They spared no pains to ensure that the tests should be complete. Some travelled great distances for the sole purpose of putting the P.W. "Airsprite" through its paces in the new "P.W." Test Department. One chief engineer travelled all the way from Manchester to London. Another came from Birmingham. And this right in the middle of the radio season, mark you; not in the quiet months.

vidually proved the soundness of his judgment by the success of his own firm's products, for all their companies are, despite the depression, sound to their very cores; their verdict is complete and final.

The success of any receiver design must as a matter of course be somewhat problematical. You might justifiably have applied that statement to the "Airsprite"—before the unparalleled series of "industry" tests took place. Now there is, of course, no room to doubt. It is a cast-iron "cert.," and I should not be saying so much about it were I not anxious that this indisputable fact should be fully appreciated by all radio enthusiasts. They will miss something good if they do not build the "Airsprite" or modify their present sets to take advantage of the entirely new features in it.

There Is No Complexity.

Other set designs will be placed before you concurrently with the "Airsprite." A proportion will probably be quite good set designs devised by quite good designers. But will these other sets be new set designs or merely re-arrangements of old radio



Mr. G. V. Dowding (Technical Editor) and Mr. K. D. Rogers (Chief of Research) discussing the final plans of the great new receiver.

Well, one man, even one experienced engineer, can make mistakes. Two or three might by some obscure workings of fate fall into a common erroneous line of thought. But a score or more of trained engineers representing a score or more of highly respected, successful concerns, each with its great reputation and each trusted by its tens of thousands of satisfied customers, **CANNOT BE WRONG.**

They have said that the "Airsprite" is an outstanding achievement, that it does all that we claim for it, and that in their opinion it is a set that the public ought to and will take to its heart. Each has indi-

ideas? Will they be backed only by their producers or will they have successfully withstood a colossal battery of expert criticism previously to being placed before the public?

Now there is one thing you must not look for in the P.W. "Airsprite," and that is complexity. If you want a weird and wonderful Heath Robinson medley of "stunts" and "wangles," look elsewhere. We can't oblige you.

The words inscribed on the "P.W." banner are "Simpler and Better Home Radio." The "Airsprite" constitutes the
(Continued on next page.)

INTRODUCING THE "P.W." "AIRSPRITE."

(Continued from previous page.)

biggest step forward in the direction of that ideal that we have yet accomplished. The "Airsprite" can do things no other set has hitherto been able to do. But it does these things without its constructor having to pay toll in cash, time or knob tinkering.

Not Theoretical Results.

Its results are there for the least expert manipulator to enjoy.

And they are not theoretical results. You will know at once, however slight your previous experience of radio, that you are getting something no other set can give you.

The P.W. "Airsprite" uses only three valves, but three valves operating to the highest degree of efficiency. Yet you will find no partition screening or metal baseboards to hold them in restraint, and, incidentally, make the construction difficult. Anyone can build the "Airsprite."

However, you must not think of the "Airsprite" in terms of numbers of valves. We don't; we've tried too many "fours" up against it to make that possible. It would be just as easy to think of those "fours" as rather poor three-valvers . . . when they go into contest with the P.W. "Airsprite."

But, even so, the exceptional power and

I know that that must sound quite fantastic to all who have not yet had the opportunity to examine the receiver, but it is no less an absolute fact as a score or more independent and respected radio engineers are going to testify in print.

But simple though the invention may be in practice, despite its supreme effectiveness, it is not possible for me adequately to describe it to you in a few words. I must ask you to wait for the full story next week, when you will enjoy the novel experience of seeing us endeavouring still further to justify the simplicity, inexpensiveness and snag-freedom of the scheme!

In Detail.

Let me explain what I mean in detail. As I believe I have already indicated, there is a fixed idea widely held that a new invention of a worth-while character must be costly and complicated. This is because so often in the past has laboratory enthusiasm overcome commercial scruple, and new ideas have been thrown upon the market prematurely; before being perfected and refined.

In the train of these quite honest attempts to give the public the results of new discoveries as soon as possible, has marched the charlatan preying on the credulity of the layman with "stunts" designed to attract the glamour of novelty by aping the crude complexities of undeveloped invention.

No Stunts.

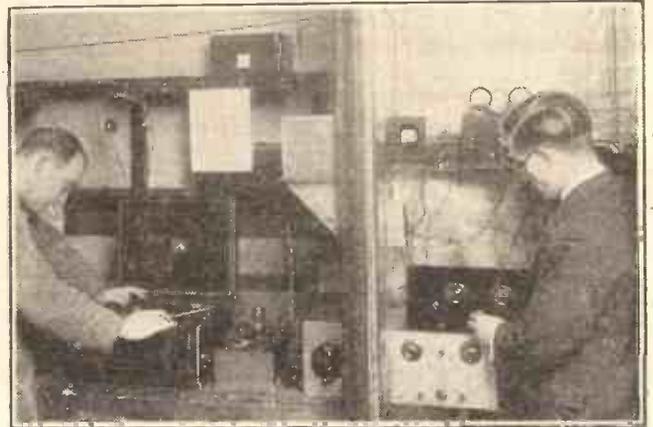
Needless to say, there is nothing "stuntish" in The P.W. "Airsprite." If there were, the engineers of the radio industry would not have given it two seconds of their valuable time. Nor is

there anything experimental and undeveloped. The ideas embodied in it passed through all their early stages of development before being prepared for "public consumption."

This, again, is fact, not journalistic eye-wash. The following statement can at once

be disputed, and would be disputed were it not absolutely true. The final models of The P.W. "Airsprite" were undergoing the searching examination of Chief Engineers of the Radio Industry over two months ago.

SCIENTIFICALLY-CONTROLLED TESTS



The P.W. "Airsprite" undergoing some of the exacting tests which it had to pass with flying colours before the final models were constructed.

That two months alone has obviously left plenty of time for mature reflection on our part. Further, it has incidentally provided the Chief Engineers concerned an adequate opportunity to modify their statements about the set, should they have so desired. But not one has.

Practical Tests.

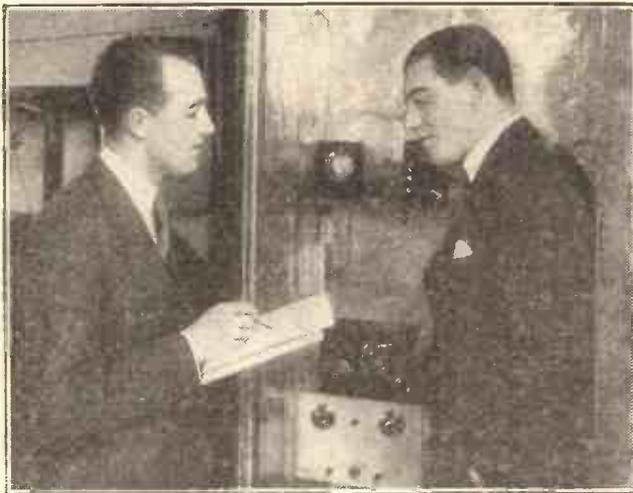
But before that stage was reached when it was possible to build up final models of the "Airsprite," there lies some months when the most important new system used in it was well out of the laboratory and being tested under practical conditions. I am not saying that we were not tempted to rush into print at an early stage. We were sorely tempted, for really new radio inventions of practical value are not found by the wayside as numerous as blackberries! Indeed, they are only encountered with extreme rarity these days.

But we realised the necessity and the value of bringing the idea to its complete fruition. So instead of it being a rather clumsy and decidedly complicated method of securing the new effect, it appears in all the glory of its sifted and simplified perfection.

The Final Simplification.

As I glance at the theoretical diagram of The P.W. "Airsprite" I find myself wondering how many will be able to visualise the work, the thought and, yes, the worry that lies behind it. But, then, I have the satisfaction of knowing that although the diagram shows only the remaining few lines and sings of a whole maze from which they emerged, everyone who handles an "Airsprite" will at once be able to appreciate to the very utmost what those few signs and lines have contributed to simpler and better home radio.

HE REPRESENTS YOUR INTERESTS



Mr. G. T. Kelsey, inventor of the short-wave adaptor, and Mr. A. Johnson-Randall, Queries Editor, with the P.W. "Airsprite." Mr. Randall is one of our sternest critics, but he signed the "pass out" certificate for the P.W. "Airsprite" readily enough.

selectivity of the set do not comprise its main claims to your attention. At no cost or extra wiring above that for ordinary components for an ordinary set it provides something entirely new; a something which brings home radio a big step towards perfection.

A DUPLEX BLUEPRINT OF THE P.W. "AIRSPRITE" WILL BE GIVEN FREE
WITH EVERY COPY OF NEXT WEEK'S "POPULAR WIRELESS."

BROADCASTING—THE NEXT TEN YEARS



A mass attack in 1935 by those who would commercialise British Broadcasting is one of the coming events forecast in this survey of B.B.C. organisation.

By OUR SPECIAL BROADCASTING COMMISSIONER.

THE organisation of the B.B.C. in the next ten years depends on several main factors, the first of which is financial difficulty. In the ordinary way the constitution of the B.B.C. will come under review towards the end of 1935, when the Government of the day will have to decide what to do about broadcasting as from January 1st, 1937.

A Mass Attack.

Financial necessity may decree an earlier decision, if only to give the B.B.C. the power to borrow against contingencies which could not be met in the face of progressive Treasury raids. My view, on the whole, is that the financial emergency will not supervene, and that the B.B.C. will run its natural course.

What, then, will happen when the Committee of 1935, corresponding to Lord Crawford's Committee of 1925, gets down to its deliberations? There will be, of course, a mass attack by those who would commercialise British Broadcasting and leave it to the mercy of the caprice of trade.

I can prophesy with assurance that this attack will fail, and that public service broadcasting will continue. It is not in this direction that the danger lies.

Looking to the future of the B.B.C., one is concerned chiefly about what I think could be fairly described as the problem of the Director-General. Sir John Reith has been the chief architect and craftsman of the present system, and has done excellent work. The deficiency, if any, has been the impossibility of deputing functions; in other words, it has been a "one man show."

So far, so good. But what of the future? I think it likely that Sir John will carry on for the next ten years, but one cannot be sure, for the reason that Big Business, reinvigorated by a possible return to prosperity, is certain to seek his services in a post which would carry the monetary reward which he undoubtedly deserves.

No Valid Criticism.

What, then, will happen if the B.B.C. remains, as at present, in the form of a benign oligarchy, or rather, benevolent despotism? This is an important point which leads me to my next consideration.

There is no valid criticism of the formal constitution of the B.B.C. The Board of Governors is set up as a trustee for the public, and is precluded both from administrative and political interference with the day-to-day working of the service.

But if the B.B.C. is to go forward, not dependent upon the insecure foundation of one personality, it must be established that the Board of Governors, while being responsible and experienced, are also young in mind and alert to the opportunities of their trusteeship.

Next, as to the type of executives, there will be many changes during the next ten years. I am not reflecting on the capacity or the diligence of those who have carried forward Sir John Reith's work in the various departments, but I am saying that there will be a new test before long, and this is, mainly, the ability to look both outwards and inwards—in other words,

don and the Provinces. In the old days, the multiplicity of stations solved this problem automatically; but with the coming of the Regional Scheme, and the consequent centralisation, it became easier for the London headquarters to get everything into their own hands, and discourage local enterprise.

Regional Independence.

It will be a cardinal test of the future to discover whether the B.B.C. will have the statesmanship and commonsense to counteract the unnecessarily centralising tendency of the past few years. If the B.B.C. cares to take the long view, not necessarily longer than 1936, it will set itself out to re-create the authority, initiative, and independence of its Regional centres. If, perchance, it is not satisfied with its Regional personnel, this should not be an excuse for tolerating a menace to its monopoly.

The next point is an intelligent and constructive recruitment of staff about which practically nothing has been done, so far. I was glad to hear the other day that the suggestion had been thrown out that the B.B.C. should seek a dozen or so bright and competent young men to fit into various posts as they fell open.

This may be a sign of recognition of a grave need, but in itself it is inadequate, as a solution of the main problem. It is not necessarily "bright" men, young or old, that the B.B.C. needs in recruitment. What it does need is the best available artistic and administrative talent that can be found.

A Lost Opportunity.

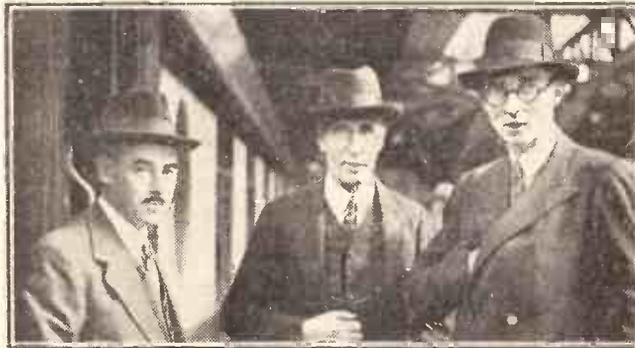
Commerce can no longer offer superior attractions in the way of money or of position. The B.B.C. should plan to get the cream of all available talent and ability and should not be content with a sporadic effort to dig up a dozen or twenty or any specified number of "bright" men, young or old, to form a permanent reserve.

The question of publications will become critical during the next ten years. This is an aspect of B.B.C. activity which never could be justified in the ordinary way.

The Press as a whole lost the opportunity of curtailing it when they failed to prevent the Treasury taking about a million pounds a year from the B.B.C. licence revenue. But as it is going on now,

(Continued on next page.)

PERSONALITIES BEHIND THE PROGRAMMES



Mr. Noel Ashbridge, the B.B.C.'s Chief Engineer, and a frequent contributor to "P.W.," is on the left, and beside him is Vice-Admiral Sir Charles Carpendale, with Mr. L. W. Hayes.

to realise and to feel what is happening in the world from day to day.

And that is not one of the assets of most of the executives at Broadcasting House to-day. Therefore, one can look for progressive changes in executive chiefs.

The next point is the attitude of the B.B.C. towards the conflict between Lon-



MUSIC

is probably the most important aspect of the B.B.C.'s daily work. It is in the capable hands of

DR.
ADRIAN
BOULT

ADAPTABLE COMPONENTS

Some hints on making easy interchanges from set to set.
By J. UTTLEY.

MY friends say that I suffer from the "plug-in" virus in excelsis. As an experimenter, I have always wanted to get the utmost use out of my instruments, particularly if they are expensive; and at an early stage I realised that it was no game to lock them up permanently in one set. The problem was to make them adaptable so that they could be transferred promptly from one set to another, thereby enhancing their value and proving an invaluable asset in matching the various portions of a circuit.

The obvious solution was to mount the components on some standard system. This system was already indicated by the orthodox setting for valves and coils.

Collection Of Clips.

Thus, components with four connections, such as transformers and coils, were mounted on derelict valve bases, and other components with two terminals were mounted on coil mounts, and clips were used in other cases. The result is that after I have wired up a set, apart from the panel there are practically no components on the base-board—merely a collection of clips, holders and mounts. The separately mounted components can be inserted at a moment's notice, and their suitability or otherwise tested by substitution with similar components.

Coming to details, I make my coils on a former consisting of a postcard wrapped round a valve base, the edges being gummed together and the top stiffened by an extra thickness of card. Suitable windings, on a tube of 1½ in. for the short waves, are 100 turns of 36 D.C.C., tapped at 25 and 50. The reaction section is wound at the bottom, and should be 70 to 80 turns with a .0001 differential condenser.

Detachable Resistances.

The obvious connections are top of aerial coil to grid of base, and bottom of coil to plate of base, while the reaction windings are taken to the filament legs. The tapings are best taken to small terminals at the top of the coil tube, and a piece of flex can then be used for connecting with the aerial terminal on the set.

The L.F. transformers are mounted on a small vulcanite base to which separate valve legs are attached. The suggested connections are IP (or plate) to plate on the base, OS (or grid) to grid on the base, and OP (or H.T.+) to one filament leg, and IS (or grid bias) to the other filament leg.

It is quite a simple matter to make up an R.C. coupling on a similar base, using detachable resistances and condensers, so that different values can be tried out and tests made against a transformer coupling. The same system in connecting up to the

base must, of course, be followed.

Carrying this idea a step further, if you get a valve base and attach lengths of flex to the various legs, you can test out a friend's transformer by connecting the flex to the correct terminals on the transformer (which is outside the set), and then plugging the base into the working set, when any faults would be at once revealed. The suggested connections for coils and transformers are obvious as regards plate and grid, and do not need any memorising.

Choke Surprises.

H.F. chokes are mounted on coil mounts, and one of the biggest surprises I have

sketch. They consist of a small ebonite base with two copper strips attached 1½ in. apart—the standard spacing of condenser terminals. The tops of these strips are notched so that the terminals can be slipped on to them.

Only Five Terminals.

Grid leaks are made interchangeable by the use of the orthodox double clips. I frequently employ a complete L.F. amplification unit, consisting of transformer, valve and grid-bias battery, wired up on a base measuring 4 by 5 in., and only five terminals are needed to incorporate it into a set.

It would not be a difficult matter to mount this on five legs, and plug it into a five-pin valve holder.

It may be thought that the preliminary work required in mounting one's components in this manner is considerable, but I can say without hesitation that it is well worth while.

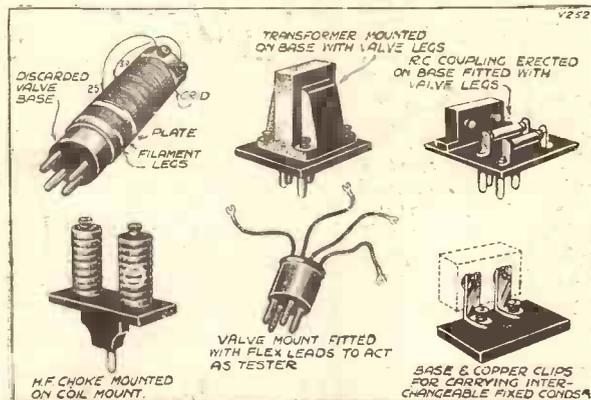
No one can imagine the lessons that one can learn in matching impedances, the unexpected and startling results produced by certain changes, and the facility in testing the respective merits of various components.

They Must Fit.

There is one factor that must not be overlooked in practising this system: the legs and sockets must be kept clean and be a good fit, otherwise losses from bad connections will naturally result.

In fact, if it did nothing else, this "plug-in" system would force constructors to realise the importance of cleanliness in any receiver—a point which is too often forgotten.

ALL FITTED FOR EASY CHANGE-OVER



It is remarkable how easily and well the various components can be mounted by using old valve bases, plugs, or scraps of ebonite, as shown.

noticed is the effect of various types of chokes in a circuit.

Small fixed condensers are used in conjunction with holders, as illustrated in the

BROADCASTING—THE NEXT TEN YEARS

(Continued from previous page.)

the publication activity of the B.B.C. will be yielding rather more than half a million pounds net profit before the next ten years have run their course.

No doubt, as in 1925, Press interests will appeal to the Parliamentary Committee against this admitted misuse of monopoly in another direction. But the appeal will fall on deaf ears and will not succeed unless and until the Press as a whole secure for the B.B.C. its right proportion of licence revenue. I am not pessimistic that this result will be attained before 1942, but I think the process of education will last longer than 1936.

Hostile To Broadcasting.

Relations between the B.B.C. and the Post Office will have to be changed. The B.B.C. is becoming much too important to be in any form of tutelage to a Government department which has numerous other interests, some of which are hostile to broadcasting.

True, the Crawford Committee gained for the Corporation valuable new freedom, but

it left the P.M.G. as policeman of the ether and as sole spokesman for broadcasting in the House of Commons. This system works all right when the P.M.G. happens to be enlightened enough to recognise the real importance of broadcasting.

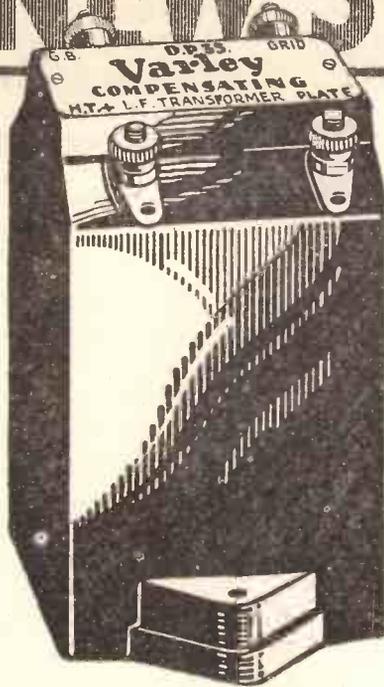
But it is unsound to leave any system of the kind to the accident of the personal intelligence and goodwill of an individual. If broadcasting progresses as I think it will in the next ten years, I believe it will have direct representation, not in the House of Commons, but in the House of Lords, "reformed" or "unreformed."

Free From Control.

I do not set out to prophesy its first representative on the plush benches; I only say that Broadcasting must be free from the inimical and envious control which is now exercised by the Post Office and Treasury Branches of the Civil Service.

In conclusion, I would say that the next ten years of British Broadcasting will see it developed professionally and efficiently in every direction of its activities. No longer will novelty or "stunt value" excuse mediocrity, but I believe somehow that Sir John Reith will effect the transformation. I only hope that he will be wise enough to encourage responsible and adequate deputyship, and not through sterilising committees.

A NEW STAR CIRCUIT



*and this
Varley
made it
possible*

SPECIFIED in the "Popular Wireless"

AIRSPRITE

From the very inception of this "P.W." wonder set, Varley's research department and the technical staff of "Popular Wireless" worked in close collaboration. Finally, after the most stringent tests, "P.W." declared that the Varley compensating L.F. transformer D.P.35 was exactly what they required.

Obviously it would be foolhardy to use any other transformer—*everything depends upon the exact characteristics of the L.F. transformer chosen.* In fact, Mr. G. P. Kendall, B.Sc., Chief Engineer of "Ready Radio," has found on test that this Varley transformer is the only one suitable for the job and is using it exclusively.

Get the correct transformer—Varley D.P.35, specially designed for this great set—and you will get the results the designers got! Ready now.

COMPENSATING D.P. **11/6**
L.F. TRANSFORMER 35

Varley
PROPRIETORS. OLIVER PELL CONTROL LTD.

You must read about the
“P.W.” “AIRSPRITE”

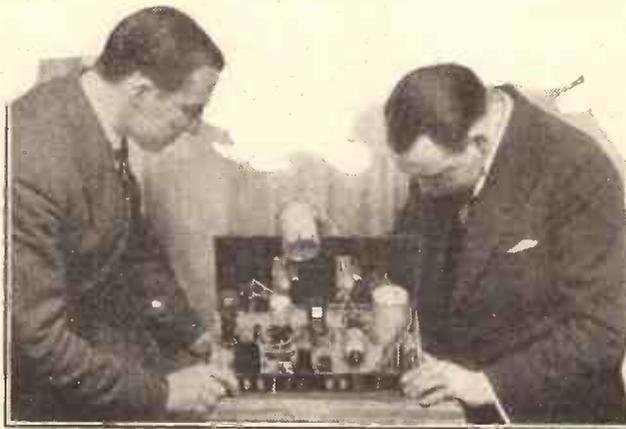
IN NEXT WEEK'S "POPULAR WIRELESS"
 IT IS INDISPUTABLY 1933's STAR SET!

AN IMPORTANT NEW RADIO INVENTION MAKES ITS FIRST APPEARANCE IN THIS MAGNIFICENT HOME-CONSTRUCTOR DESIGN—AN INVENTION SO SIMPLE IN CONCEPTION BUT SO STAGGERING IN ITS EFFECTIVENESS THAT LEADING ENGINEERS OF THE RADIO INDUSTRY HAVE UNITED IN PRAISE OF ITS ACCOMPLISHMENT

**THE “P.W.”
 “AIRSPRITE”**

NOVELTY
 WITHOUT
 COMPLEXITY

BETTER
 RESULTS
 WITHOUT
 EXPENSE



**THE “P.W.”
 “AIRSPRITE”**

THE FIRST SET
 EVER TO RE-
 CEIVE UNANI-
 MIOUS PRAISE
 FROM THE
 GIANT COR-
 PORATIONS
 OF THE RADIO
 INDUSTRY

BRIEF EXTRACTS FROM SOME OF THE “P.W.” “AIRSPRITE” REPORTS WHICH
 WILL APPEAR IN FULL IN NEXT WEEK'S “POPULAR WIRELESS.”

“Magnificent.”—TELSEN. “Greatly impressed by its performance.”—MULLARD.
 “Great improvement in radio technique.”—DIRECT RADIO. “Your claims . . . well
 borne out in practice.”—BULGIN. “Definite advance.”—POLAR. “An important
 step towards the development of simpler and better home radio.”—VARLEY. “Most
 impressed.”—COSSOR. “Extremely simple to operate, effective in action and, in gen-
 eral, fully justifies your claims.”—WARD & GOLDSTONE. “Particularly impressed
 by the clarity of reproduction obtained on distant stations.”—CELESTION. “A definite
 advance towards simpler and more efficient home radio.”—COLVERN. “Greatly
 impressed.”—BELLING & LEE. “Should do much to simplify the good reception of
 distant stations.”—MARCONIPHONE. “An achievement”—WHITELEY ELECTRICAL.
 “A very fine set indeed.”—READY RADIO.

THE “P.W.” “AIRSPRITE” IS DESCRIBED
 IN THE NEXT ISSUE OF “POPULAR WIRELESS”
 ON SALE WEDNESDAY, 1st FEBRUARY, WITH FREE DOUBLE-SIDED BLUEPRINT
 PRICE 3d. AS USUAL!

MY little notebook, in which I jot down any items of short-wave interest that occur to me during the week, seems to be fairly well filled up this time. Such is the keenness of some of my readers, however, that I could write several pages of short-wave notes from the contents of their letters without referring to my own notes at all!

E. J. L.'s reception of W I X A L on about 49.6 metres has brought from two readers, J. E. S. (Bagshot) and F. L. P. (Ruislip) the news about this station. The transmitter is located at Boston, Mass., and is testing on 49.67 metres, the wave officially occupied by W 4 X B, Miami.

Established Identity.

F. L. P. also clears up the C I Q query that appeared a few weeks ago. He suggests that the station was D I Q, Nauen, which seems very likely, as D I Q does test with American stations on about that wave-length.

N. P. S., a Boscombe reader with a sense of humour that appeals to me, sends a long letter in which the various short-wave pests are classified and labelled. To mention a couple, he talks of the "Cricket on the Hearth" (automatic Morse transmitter), and the "French fonitis" (unreadable telephony on the 80-metre amateur band).

A New Arrival.

He adds "the quick-fire turns given by the 'Pronto, Pronto' gang start to intrigue me, but a terrific crack in the ear brings me back to earth and forcibly reminds me that the lodger has switched his light off, or, if it be daylight, a rapid series of such reminders tells me that the baker's van is in full cry down the street and firing nicely on all four."

N. P. S. tells me that my recent appeal to short-wave novices to be patient and to listen to everything that they hear, put



All the interesting news and views of current short-wave practice.

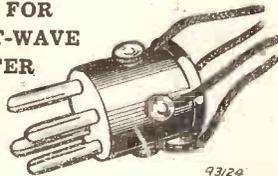
fresh heart into him at a time when he needed it.

Has everyone heard the "Big German" by now? At the time of writing I don't know what station it is, but there certainly

USE FOR OLD VALVE BASES

"NEVER throw anything away" should be the motto of the real radio enthusiast. Old valves, in particular, should never be cast aside, for they make very efficient adapter plugs.

IDEAL FOR SHORT-WAVE ADAPTER



Clear all the glass and internal connections away and fit four small terminals at even intervals round the valve base.

This results in a very neat and businesslike job, and the adapter can be used for a variety of purposes.

is a Big German let loose in the neighbourhood of 50 metres.

When Moscow, G.S.A. and the Vatican are all in form and this fellow sits down in

the middle of them, one feels that all the high-power stations in the world are in one's back garden.

Nairobi, on 49.5 metres, continues to be an excellent transmission. I should hardly think there is anyone with a short-wave receiver who hasn't heard him during the last few weeks.

I was laid up for a while just after Christmas (not through over-eating, by the way), and a sympathetic visitor listened to a nice programme on my one-valver. He couldn't stay for an announcement, but I heard it a few seconds after he had gone, and it was Nairobi. He still doesn't believe it, poor chap.

Clear Announcements.

I find that G.S.A., on 49.6, has good steady periods now and then, as distinct from his usual state of rapid fading. In the region of 6.30 p.m. recently he has been dead steady. A friend in Birmingham tells me that G.S.A. and G.S.D. are both very strong there.

Incidentally, doesn't one appreciate the slow, solemn, but clear announcements from the Empire station? If only other short-wavers would copy the methods of the B.B.C.'s special short-wave announcers, identification would be a much more simple matter.

Over the Worst!

I have been examining some very detailed sunspot data recently, and have discovered, much to my joy, that we are past the "trough" of the eleven-year cycle at last. Conditions are due for a steady improvement for the next five years at least, which is cheering news.

As a matter of fact, throughout the "depression" period there have been patches of good conditions, and these alone have made short-wave work worth while.

Conversely, while the general improvement is taking place, we must still expect dull periods. But we have crossed the line!

WHAT'S happened to Jack Payne and his hustle? His latest visit to Broadcasting House showed him in a very restrained mood. In fact, between all his numbers there was an uncanny stillness, such as we are accustomed to associate only with conductors of big music at big concerts. Perfect silence before we begin, don't you know!

All the same, he gave us a good hour, minus, of course, the several specks of silence. Much as we like Henry Hall, there is something distinctive and distinguished about Jack's boys and the music they put over.

Distinctive Dance-Bands.

I suppose all dance bands deliberately try to be distinctive, that is, surely, one of the ways to fame, provided the feature exploited is not unpleasant. It would be unfair to judge a band on a single performance of what its leader and spokesman called a programme of usual and unusual music.

But I couldn't help noticing an almost complete dearth of usual music in a mixed programme from the Monseigneur the other night. So much liberty was given every instrument in turn to go where it liked, and to do what it liked, that the tune was never once heard. I will say that due regard was paid to the tempo, but the twang-twang instruments had as much as they could do to hold their tenor saxophone in. It was a marvel, too, how the vocalist sang to such an accompaniment. Yes, the Monseigneur Dance Band is distinctive all right!

Those Readings.

I thought the readings from "Dombey and Son" emphasised once

THE LISTENER'S NOTEBOOK

A rapid review of some recent radio programmes from home stations.

more the absence of the short-story teller in our programmes. To my mind, these readings are like the serial type of story; the necessarily long interval between instalments tries one's patience, and one loses interest.

Of course, listeners familiar with Dickens don't feel this inconvenience as acutely as those who have yet to try these famous novels.

A Disappointment.

Illness is always a justifiable excuse for not keeping a date, but when a speaker's absence is only accounted for by the fact that "he hasn't had time to prepare his speech," there is some cause for dissatisfaction.

Mr. Vernon Bartlett must realise that his weekly talk has come to mean emptier streets on the night of his talk. This being the case, we don't expect to be disappointed, particularly for so trivial a reason.

The substitute who stepped into the breach made an excellent deputy, although he spoke much too quickly. It was obvious he had far too much to get through in fifteen minutes, and his race against time (in which he was hopelessly beaten, by the way) taxed listeners' powers of assimilation to the full.

Victorian Melodies.

It is a good sign to find Christopher Stone figuring in a Sunday programme. Is this the thin end of the wedge? Anyhow, it was good to hear him. How far "Victorian Melodies" owed its success to him is a matter of opinion; but, whatever the truth may be, his was one of the best Sunday programmes we've had for some time.

As Christopher Stone said, these melodies were intended to bring the light of other days around us; and, indeed, they did, for although some of us may never have heard these songs from a concert platform, very few can say we have never heard our elders humming them.

Fine Singing.

Christopher's hint that the programme was not for the frivolous or the scoffers was actually unnecessary, for I defy anyone to remain frivolous once the programme got under way. Could anyone, for instance, wish to be frivolous while Ben Davies was singing?

What a remarkable man he is! How wonderfully clearly his words came through! Here was an object lesson for many a younger singer.

It is no secret, of course, that Ben Davies has passed his prime, but he can still hold an audience.

A German Lament.

What a great personality Christopher Stone is, too! His reputation, apparently isn't confined to these shores only. I read in a German wireless paper the other day an article lamenting the indifferent way in which gramophone recitals are given in Germany. "Is it not true," the writer asks, "that in England the *Schallplattenkritiker* (Christopher Stone) has become, through the excellence and originality of his ideas, the most popular of all microphone personalities there?"

Tortoise Music.

I'm afraid I didn't appreciate the funny side of "Humoresque," not even with the announcer's help. But when the joke consists of nothing more than playing a familiar piece of music, which is normally played quickly, slowly, and labelling the new version "The Tortoise," then it isn't surprising that we fail to see in it a first-rate piece of fun.

But, for all this, "Humoresque" was a lively affair, better suited, perhaps, to the nursery than the living-room at 10 p.m. The musicians themselves enjoyed it enormously, anyhow!

The Human Touch.

There seems to be a growing tendency among announcers to be less mechanical than they have hitherto

(Continued on page 1086.)

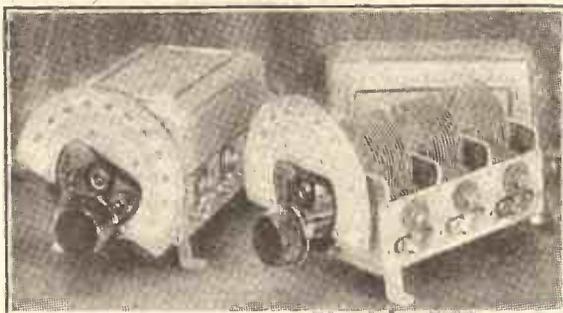


A LOTUS GANG CONDENSER

THE most essential thing in the design of a gang condenser is rigidity. If there is the slightest tendency for the sections to go out of rigid coupling, or if there is any looseness or undue flexibility of the vanes, the whole object of the component will be defeated.

Of course, there must also be an extremely close matching between the sections. This does not mean that it is necessary only to ensure identical maximum capacity values. In addition the individual capacities must remain identically similar at any adjustment.

The new Lotus 3-gang condenser has the virtue of mechanical robustness to as marked an extent as almost any I have seen. It is almost rugged in its robustness, though with its shielding cover in place it is perfectly neat and clean in appearance, and is very compact.



Two of the new Lotus three-gang assemblies.

Its movement is good, too, and electrically it stands above the average. I took about eight intermediate measurements on one of my samples and I was agreeably surprised at their almost uncanny absence of even tolerable error.

This says a great deal for modern methods of manufacture. It is a job which would have been utterly impossible in the days before scientific mass-production, whatever may be said of the skill of "handcraftsmen."

I must not forget to mention that the Lotus 3-gang condenser is sold complete with an excellent disc drive and that it has a usefully placed scale light.

NEW BELLING-LEE ITEM

Constructors will undoubtedly like the new Belling-Lee Terminal Mount.

It is a fine and practically unbreakable bakelite moulding very tastefully designed.

The great feature from the constructor's

point of view is that it can be mounted either vertically or horizontally. The retail price is 6d.

The Belling-Lee type "B" Terminal pairs perfectly with the above-mentioned Terminal Mount. For one thing, its head comprises a clean, walnut coloured bakelite moulding which matches the mount in both design and colour.

Also, it has a neck which neatly drops into a recess on the mount, and there is a notch which completely prevents turning.

By the way, what handy devices terminal mounts (or Blocks, as they are sometimes called) are in set building, especially when there is no serried rank of terminals on a long terminal strip.

I don't mean to say I prefer battery cords to terminals for the battery connections of ordinary sets: I don't in the usual way. But for experimental hook-ups, certain units and so forth, a Terminal Mount or even a pair of them, is almost essential.

They are items all constructors should have on hand as indispensable gadgets.

BOOM IN CABINET SPEAKERS

I have had occasion several times to refer to cabinet resonance of late. However, it is a subject which very much concerns the majority of listeners.

When a loudspeaker unit is built into a cabinet, it is inevitable that there will be distortion due to resonance unless special steps are taken to prevent it.

In some cases it would obviously seem that no steps at all are taken. One might almost say it is painfully obvious!

There has recently come into prominence a method of overcoming the trouble which involves the use of fibrous padding material. This is, of course, placed inside the cabinet, and its object is to absorb the sound waves which would otherwise be left free to resonate.

Messrs. H. L. Williams and Co. have a quite successful material for the purpose, known as Acoustic Down. And they sell it together with fixing materials and cabinet (if this is required) in the form of constructor's kits.

Ordinary cabinets can easily be treated, and it is even possible to apply the scheme to portable sets.

The complete kits are styled "Melotone" loudspeaker kits, and we have had one of these built up.

It certainly does fulfil its object and a most impressive performance is given. The freedom from the muzziness due to that all-

too-common box resonance is at once patent, especially to the critical ear.

THE VARLEY COMPENSATING TRANSFORMER

I know a good bit about L.F. transformers but it is very clear that my knowledge of this branch of radio does not equal that of the designers employed by Varley.

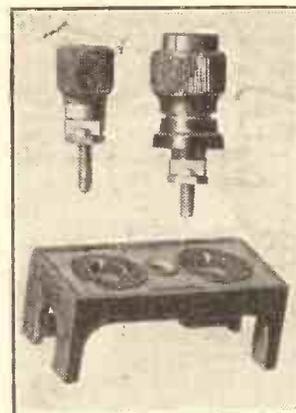
I am at a loss to understand how they have achieved such a marked effect as they have in their new Compensating L.F. Transformer, while at the same time retaining good amplification.

For it gives results equal to that of a first-class ordinary transformer plus a high-note lift to compensate for high-note loss due to reaction or super-selectivity.

It is easy enough to get a rising characteristic with low over-all amplification, but

it is an achievement indeed to obtain it without general loss.

And on top of all that the price of the Varley Compensating Transformer is only 11/6, which is lower than the price asked for quite a few transform-

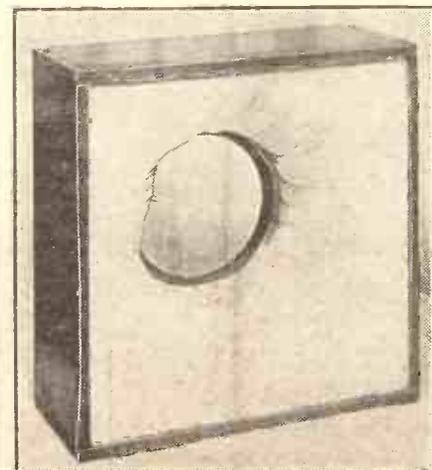


The types "R" and "B" Belling-Lee terminals, and the new Belling-Lee terminal mount.

ers of equivalent if not inferior quality.

I will prophecy, and it is safe to do so, that compensating transformers are destined for a big future.

For a long time the be-all and end-all of transformer design has been the "straight-line," but in practice it often happens that the characteristics of what would be labelled a "poor" or "cheap" transformer actually suit a circuit very well indeed, although the amplification is bound to suffer. The Varley Compensating Transformer gives correction without amplification loss.



The "Melotone" loudspeaker kit.

Graham Farish says:

MY NEW OHMITES ARE BETTER THAN EVER



**1/6
EACH**

because I have been able to make an improvement which makes all the difference. I keep pace with Time and embody in my components all that is newest and best. I have called in all the old pattern and have substituted this latest model OHMITE. It is now the very finest resistance that money can buy.



BETTER THAN WIRE WOUND

The popular and efficient resistances for all general purposes. All values 300 ohms to 5 megohms. 1/6d. each.

Good as the Ohmite has always been the new improved type is even better. It carries more current with a generous margin of safety, and simply does not break down. Non-inductive, better than wire-wound, it is unbreakable and *absolutely silent* in operation. Fitted with terminals which obviate special holders as well as the disadvantage of soldering.

FIT the new OHMITE once and for all time.

"AIRSPRITE"

Ohmites are being specified in both the A.C. & Battery models.

SAFE MAXIMUM CURRENT CARRYING CAPACITY OF "OHMITES"

100°F. Temperature rise.

Ohms	Milliamps	Ohms	Milliamps
100,000	3.5	10,000	12.
80,000	4.24	5,000	20,25
60,000	5.	4,000	24.
50,000	5.5	3,000	29.
40,000	6.	2,000	35.
30,000	6.75	1,000	40.
20,000	8.		

Other values pro rata.

HEAVY DUTY TYPE APPROXIMATELY DOUBLE

To get the Best from your set—earth with FILT—2/6.

GRAHAM FARISH COMPONENTS

MASONS HILL, BROMLEY, KENT.

EXPORT OFFICE: 11/12, FENCHURCH STREET, E.C.3.

NOW—for 39'6
most brilliant set

*The Ultra
 Selective*

TELSEN

*Full size Blueprint, with complete
 building and operating instructions
 supplied FREE with every kit!*

THE Ultra Selective TELSEN 'ASTRAL 3' smashes all existing standards of kit set value and design. It costs less to buy and less to run. It is easier to build and easier to operate. It is up-to-the-minute in design and ahead of all the rest in performance. Its selectivity is simply astounding, its range enormous, its reproduction superb. Yet every component you require for building it, together with full size blueprint and detailed instructions, is contained "complete in the box" for 39/6! You may already have some of the components by you, in which case you can obtain the blueprint and full building and operating instructions post free for 1/-. Whichever you do, you can be sure that in building the TELSEN 'ASTRAL 3' you are building the finest set from every point of view. Go to your dealer now.

TELSEN
RADIO COMPONENTS

Complete kit of parts,
 including panel, base-
 board, terminals,
 battery cords, and all
 accessories

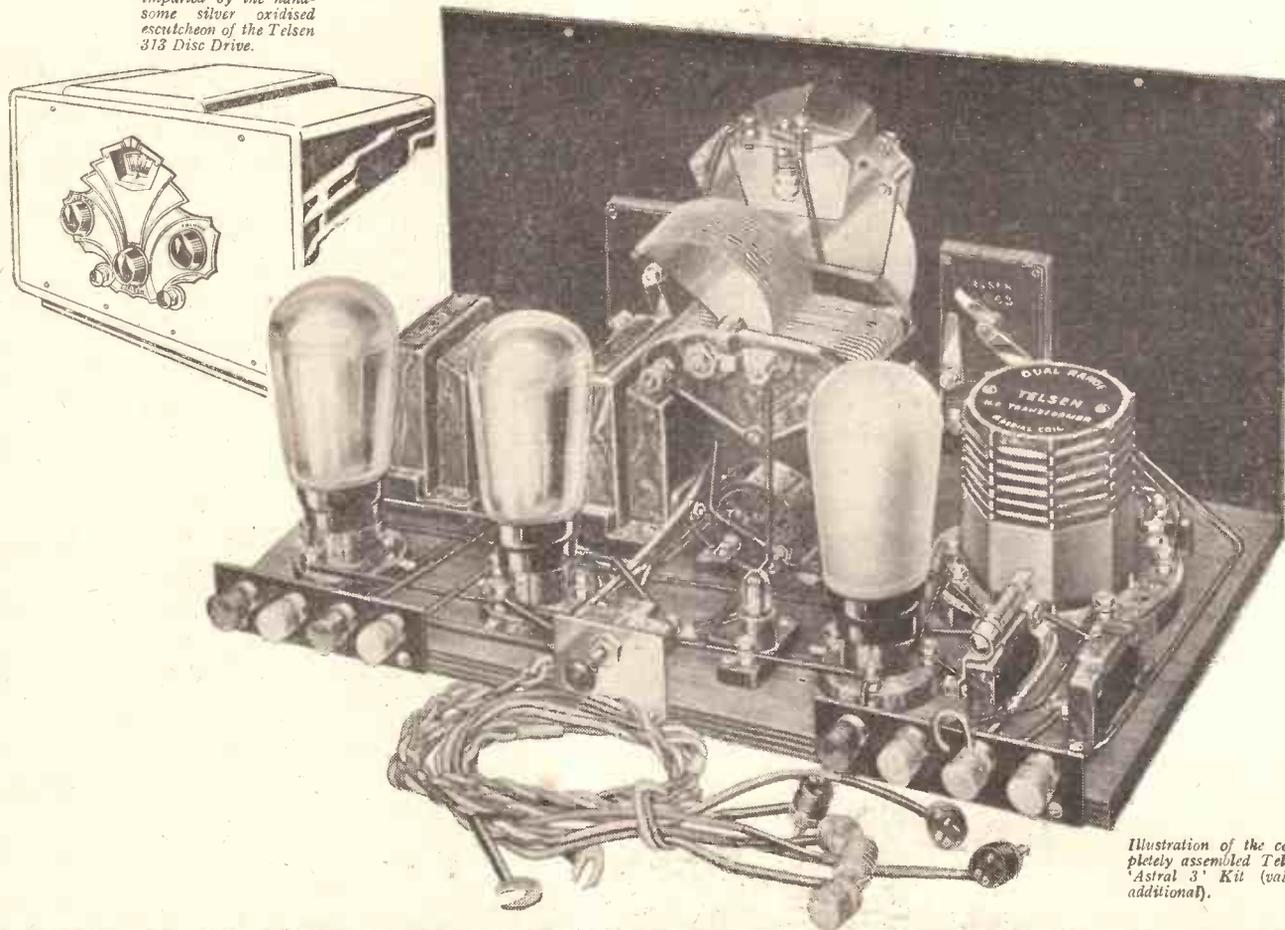
39'6

Obtainable from all
 radio dealers.

you can build the
ever designed.....!

'ASTRAL 3'

*Showing the dignified
'commercial' appearance
imparted by the hand-
some silver oxidised
escutcheon of the Telsen
313 Disc Drive.*



*Illustration of the com-
pletely assembled Telsen
'Astral 3' Kit (valves
additional).*

The TELSEN 'ASTRAL 3' embodies every ultra-modern refinement, including slow-motion disc drive control, air-spaced logarithmic condensers, decoupling in circuit, separator control and handsome silver oxidised escutcheon plate.

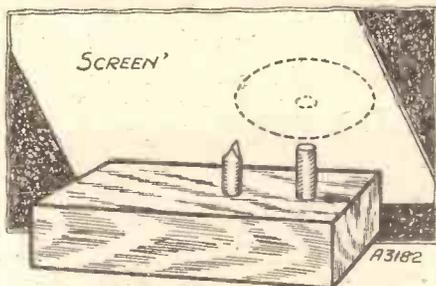
IN THE WORKSHOP

Cutting Screens—A Switch Hint—
Better Contacts.

VERY few constructors possess a proper cutter for making a hole in a screen through which a screen-grid valve passes. It is comparatively simple to make such a cutter with two screws and a piece of wood.

Obtain a piece of hard wood about three quarters of an inch square, and about four inches long. Screw a $\frac{3}{4}$ in. No. 4 iron wood screw into this, half an inch from one end. Another screw should now be put in at a distance from the other equal to the radius of the circle required. It will

HOME-MADE BUT EFFICIENT



The simple screen cutter described above.

JANUARY is usually one of the best months for long-distance listening, and January, 1933, so far as it has gone, is sustaining its good reputation except in one respect. For some queer reason American stations are not coming in so well at the moment of writing as they were during the previous month.

This is no doubt only a temporary setback, but it is rather a pity that it should have happened just at the time when so many new sets, bought or built, are in action. Hearing wondrous tales of American stations, the owners of new sets may have sat up one night or even more—and have heard nothing!

One Faithful American.

Even on the worst of nights, however, one U.S.A. station has generally been faithful. This is WCAU, a remarkable 5-kilowatt working on 256.3 metres. I have had this station myself as early as 10.30 p.m., and I have no doubt that a good many readers have done the same without knowing it, for the volume is often as great as that obtained from European stations.

If you can tune in Hörby earlier in the evening and note the settings, the odds are that a very small movement of the controls will suffice to bring in WCAU shortly after the Swedish station has closed down, which it generally does at ten o'clock.

For some reason American stations with wavelengths above the 379 metres used by WGY have not come in well this winter. By far the most profitable band to search is that between 230 and 379 metres.

The best-heard stations are WIOD (230.6 m.), WCAU (256.3 m.), WHAM (260.7 m.), WJJD (256.3 m.), WPG (272.6 m.), WTAM (280.2 m.), WTIC (282.8 m.), WBZ (302.8 m.), KDKA

be seen from the sketch that the screws are screwed in up to the ends of the threads.

The heads should now be cut or filed off, and the second screw is filed to form a slanting chisel-point.

The way to use the tool is obvious. A centre hole is drilled in the screen to take the pivot screw, and the cutter is rotated about this. It is best to cut half-way through, and then turn the screw over and finish cutting from that side.

Renovating the Switch.

WHEN an on-off switch or three-spring wave-change switch is noisy in operation, it is usual to remove the plunger and clean up the surfaces where contact is made.

The best way to clean the springs is with a small piece of fine emery paper made into a small roll and put between the springs instead of the plunger.

A few backward and forward pulls will clean the contacts just where they rub against the plunger. It is sometimes desirable to bend the springs together a little to increase their tension.

Locked Terminals.

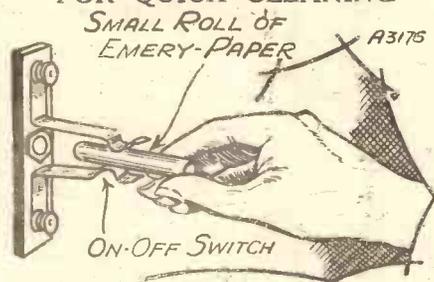
THE terminal tops of quick make and break, or snap switches, are very prone to work loose, due to the vibration set up every time the switch is operated. Since it is essential to use this type of switch for some purposes, a means of overcoming the trouble has to be found. Probably the simplest way of all of over-



The thin lock nut overcomes vibration troubles.

coming this snag, is to remove the terminal tops, clamp the connecting wires down with thin nuts, then screw the terminal tops down on top of these, as in sketch. This forms a locking device, and prevents the trouble almost entirely.

FOR QUICK CLEANING



A roll of emery cloth will greatly improve the contact.

Two other stations which the owner of a sensitive set may add to his bag are Lahti, on 1,796 metres, and Kaunas, on 1,933 metres. High selectivity is required to receive Lahti, which is separated by only 7 kilocycles from Radio-Paris on the one side and Huizen on the other.

I can nearly always find him with a super-heterodyne, and I think that the reason why it is not more often reported is that few enthusiasts realise that there is a station working between the Dutchman and the Frenchman. Kaunas is receivable clear of interference only at times when Huizen is silent. Huizen, by the way, is at present transmitting the Hilversum programmes and vice versa.

A Wonderful Quartet.

The medium waveband is full of interest at the present time, and there are quite a number of stations for the enthusiast to add to his log. By the time that these notes appear in print Freiburg, now working on 570 metres, will probably have the new 5-kilowatt transmitter in action. This will work on 259 metres, and the Stuttgart programmes from Freiburg will therefore be receivable only when Frankfurt is silent.

The change of wavelength just mentioned frees Ljubljana from jamming, and the Yugoslavian station, which a year or two ago was extraordinarily well received, will come into its own once more, provided that the receiving set will tune up to 574.7 metres.

A little lower down Budapest, Munich, Vienna, and Brussels form a wonderful quartet. Some adverse influence was affecting all of them at the very beginning of the year, but there are signs that they are returning rapidly to form.

(Continued on page 1088.)

STATIONS WORTH HEARING

(305.9 m.), WENR (344.6 m.), WABC (348.6 m.), and WGY (379.5 m.).

On this side of the Atlantic excellent reception of a large number of long-wave stations is possible at any time when they are working. The only trouble during daylight hours is the prevalence of a certain amount of Morse interference. This affects only one or two stations at any time, and there are always plenty of alternative programmes coming through clearly.

The best of the long-wave stations are Oslo, Kalundborg, Motala, Warsaw, the Eiffel Tower, Königswusterhausen, Radio-Paris, and Huizen.

In addition to these, the Vienna experimental station is at work on two or three evenings each week on 1,237 metres, and is sometimes to be heard with good volume. The giant Luxembourg transmitter—the biggest station in Europe with its full power is 200 kilowatts—is frequently to be heard conducting experimental transmissions on 1,250 metres.

High Selectivity Required.

So far nothing like full power has been used, but when it is—!

In many parts of the country the Icelandic station Reykjavik is well received on occasion. This station, which works on 1,200 metres, is always worth trying for at times when the Moscow Popoff station, which shares the wavelength, is silent.

RADIO SIMPLIFIED

A PRACTICAL OUTLINE FOR BEGINNERS

THE LINKS BETWEEN—

You and the Broadcasting Station.

THE purpose of this outline is a practical one. It has been written to improve reception from your set. When you switch on to listen to the broadcasting, the action

tell you how to ensure that your set works as efficiently as possible. And to obtain that practical improvement and life-like result we shall have to tell

To prevent unwanted leakage, use clean insulators, and keep the lead-in away from wet walls, etc. as far as possible. Fix it about one yard away from

tinuous piece from the farthest insulation to the set's aerial terminal, if possible.

If you use an out-door aerial switch (it's an excellent plan) keep a cover over it so that the contacts remain clean and bright.

We shall say more about aerials later, but before doing so we must look at the interesting question of different wave-lengths.

Here is the first of a series of weekly supplements designed to provide readers with a practical and up-to-date knowledge of radio. As well as interesting the thousands of new readers who have taken up radio as a hobby in 1933, these articles will provide older readers with an excellent "reminder" of all phases of the most fascinating hobby in the world.

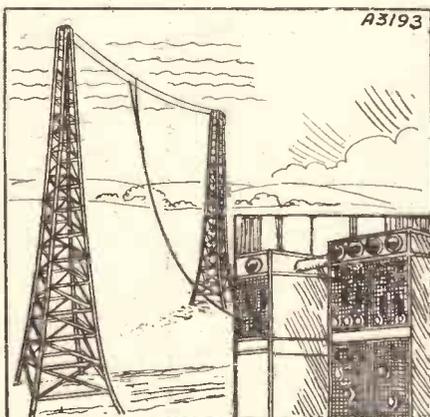
LONG, MEDIUM AND SHORT WAVE

THE name "long-wave station" is given to Radio Paris, Eiffel Tower, Daventry 5 X X, and others, because they work on the wave-lengths of over 1,000 metres.

In addition to those named we have the Dutch and German long-wave stations (Huizen and Zeesen respectively), and such favourites as Motala (in Sweden) and Kalundborg (in Denmark), but altogether there are only about a dozen easily-received long-wave stations.

Most of Europe's broadcasting is done on medium wavelengths, between 200 and 600 metres. Instead of a mere dozen there are a hundred and fifty or so easily received stations on medium wavelengths.

And finally there are the short waves, down below 100 metres. We shall talk of these later, because although the ordinary set does not receive them it can be made to do so if desired—and they are the uncommonly interesting wavelengths used for very long-distance reception.



Energy developed by giant valves at the broadcasting station creates waves in the ether.

of moving that switch on your receiver has, as you know, linked up your house with a concert-hall, or a studio or some other place of entertainment. And the sounds from

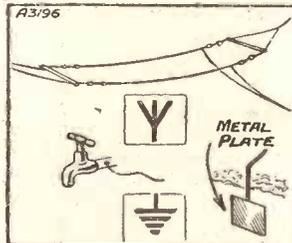
you a little about how broadcasting is carried out.

There will be no tedious explanations or boring figures and facts. It is the improvement of your reception that we aim at, and only matters that affect it directly will be dealt with.

The first link in the chain to be considered is your aerial. It acts as the collector, and along its wires flow tiny currents which pass to the set by the down-lead, or "lead-in" as it is

often called. When inside the set these currents flow through a coil of wire—called the aerial coil—and from there they pass into the earth along the earth-lead.

So you see the vital links between your set and the broadcasting station are the aerial with its down-lead, working in conjunction with the connection to earth. All your broadcast entertainment comes along this route, which is called the aerial circuit.



An outdoor aerial and two forms of earth connection, together with their appropriate theoretical symbols.

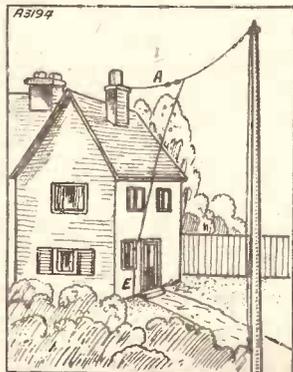
the wall except where it passes into the house, of course! And use good sound aerial wire, preferably of the stranded kind.

The earth is just as important, whether a water-tap, a plate buried in moist earth, or a chemical earth like the "Filt" is used. (These latter are very good indeed.)

And here are some useful hints on the aerial circuit.

Try to keep kinks out of the wire when erecting it. (They lead to broken strands.)

Don't cut the wire unnecessarily, but use one con-



The ether vibrations create currents in listeners' aerials.

there—the songs, the speeches, or whatever they may be—are reproduced at your own fireside.

If your set works well, the reproduction is clear and life-like; so in this outline we shall

BEFORE IMPROVING THE AERIAL

we consider what happens inside the set, let us note how we can improve the collector or aerial circuit. By raising the wire as high as possible, clear of houses, etc., we can get more energy introduced into it. But even a short, low aerial, or one inside the house, will collect some broadcasting, which can easily be magnified by the set, so high and unwieldy aerials are going out of fashion.

WHAT YOU DO WHEN YOU TUNE

If you put your tuning condenser dial at 0, and then look inside the set and notice the position of the moving plates, you will (or at least you should) find they are "all out." The turning of the dial to its highest reading will cause the two sets of plates to interleave, until they are in the "all-in" position.

If you do this when the set is "alive," station after station will come in and go again as the dial moves round from 0° to the top dial reading. Each station, in fact, has its own dial-position.



Special Beginners' Supplement, Page 2.

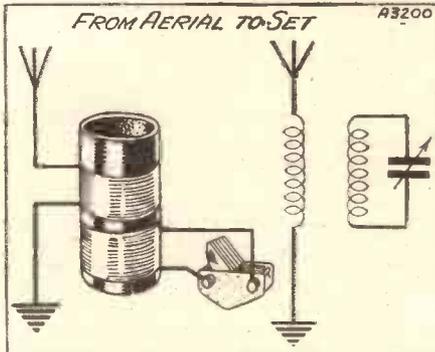
Sometimes this dial-position is very clearly apparent, so that a small deviation on either side of it results in losing the programme, and the set's tuning is then said to be "sharp." Con-

(Again halfway round will equal 1,500 metres, etc.). Although the "reaction" or "selectivity" controls may, to some extent, appear to upset tuning on certain sets, they cannot affect the main result, which is simply to alter the set's wavelength within the limits given above.

Although there is nothing to show except the slight movement of the vanes of the condenser, as the dial is rotated, there must be a very interesting process going on inside the set when it is being tuned.

Look at the sketch on the left for one moment, and imagine a weak current of electricity is flowing down that aerial wire, on the left, due to a distant broad-

casting station. Such high-frequency currents have very curious effects. For one thing, they will affect an



One coil is connected between aerial and earth leads. It transfers the energy to the adjoining coil, across which the condenser is connected for tuning, and so selecting any particular programme.

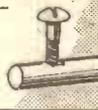
versely, when one station's programme spreads over a great many dial-readings we say tuning is too "flat."

The cures for the latter trouble will be mentioned in due course, but we can say right away that one common fault to look for is the placing of an ordinary tuning (unscreened type) coil too close to a metal screen. An extra half-inch or so of spacing between coil and screen will cure many a flat-tuning trouble.

casting station. Such high-frequency currents have very curious effects. For one thing, they will affect an

FIXING THE DIAL

JUST A PRACTICAL TIP—IF THE SCREW WILL NOT BITE, FILE A LITTLE FLAT ON THE SPINDLE TO HOLD IT



A3100

adjacent coil of wire, even though separated by a space of perhaps 1/2 in. or more. They will cause similar little high-frequency currents to flow in that coil, too.

And, if we fit that coil with a tuning condenser, thus giving it a wavelength of its own, it becomes extremely susceptible to currents of its own wavelength. It is then said to be "in tune" with the distant station that is causing the currents in question to flow in the aerial.

So that is what the other coil and the condenser shown in the sketch are for. That second coil (the lower one on the left) is placed so close beside the aerial coil (usually on the same former or cardboard tube), that any currents flowing in

VARIABLE CONDENSERS

THERE are a great many shapes and sizes of variable condensers now available, at various prices, and even the cheap ones will work well. But it is as well to remember that the condensers get more actual use and adjustment than any other part of the set, so it pays to get good ones if you can. The variable tuning condenser has several different tasks to perform. First and foremost it must do its electrical work of providing capacity for tuning the coil. Nearly always .0005 mfd. of capacity must be achieved for the "all-in" position.

When "all out" it must have only about 1/10th of that capacity. In other words its capacity becomes .00005 mfd. instead of .0005 mfd., and it must change smoothly and efficiently from minimum to maximum and vice versa, and always give the same capacity at the same position.

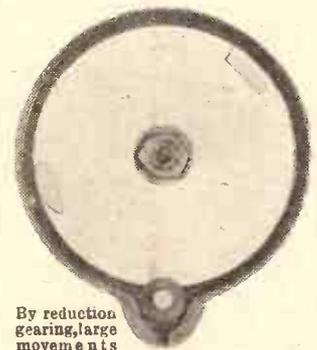
To do this its moving plates must be capable of sliding clearly

For reaction and selectivity control the mica types are more generally used, and the maximum capacities vary a lot, according to the work required of the condenser. A maximum capacity of .0003 mfd. is a usual value for reaction, and smaller values—.0002 or .0001 mfd.—for controlling selectivity, etc.

One specialised form of variable condenser known as the "differential" type has two sets of fixed plates instead of the more usual single set. And it is arranged so that when the moving vanes engage with one set of fixed plates they disengage from the others by an equal amount.

ALL these various condensers have their various uses, but the following brief summary of different types used for tuning will help the reader to understand why there are so many kinds available, and which will suit him best.

STRAIGHT LINE AND MID LOG.



By reduction gearing, large movements of the tuning control carry out fine movements of the condenser.

"Straight-line capacity" tuning condensers were the original types with semi-circular moving vanes. They are now out of fashion.

"Straight-line wavelength" types gave much better tuning than the above, but did not separate bottom-of-the-dial stations so well as those stations with higher dial-readings. (There are still many of these in use, giving good service.)

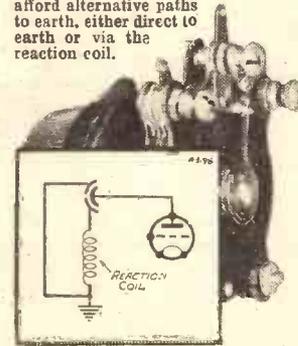
"Straight-line frequency" condensers overcame the difficulty of spacing stations evenly, but in this type the moving vanes are usually very tapering, and thus require a big panel space.

To overcome that drawback the advantage of the two last-named types were combined into a shape generally known as a "log-mid-line" condenser. This is quite compact, and gives good, even spacing, so most new condensers are of this class.

The term "slow-motion," as applied to condensers, is, of course, a reference to the rate of rotation by the dial. It makes fine tuning quite easy.

DIFFERENTIAL CONDENSERS

afford alternative paths to earth, either direct to earth or via the reaction coil.



and firmly in between the fixed plates, without touching anywhere, and without any unwanted shake or flimsiness.

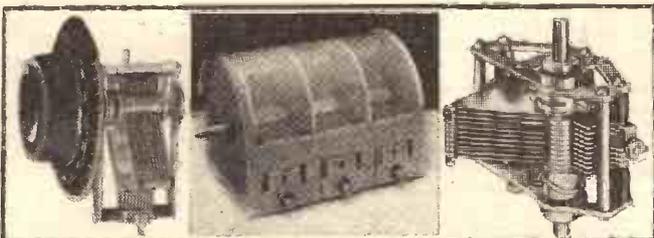
There must be sound contact from both sets of plates to the rest of the set. There must also be almost perfect insulation between fixed and moving sections, and some good strong form of easy mounting, to fix the whole component to the panel.

Generally speaking the air-spaced condenser is best for tuning, but sometimes mica or other insulator is used between the plates instead. The advantage of that is that the condenser can then be made smaller than an equivalent air condenser.

WHAT THE TUNING DOES

THE actual operation of the tuning, in any set, should result as follows:

- (a) with wavechange switch (if used) on "medium" waves. 0° on tuning dial equals lowest medium wavelength receivable. (Generally this is about 200 or 250 metres.) 100° (or 180°) on tuning dial equals highest medium wavelength receivable. (Generally 550 metres, or thereabouts.) Intermediate dial-readings give the intermediate wavelengths.
- (b) With switch on "long" waves,



They take many forms, but all variable condensers work on the same principle of moving plates interleaving with fixed plates.

0° on dial now represents about 1000 metres. 100° (or 180°) on dial now represents about 2,000 metres.

one coil can affect the neighbouring coil. And the variable condenser allows the second coil to have its wavelength adjusted first to one station's and then

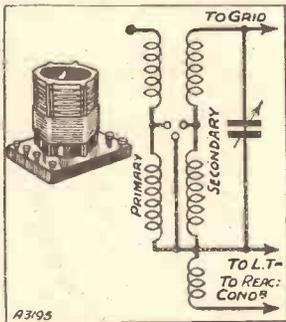
Special Beginners' Supplement, Page 3.

Of all the components which go to make up the complete radio receiver it can be well and truly said that the tuning coil or inductance is one of the most important, because any lack of efficiency in this part of the circuit invariably results in flatness of tuning or poor volume.

In its simplest form a tuning inductance is merely a coil of so many turns of copper wire, each of these turns being insulated from its neighbour. Copper wire is chosen in preference to other metallic conductors because of its low resistance, a very necessary factor in coil design.

Since the turns touch each other in coils of the type employed on the broadcast wavebands, the wire is insulated by covering it with enamel, cotton or silk; cotton tends to absorb moisture, for which reason silk and enamel coverings are more commonly used in the modern coil.

SIMPLE SWITCHING



The windings of a modern dual-range coil are arranged so that the movement of a simple switch changes the waveband.

You may wonder why tuning coils are wound on circular formers—the reason is that by adopting this particular shape the inductance value for a given length of wire is greatly increased. Actually a perfectly straight piece of wire possesses inductance, but it would obviously be impracticable to make tuning inductances in this fashion.

The one aim of the technician is to achieve the greatest efficiency with a coil of small physical dimensions. The circular winding has been found to be the most practical one.

FACTORS IN DESIGN

These is selectivity, or the power of being able to select a given station free from interference by another station; the second is volume.

All coil designs are a compromise between volume and selectivity. If a coil gives a very high degree of selectivity, then this has only been obtained at the expense of a certain amount of volume.

Conversely, volume is obtained only by sacrificing selectivity. Hence the coil windings have to be proportioned so as to give satisfactory volume combined with adequate selectivity for the conditions under which the set is likely to be used.

ALL ABOUT COIL UNITS
A consideration of types and practical design.

Some years ago practically all tuning coils were of the plug-in type, that is to say, the coil plugged in to a coilholder, mounted either on the panel of the set or the baseboard.

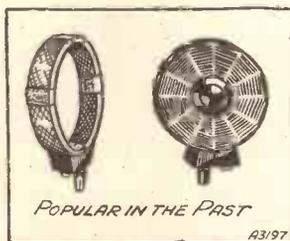
Plug-in coils were available (and still are) in a variety of sizes, ranging from 25 turns to 300 or 400. So the listener could cover any wave-range he wished by the simple expedient of taking out a coil and inserting a larger or smaller one in its place.

Plug-in coils are quite efficient, but they have disadvantages in the light of modern developments.

CHANGING COILS

In the first place it is perhaps necessary to take out and replace several coils in order to change over from the medium waves to the long waves or vice versa.

Suppose, for example, the receiver has an S.G. stage, then it is conceivable that as many as five coils may have to be changed each time the listener wishes to go over to Daventry on the long waves. This is one of the reasons for the popularity of the dual-range coil. Plug-in coils are very rarely used in broadcast receivers these days.



Plug-in and basket coils although efficient do not lend themselves to easy wave-changing.

DUAL-RANGE DETAILS

The dual-range variety has virtually two separate windings connected in series, one portion of the coil being suitable for the medium waveband and the other for the long waveband.

The long wave section can be cut out of circuit at will with the aid of a switch, which "shorts" this section of the coil to earth. Thus only the medium-wave part remains in circuit as far as tuning is concerned.

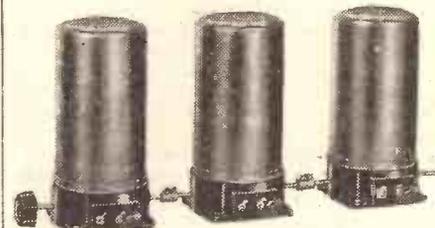
Wave-changing in many of the popular coil units is carried out with a three-point push-pull switch, which is arranged to give the medium waveband when the knob is pulled, and the long waveband when it is pushed towards the panel. Other coils only re-

quire a two-point switch, depending upon the arrangement of the coil windings.

The internal connections and arrangements of the various types of coil varies according to the designers' own ideas.

For example, there is the question of how the aerial should be connected to the aerial coil. In practice there are three effective methods.

The first is by means of a direct tapping on to the winding, and the position of this tapping has a definite bearing upon the



Works of art (compared with the clumsy coils of the past) self-screened and all worked by one switch.

degree of selectivity which the coil will give.

Because of this it is quite usual for the coil makers to arrange for two or more tapplings (e.g. the Colvern T.D. coil), so that the listener can choose the most suitable one for his locality.

The second method is to connect the aerial through a small fixed or variable condenser (not larger than .0001-mfd.) to the grid end of the coil winding. This end incidentally is the one which goes to the fixed vanes of the tuning condenser; the degree of selectivity then depends upon the size of the fixed or variable condenser.

The third method is that in which a separate primary winding (e.g., the Telsen unit) is magnetically coupled to the secondary, this being the winding to which the tuning condenser is joined.

MAGNETIC COUPLING

Perhaps it would be as well if we gave a few words of explanation concerning magnetic coupling. When the oscillating currents sent out by the broadcasting station picked up by the receiving aerial flow through the inductance coil, they set up what is called a "magnetic field," which spreads itself out

and affects any other coil in its immediate neighbourhood.

Hence the currents in flowing through the primary winding of a tuning coil set up magnetic lines of force, which affect the secondary winding and so produce voltages across its two ends.

You will have noticed that a number of the coils on the market at the present time are "canned," or in other words completely enclosed in a metal screen, usually of aluminium.

Now, any coil through which an alternating current flows has a magnetic field and the object of screening is to restrict this field so that it has no effect upon other coils elsewhere in the circuit.

REASONS FOR SCREENING

are two or more tuned circuits.

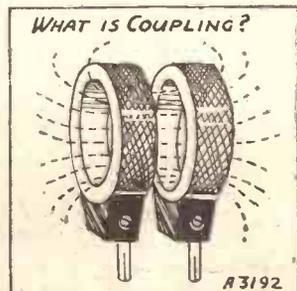
If no screening were employed the magnetic fields set up by the tuning coils might interact and so cause inefficiency and instability

Sometimes a vertical screen, together with copper foil on the baseboard, is perfectly effective in preventing this undesirable interaction, but by screening each coil unit the receiver can be made more compact.

For ease of connection, it is standard practice to bring the various points on the windings to numbered terminals on the coil

base. These numbers are not standardised. Hence one make of coil cannot be interchanged with another without due reference to the makers' circuit diagram and instructions.

If you inspect a dual-range coil, you will find that the long-wave winding is generally wound



When current flows in a coil a magnetic influence spreads and affects a neighbouring coil, so a similar current appears there simultaneously

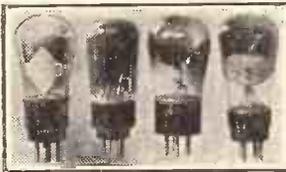
in slots. The object of this is to wind on sufficient turns without making the coil bulky, or employing excessively fine wire.

The slots are separated in order to keep the self-capacity as small as possible, because the perfect coil would have all inductance and no capacity.

Special Beginners' Supplement, Page 4.

A MODERN ALADDIN'S LAMP THE VALVE HOW AND WHY IT WORKS.

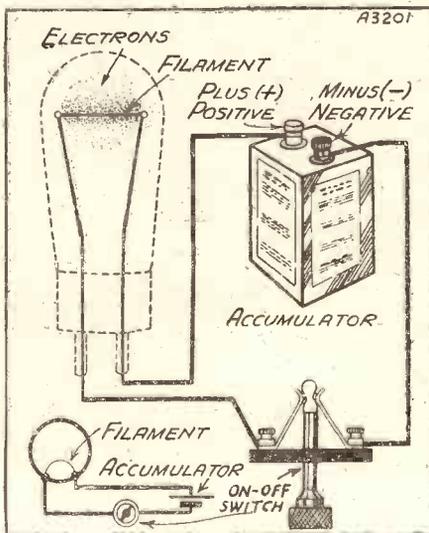
THE valve is the most vital thing in wireless. Without it modern broadcasting would be quite impossible. It is just as important to transmission as to reception, and the valves used at the giant broadcasting stations differ little if at all in the fundamentals of their design from the much smaller valves used in listeners' sets.



All these valves are triodes—i.e., they have three elements, as explained in the text.

The most commonly employed receiving valves are known as triodes. That is, because they have three elements in their design. These are the filament, the grid and the plate.

The filament comprises a very thin wire of special alloy which has the power to throw off electrons when it is heated. Electrons are particles of electricity, and they are thrown off the heated filament just as steam is evaporated from boiling water.



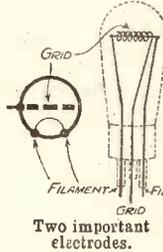
Pictorial and theoretical representation of a filament circuit.

The filament is heated by a current of electricity in the same way as are the filaments of electric light bulbs, except that it is not necessary to raise them

to a greater heat than is indicated by a dull red and the electrical power needed to do so is quite small.

In fact, a tiny accumulator cell is all that is required to supply this filament heating current.

In the first sketch we show a complete "filament circuit." There is a "filament" or "on-off" switch which enables the circuit to be made or broken, in order to permit the filament-heating current to flow or to be cut off as desired.



The theoretical representation of this simple circuit is also shown.

That terminal of the accumulator cell marked with a minus sign, the negative terminal, is the one from which the electron current flows. After traversing the circuit the current re-enters the cell at the positive terminal.

Perhaps this point puzzles you. You may wonder why it is that the cell eventually "runs down" if the current merely flows out of one terminal back into the other. Well, you will see the reason explained in the accumulator article on this page.

Surrounding the filament of the valve is the grid, so named because it consists of a mesh-like structure—either a spiral of wire or a fine gauze.

The object of the grid is to provide a free passage for the electrons, while leaving it possible to influence them by an electrical charge.

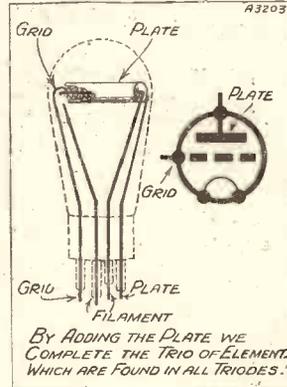
Finally, encircling the grid is the anode, or plate as it is often called. This is sheet metal, for it is at the anode that the electrons reach their

journey's end; they don't have to pass through it.

The three elements are enclosed in a glass envelope, from which as much as possible

of the air is extracted, for air particles would constitute obstacles against the free movement of electrons.

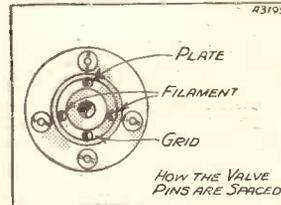
The air is extracted by vacuum pumps, and the silver lining almost always noticeable in the glass bulbs of valves is due to the use of a chemical called "the getter," whose job is to absorb



as much of the residue of air as is possible, for no pump alone can produce a perfect vacuum.

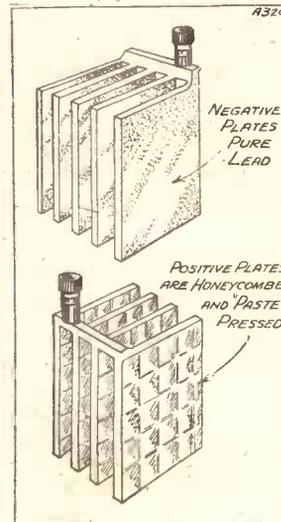
The filament has two external connections; the grid and plate

THEIR DISPOSITION



need only one each. The pins of the valve by which it is connected to the receiver are arranged so that one stands out from what would otherwise be a completely symmetrical arrangement. This "odd man out" is the anode (or plate) pin and the one opposite it is the grid pin.

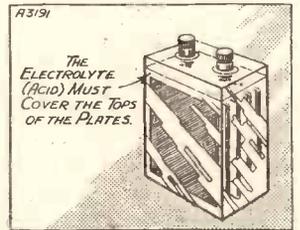
THE TWO TYPES



HOW ACCUMULATORS WORK AND SOME HINTS ON UPKEEP

THE name "accumulator" is misleading, because accumulators do not really accumulate electricity like fixed condensers do. What happens is this. There are two sets of plates which interleave but do not touch. The one set is made of pure lead, and the other comprises a series of honeycombs of lead into which a paste of red lead and sulphuric acid is pressed.

WATCH THIS POINT



The plates are immersed in a sulphuric acid solution.

When the accumulator is connected to a source of electrical power so that its positive terminal is presented to the positive of the charging current,



certain chemical changes take place.

The accumulator is charged. Its electrical equilibrium has been completely upset. There are vastly more electrons (particles of electricity), on its negative plates than there are on its positive plates.

Therefore, if the two terminals of the accumulator are connected by an electrically conductive path, such as the filament of a valve for instance electrons will pass from the negative plates along this path back to the positive plates. And they will keep on flowing until there are as many electrons on the positive plates as there are on the negative plates.

And when this has been brought about it will be found that the chemical nature of the plates will have changed again.

The specific gravity of the acid solution keeps pace with these chemical activities, and so the condition of an accumulator cell can be estimated if the specific gravity of the acid at full charge is known.

Inexpensive instruments known as hydrometers enable the specific gravity to be tested.

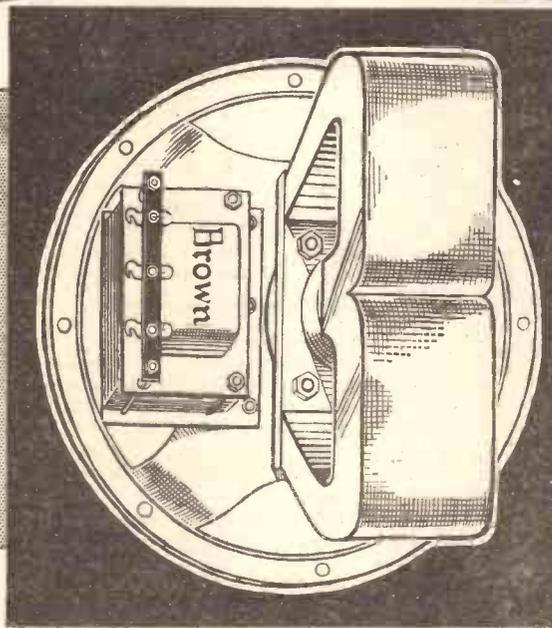
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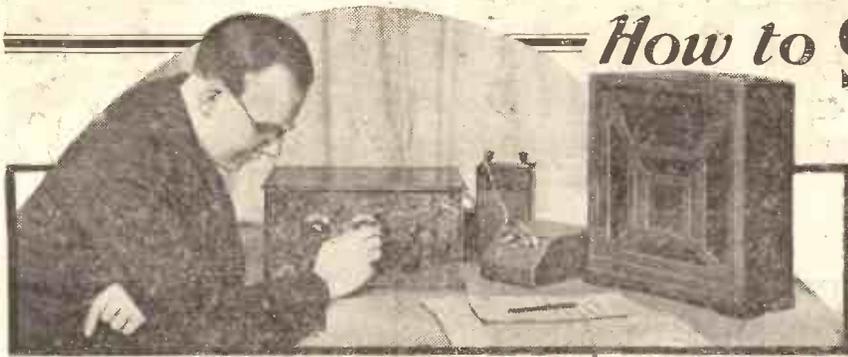
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How to SHARPEN YOUR TUNING

By A. JOHNSON-RANDALL

MANY are the letters I receive from readers who complain bitterly of their inability to obtain sufficient selectivity.

Most of the sets in question were built before the broadcast wavebands became so congested, and are therefore incapable of separating the multitudinous foreign broadcasters that occupy almost every division on the tuning scale.

Moreover, now that we have a number of Regional transmitters in this country,

listeners living within a certain radius of these stations often have to contend with very serious interference, which on an unselective set may spread over a large portion of the tuning scale. Most receivers are capable of improvement, even those being worked near one of the Regional stations.

Perhaps the most convenient method of sharpening up the tuning is by inserting a small condenser in series with the aerial.

The aerial lead is taken to one side of the condenser, the other terminal of the condenser being joined to the aerial terminal on the coil.

There will already be a lead going to the coil from the aerial terminal on the set, and this must first of all be removed, otherwise the series aerial condenser will have no effect.

Two Transmissions Together

This scheme is a very popular one, and cannot fail to improve the selectivity, although it should always be remembered that a slight loss of volume, when the value of the condenser is small, is the natural outcome of the modification.

But I think you will admit that it is better to have reasonably good station separation, even though the volume is a little less, rather than to have two transmissions coming through together so that it is not possible to get any enjoyment from either.

A practical article in which the best methods of improving the selectivity of existing receivers are fully described. Those who own sets of the detector and L.F. type will be particularly interested in the S.G. unit on the next page.

What the series aerial condenser does is to reduce the coupling between the aerial and the set, and the same effect can be obtained by cutting down the size of the aerial itself. But by using an adjustable condenser in series with the aerial, the tuning can be sharpened as desired and moreover can be varied at will.

This applies particularly when the series condenser is mounted on the panel, and I

As I pointed out previously, the listener who lives within, say, eight or ten miles from one of the powerful Regional twins, such as Brookmans Park or Slaitwaite, is often faced with the difficult problem of trying to stop his local from spreading over too large a portion of the tuning scale. This is liable to happen with sets of the more simple type, such as those without an S.G. stage, or those with one S.G. and having no special claims as regards selectivity.

Effective Within Limits.

The aerial series condenser scheme, although effective within limits, does not take the place of an additional tuning circuit, and when the interfering station is but a short distance away the value of the series condenser has to be cut down to such a low figure that by the time the local is restricted to a few degrees on the tuning scale the volume obtainable on distant stations has decreased until it is but a shadow of its former self.

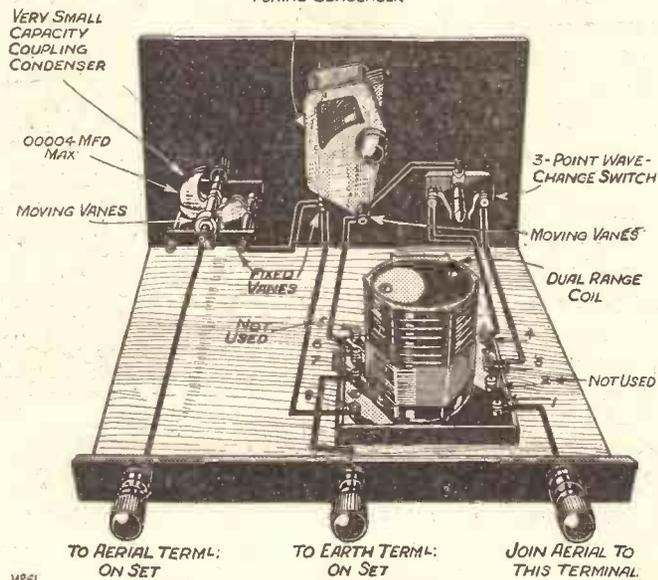
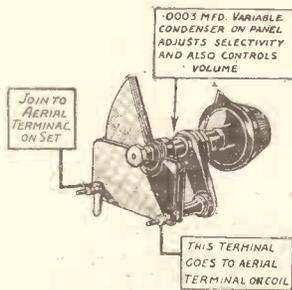
I have often wondered why listeners, who do not mind an additional tuning control, do not try an extra tuned circuit in front of their sets.

Such a unit has definite advantages so far as selectivity is concerned, although, like all devices of this nature, there is a small loss of volume. But in return one does get a much clearer background, and a delightful sharpness of tuning.

I have drawn a sketch showing how one of these units may be constructed by using a Telsen dual range coil.

The unit is connected between the aerial and the aerial terminal on the existing receiver, the aerial lead being removed from the receiver and joined to the unit.

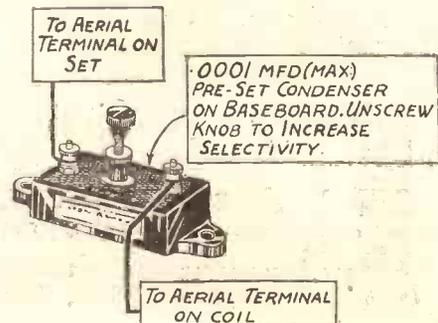
The centre terminal on the unit goes to the earth terminal on the set, (Continued on page 1074.)



A SELECTIVITY UNIT FOR SENSITIVE SETS.
The unit shown in the above diagram is specially suitable for use with broadcast receivers which possess a degree of sensitivity far in excess of their station separating powers. The dual-range coil is a Telsen. The smaller diagrams depict alternative methods of increasing selectivity the midget variable condenser having the advantage of being instantly adjustable when mounted on the panel. A pre-set condenser is, however, also very effective.

can recommend those convenient little solid dielectric condensers that can be purchased so inexpensively from any large radio stores.

A panel-mounting selectivity condenser is really a dual purpose fitment because it also acts as a good volume control for the local station.



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READY RADIO KITS

HOW TO SHARPEN YOUR TUNING

(Continued from page 1072.)

the remaining connections being quite clear from an examination of the sketch.

There is one point that I feel I ought to stress, that is the coupling condenser must not be big, otherwise the selectivity unit will have a definite effect upon the aerial circuit of the receiver and tend to upset the tuning.

But if this condenser is made very small in value, and .00004 is a good average figure, the upsetting effect of the unit is negligible.

The particular coupling condenser shown is an air dielectric type made by Jackson Bros.

In use the unit is tuned in precisely the same way as the set, and a certain amount of practice is necessary in order to get the best results.

First of all, I suggest connecting the aerial lead to the aerial terminal of the set in the usual way, and tuning in a station. After this the aerial lead can be removed from the aerial terminal on the set, and joined to the aerial terminal of the unit, the tuning dial on the unit then being rotated until the same station is heard.

In this way the unit can be calibrated by making a note of the dial settings for the regularly received transmissions.

The best position for the .00004-mfd. condenser will have to be found by experiment. When the moving vanes are fully in mesh with the fixed, the selectivity of the unit will be at its minimum, and this will probably be ample for many listeners.

Station Separating.

Although I said that the unit was specially suitable for receivers having no pretensions to high selectivity, there is, of course, no reason why it should not equally well be used in conjunction with more elaborate designs, provided the extra tuning dial does not complicate matters too much.

While a selectivity unit such as I have just described is of the utmost value in so far as its station separating powers are concerned, it does nothing towards enhancing the range of the set.

There is only one way of doing this, and that is by adding an amplifying stage. If we can arrange the extra amplifying valve so that it gives us a greater measure of selectivity, so much the better.

This is exactly what a good S.G. stage does. The valve magnifies the distant transmissions and thus improves the overall volume, while the extra tuning circuit provides us with a reasonable chance of bringing in these distant stations free from interference.

Four Different Tappings.

The Colvern T.D. coil lends itself admirably to this type of circuit because of its screening and also the fact that it has four different aerial tappings, any of which is instantly available simply by altering

the set, and connect it to the terminal marked A1 on the unit.

Earthed Through L.T.

Join terminal A2 on the unit to the aerial terminal on the set. The earth connection on the set remains untouched since the unit finds its earth through the L.T. supply.

The anode of the S.G. valve requires an H.T. voltage of about 120 (H.T.+2), and the screening grid 72 volts (H.T.+1). I have assumed that the same H.T. battery or mains unit will be used throughout, in which case no H.T.— connection is required on the unit.

The aerial plug can be inserted into any of the sockets numbered 1, 2, 4 and 5, the most suitable one being found by trial on actual broadcasting.

Should a very high degree of selectivity be necessary, a series aerial condenser can be added as described earlier in the article. In practice, however, the tappings should give adequate selectivity for all normal purposes, and a series condenser would only be needed under exceptional conditions.

One advantage of a unit of this type is the ease with which it can be cut out of circuit. Suppose you only wish to use the existing set when you are listening to the local transmission.

Very well, then, you just join the aerial to terminal A2 on the unit and switch out the filament of the S.G. valve by pushing the knob of the "on-off" switch towards the panel.

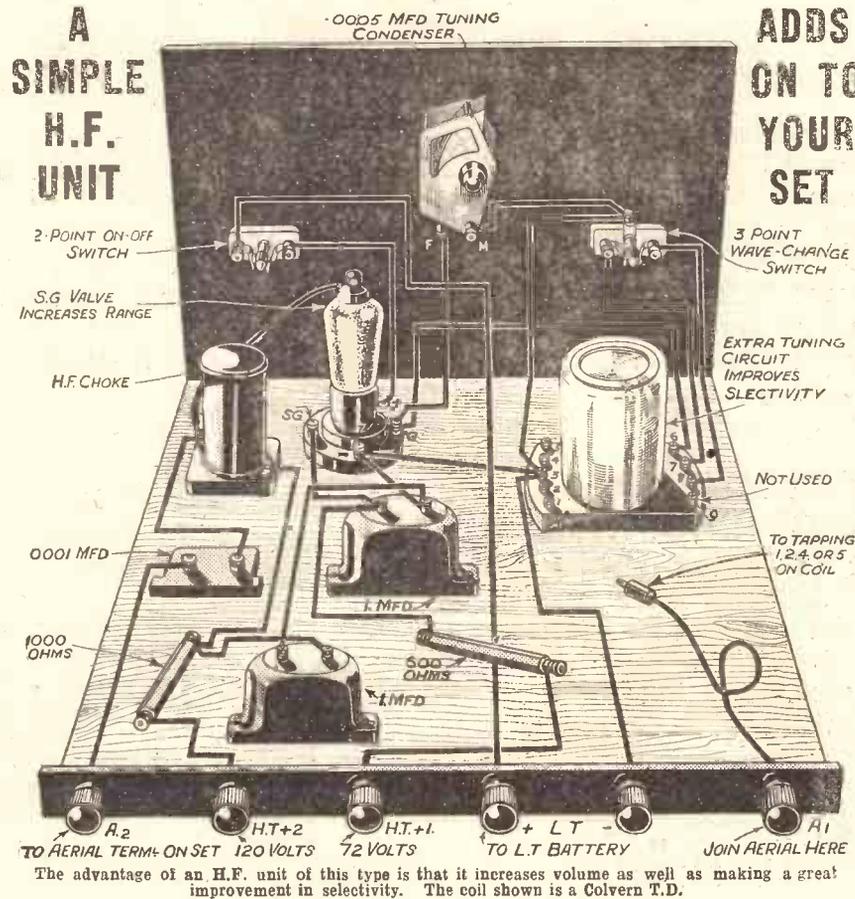
Incidentally, it is advisable to use a good make of H.F. choke, otherwise you will find that the amplifying properties of the S.G. valve will suffer considerably.

Coil Position.

Separate S.G. units are, of course, not suitable for receivers which already incorporate an S.G. stage, but they do enable the owners of sets of the det. and L.F. type to achieve vastly improved results without having to rebuild their receivers.

Referring once more to the pictorial diagram, you will probably notice that the T.D. coil unit is not positioned in a way that ensures the shortest possible wiring, particularly to the grid terminal of the S.G. valve holder and to the wave-change switch.

There is a reason for this; had the coil been turned so as to bring the terminal and sockets 1, 2, 3, 4 and 5 directly opposite the baseboard terminal strip, the remaining connections could not have been clearly shown in the drawing. Of course, in constructing the unit, the coil should be placed so as to keep the wiring conveniently short.



the position of a plug attached to a flexible connection.

The pictorial details of an efficient S.G. unit are shown on this page. Although the diagram is really self-explanatory, there are one or two points which are worth bearing in mind.

You will notice that I have inserted a resistance of 1,000 ohms in the H.T.+2 lead to the H.F. choke and anode of the S.G. valve, and a second resistance of 600 ohms in the H.T.+1 lead to the screening-grid terminal on the valve holder.

Stopping Instability.

These are for decoupling purposes, any H.F. currents which might flow along the H.T. wiring and so cause instability thus being stopped by the resistances and by-passed to the negative filament connection, and thence to earth via the two 1-mfd. non-inductive condensers.

To connect the unit up to the set, join L.T.+ and - to the L.T. terminals on the set or direct to the L.T. battery. Remove the aerial lead from the aerial terminal on

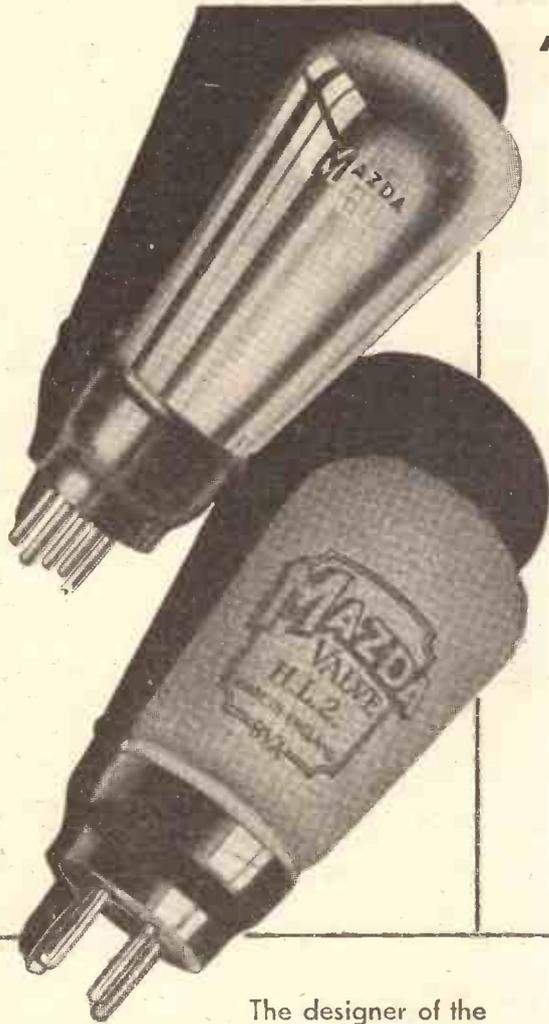


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For full report on Quiescent Push-Pull see article by E. YEOMAN ROBINSON, CHIEF ENGINEER, THE MAZDA VALVE LABORATORIES, in "Wireless World" for January 6th, 1933.

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Street. P 13

IT is now taken as a matter of course that automatic or "free" grid bias should be provided in any D.C. or A.C. all-mains receiver, but it is possibly not generally realised that the same principles may be applied to battery-operated sets. The following outline of the provision of automatic bias in battery receivers may therefore prove of interest.

By Ohm's law we know that if a current is passed through a resistance a voltage will be developed across the ends of the resistance, this voltage being commonly referred to as the "voltage drop in the resistance." The actual voltage developed depends upon the values of the resistance and the current flowing, and may be calculated by multiplying the value of the resistance in ohms by the current flowing in amperes.

Biassing a Four-valver.

A very simple and useful rule to remember is that a resistance of 1,000 ohms will cause a drop of one volt for each milliampere flowing, and from this we could determine for example that if 8 milliamps were flowing through a 1,000-ohms resistance a drop of 8 volts would occur.

Fig. 1. shows the basic circuit of a four-valve receiver of a very usual type, all

AUTOMATIC GRID BIAS FOR BATTERY SETS

Batteries for supplying G.B. are seldom found these days in mains receivers—and automatic bias is not often used in battery sets; but it can be, and is fully dealt with on this page.

volts and 20 volts negative grid bias are applied. We will also assume that the total anode current of the S.G. detector and first L.F. valves is 5 milliamperes, and we shall then know that with a total H.T. current of 20 milliamps flowing through the resistance AB we require a voltage of 20 to be "dropped." Now, taking our simple rule—(1 milliamp flowing through a resistance of 1,000 ohms causes a drop of 1 volt), we see that if 20 milliamps are flowing through 1,000 ohms the voltage drop will be 20. Therefore in this case the resistance AB will be 1,000 ohms.

As the resistance AB is passing the anode current of all the valves we must decouple the grid circuit, and this is effected by inserting R1, which is a 100,000 or 200,000-ohms grid leak type resistance and C2,

ohms, making our required total AB 1,000 ohms. The point C may therefore be connected to the grid circuit of the first L.F. valve, a decoupling resistance R2 and condenser C2 of similar values to R1 and C1 being inserted.

Variable-mu Arrangement.

It will be seen from this that automatic bias can be simply arranged for any receiver providing that if different types of valves are substituted for the originals some slight alteration of the dropping resistance is effected if necessary.

It should be noted that when automatic bias is used anode circuit decoupling for the detector and first L.F. valve should be incorporated, but this refinement is now used in almost every receiver. Referring to the grid circuit decoupling condensers C1 and C2, it may be mentioned that the small low voltage electrolytic condensers which have a capacity

HOW TO CONNECT RESISTANCES FOR FREE G.B.

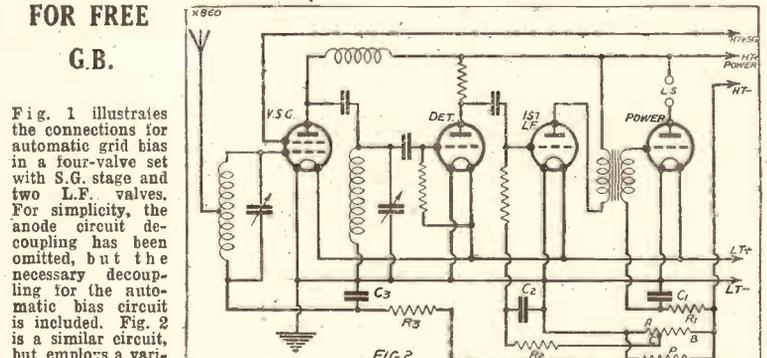
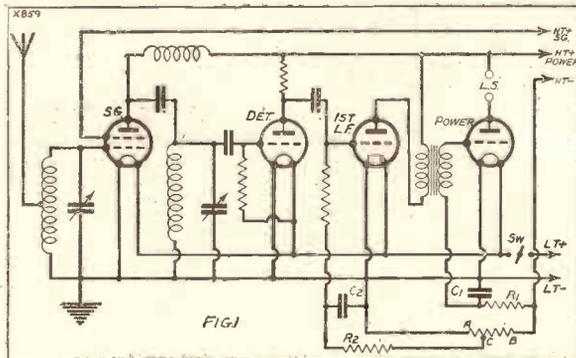


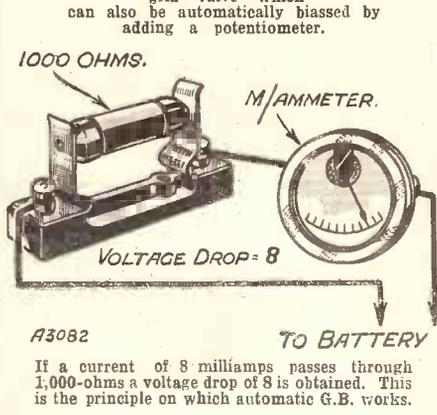
Fig. 1 illustrates the connections for automatic grid bias in a four-valve set with S.G. stage and two L.F. valves. For simplicity, the anode circuit decoupling has been omitted, but the necessary decoupling for the automatic bias circuit is included. Fig. 2 is a similar circuit, but employs a variable-mu screened-grid valve which can also be automatically biased by adding a potentiometer.

anode decoupling, H.F. filters, wave-change switching and other irrelevant details being omitted. Now the term "negative grid bias" means that the grid circuit of a valve is connected to some point negative in relation to the valve filament, the actual potential or bias voltage depending upon the characteristics of the valve, the H.T. voltage and the particular use to which the valve is put. It should be noted that no actual current is taken from the grid bias source and therefore it is possible to connect a high resistance in series with the grid circuit without altering the bias voltage applied to the grid.

Applying Decoupling.

If we consider Fig. 1 we see that a voltage will be developed across the resistance AB the actual voltage depending upon the total H.T. current taken by the receiver and also the value of the resistance, and if we connect the grid circuit of the power valve to B, the valve will be biased by the voltage dropped in the resistance.

Let us suppose that our receiver shown in Fig. 1 will be used with an H.T. battery of 150 volts connected to H.T.+power and H.T.-, and that our power valve passes 15 milliamperes anode current if 130 anode



which is a fixed condenser of not less than one or two microfarads capacity.

Providing for the L.F. Valve

Now we have arranged our grid bias voltage correctly for the output valve, but no provision has been made for the first L.F. valve. However, we have 20 volts available across AB, and the L.F. valve should require a lower bias than the power

of about 50 microfarads and are no longer than a .01-mfd. mica condenser are very suitable for this purpose, as if a capacity of, say, 1 microfarad is used a slight drop of amplification of the low frequencies may occur.

In any case, the electrolytic condensers are very cheap and small and well worth consideration. If the screen grid valve is of the variable-mu type a high grid bias is required, and this may easily be arranged in a receiver with automatic bias. In Fig. 2 we find the same circuit as Fig. 1, but providing variable bias for the H.F. valve by means of the potentiometer P.

When the slider of the potentiometer is turned to the point nearest B the full bias voltage of the power valve will be applied to the variable-mu grid. As the potentiometer P is in parallel with AB the potentiometer resistance must be high in comparison to the AB resistance, as otherwise the total bias voltage will be reduced.

A 50,000-ohms potentiometer would be suitable for use if the bias resistance be not much less than 1,000 ohms.

(Continued on page 1087.)

A FEW BARGAINS STILL LEFT

From our Advert Page 987 P.W. 14/11/33

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The AIRSPRITE A.C. Mains Version

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1 Coil Switch Coupling Assembly. Telsen W. 217	0	0	6
2 Polar type S.M. 2 .0005-mfd. Variable condensers	0	13	0
1 Polar .0003-mfd. Slow motion Differential Reaction condenser	0	6	6
1 Sovereign .0003-mfd. Pre-set condenser	0	1	3
1 Dubilier type B.S. 4-mfd. Fixed condenser	0	5	0
1 T.C.C. type 80 4-mfd. Fixed condenser	0	8	6
2 T.C.C. type 50 2-mfd. Fixed condenser	0	7	8
2 Dubilier type 9200 2-mfd. Fixed condensers	0	7	6
3 T.C.C. type 50 1-mfd. Fixed condenser	0	8	6
1 T.C.C. type 34 .01-mfd. Fixed condenser	0	3	0
1 T.C.C. type "S" .0001-mfd. Fixed condenser	0	1	3
1 Lewcos 10,000 ohm. wire wound Potentiometer	0	3	0
1 Colvern 50,000 ohm. Strip resistor	0	2	3
1 Colvern 25,000 ohm. Strip resistor	0	1	9
1 Colvern 20,000 ohm. Strip resistor	0	1	9
1 Erie 10,000 ohm. wire end resistance	0	1	0
1 Erie 1,000 ohm. wire end resistance	0	1	0
1 Erie 350 ohm. wire end resistance	0	1	0
1 Erie 200 ohm. wire end resistance	0	1	0
1 Erie 1-meg wire end Grid Leak	0	1	0
1 R.I.E.Y. 30 Mains transformer	1	10	0
1 Smoothing Choke R.I. 28/14 henry	1	1	0
1 R.I. Hypercore Output Choke	0	17	6
1 Varley Tone Compensating Transformer D.P. 35	0	11	6
1 Ready Radio S.G. H.F. Choke	0	5	6
3 5-pin valve holders	0	2	0
1 S.G. valve holder	0	1	0
1 Ready Radio 5-pin	0	1	0
1 Ready Radio Push Pull Switch	0	2	9
1 Bulgin Mains Switch S.85	0	0	10
1 Permol Coil 16" x 7" drilled to specification	0	1	6
2 Baseboards 16" x 12" and 16" x 5 1/2"	0	4	6
2 Terminal Strips 5 1/2" x 1 1/2" and 3" x 1 1/2"	0	2	0
1 Bulgin F.15 Mains fuse and plug	0	1	0
1 Goltone combined plug adaptor, flex, mains lead and plugs	0	3	6
1 Bulgin Thermal delay switch S100	0	3	0
6 Belling Lee type "R" Indicating terminals	0	7	6
2 Panel Brackets	0	1	3
1 Belling Lee Anode Connector No.1030	0	0	6
1 Set switch Bracket coupling link and spindle and brush	0	0	4
6 Yards Systoflex, connecting wire, flex, screws etc.	0	1	6
4 Valves, Mullard MM4V, 354V, DW2, Cossor	0	1	5
1 Cabinet "159" type in walnut	3	0	0
	£14	18	6

The AIRSPRITE Battery Model

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1 Pair. Telsen matched twin screened coil type W. 287.	0	17	0
1 Telsen coil switch assembly type W. 217.	0	0	6
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1 Polar .0003-mfd. Slow Motion Differential Condenser.	0	6	6
1 Ready Radio 50,000 ohm Potentiometer	0	3	9
1 Ready Radio 3-pt. on-off switch	0	1	6
1 Sovereign .0003-mfd. max pre-set condenser	0	1	3
2 4-pin valve holders	0	1	0
1 S.G. Valve holder	0	1	0
1 T.C.C. .1-mfd condenser	0	1	0
1 Ready Radio S.G. H.F. Choke	0	5	6
1 Ready Radio Reaction choke	0	1	6
1 Varley Rectatone L.F. Transformer type D.P. 35	0	11	6
1 T.C.C. .01-mfd. Condenser	0	2	6
1 Graham Farish 1,000 ohm resistance and holder	0	2	0
1 Dubilier 100,000 ohm resistance with wire ends	0	1	0
1 T.C.C. .0005-mfd. condenser	0	1	3
1 T.C.C. .0003-mfd. condenser type M	0	1	0
1 Fuse and holder	0	1	0
12 Belling Lee indicating terminals	0	2	6
1 Panel 16" x 7" drilled to specification	0	4	6
1 Baseboard 16" x 10"	0	1	6
1 Dubilier .1-mfd. condenser type 9200	0	2	0
1 Ready Radio 12-meg. grid leak and holder	0	1	4
8 Belling Lee battery plugs	0	1	4
2 Spade terminals	0	0	4
1 Terminal strip 16" x 1 1/2" drilled to specification	0	1	5
1 Belling Lee Anode Connector	0	0	4
Flex, screws, etc.	0	1	0
3 Mullard Valves: PM12V, PM1HL, PM2A	1	12	3
1 Cabinet "159" type in walnut	1	1	0
Total	£7	5	0

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Epoch A. 2	3	3	0
Celestion Rectone, Dual Matched Pm. M.C. Speaker.	6	10	0
(or 12 monthly payments of 12/-)			
Collaro A.C. Induction Gramo Motor	2	10	0
Henley "Solon" Electric Soldering Iron	0	7	6
"159" Radiogram Cabinet	3	10	0

AIRSPRITE BATTERY ACCESSORIES

	£	s.	d.
Siemens 120 volt H.T. Battery	0	13	6
Siemens 9 volt G.B. Battery	0	1	0
Block Type L.T. Accumula or 2 volt 80 amp/hrs	0	11	6
Oldham 120 Volt We H.T. Accumulator 5500 m.a./hr. Capacity	4	1	0
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Atlas A.C. 24 H.T. Mains Unit	2	19	6
Atlas "K. 260 H.T. Mains Unit with L.T. Trickle Charger	4	10	0
(or 12 months payments of 8/3)			
Atlas D.C./15/25 H.T. Mains Unit for DC Mains	1	19	6
Celestion Soundex Permanent Magnet Moving Coil Speaker with Input Transformer	1	7	6
WB. PM 4 Speaker	2	2	0
Bowyer Love A.E.D. Pickup	1	10	0
Collaro Double Spring Gramo. Motor with Automatic stop	1	13	0
Cop Aerial Lead in & Lightning Arrestor	0	2	6
Selectanet Indoor Aerial	0	2	6
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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

Technical Queries Editor:

A. JOHNSON-RANDALL

QUESTIONS AND ANSWERS

THE LONG LEAD IN.

F. L. (Clerkenwell, E.C.).—"I bought one of your 'Apex' designs from a friend at Chadwell Heath. At his house it was able to bring in any amount of foreign and British programmes, on a 25-ft. high aerial. The valves, batteries and all were packed up, but I find here in Clerkenwell the outfit will get foreigners only with great difficulty.

"Tuning is very difficult on these foreign stations, and volume is much less than before. My aerial here is about the same height as his was, but only 20 ft. long and more shut in by factory buildings.

"Also it is at the back of the house, so it has an 18-ft. run along a passage before getting to the room where the set is. Does this make much difference?

"I should be thankful for some hints as to getting better results, because I have been to

a good deal of trouble to get it all fixed, and I am sure the set itself is capable of doing all I want from what I heard it do before. So can you put me on to what is wrong?"

DO YOU KNOW—

The Answers to the following Questions?

There is no "catch" in them, they are just interesting points that crop up in discussions on radio topics. If you like to try to answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

- (1) Which foreign station broadcasts Sunday evening organ recitals from an "electric" or "ether-organ," based on oscillating valve circuits?
- (2) Which two B.B.C. stations have wavelengths only three metres apart?
- (3) Apart from the apparatus used, is there any advantage in the voltage of an "automatic grid-bias" arrangement as compared with grid-bias battery voltage?

If the set is undamaged and the batteries, etc., are O.K. you will find that the aerial and earth are causing all the trouble. But are you sure of the H.T. battery, for instance? It would have been very easy to damage it during transit, so we suggest you try to check up voltages as a preliminary step.

(This can be done by a voltmeter, or by substituting for a moment a new battery for the one under test, to see if this cures the trouble.)

Should you find that apparently all is well with the outfit, you can regard the difference in the aerial-earth system as the sole cause of the trouble, and it should be possible to make big improvements in reception by what may seem to you to be small differences in its arrangement.

The "screened" outdoor aerial with long lead-in does not sound at all promising. Are there any joints in the wire? Is it kept well away—say at least 24 inches—from the walls, except where it enters the house?

If it runs too near a metal pipe it will seem very "dead," so watch out for this possibility. And how long is the earth lead? That must be kept as short and direct as possible. It can be clipped on to a water main unless a good buried earth is available closer at hand, so don't tolerate a long earth lead, or poor earth joint.

With an ordinarily good earth an indoor aerial should give better results than you appear to be getting, so perhaps you are sacrificing strength by trying to use an outdoor aerial.

Try the effect of different shaped and sized indoor aerials, with 4 lb. of No. 26 D.C.C. or D.S.C. wire. Just bare one end of the wire and fix it to the aerial terminal and then run it as a continuous lead up to the top of the room, and zig-zagged under the ceiling, or perhaps out into that 18-ft. passage—anywhere that looks promising should be tried, the object being to keep the aerial as near the set as possible and yet get a good "spread" for the wire or wires, where they will be out of the way and not too near to metal surfaces like galvanised tanks, roofs, etc.

You should be able to find an arrangement that gives much better reception than is now being experienced.

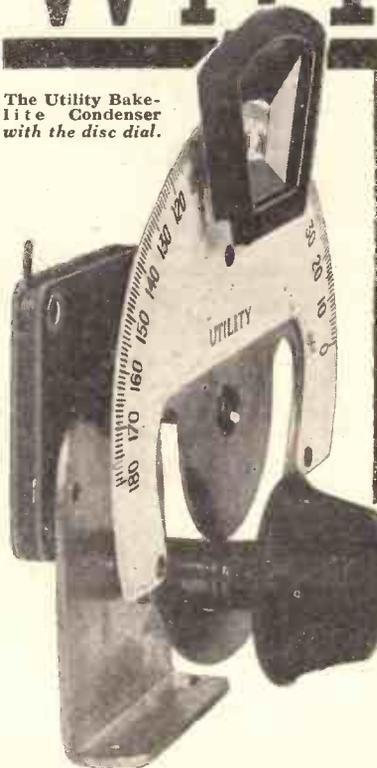
FITTING A CHOKE OUTPUT FOR THE LOUDSPEAKER WIRING.

R. M. (Abingdon, Berks.).—"Is it just as satisfactory to wire a choke-output for the outside of the set, as to use one really inside the set's cabinet?"

(Continued on page 1082.)

WHY TROUBLE?

The Utility Bakelite Condenser with the disc dial.



You may think "Why should I trouble to buy a Utility bakelite condenser when I can get a dozen others all the same." But there is as much difference between a good and bad bakelite condenser as between chalk and cheese. We believe that a bakelite condenser justifies care in design and in construction, that it should be accurately rated, that H.F. losses should be kept as low as possible. We may be wrong but a check is easily applied; substitute a Utility for the bakelite condenser you are using for reaction control. We feel sure that you will prove that we are right.

Coupled with the famous Utility disc dial the condenser costs 4/6 in the following sizes:—0002, 0003, 0005. The condenser can be purchased separately for 2/-.

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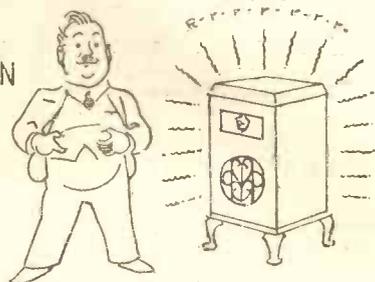
All Ironmongers sell Fluxite in tins: 4d., 8d., 1s. 4d. and 2s. 8d. Ask to see the **FLUXITE POCKET SOLDERING SET**—complete with full instructions—7s. 6d. Ask also for our leaflet on **HARDENING STEEL** with Fluxite.

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FOR ALL REPAIRS!



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 (He has almost learnt to ignore the mains hum in the background)



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BROWN ENJOYS DECENT REPRODUCTION FROM DRY BATTERIES BUT IS APPALLED BY THE EVER-RECURRING EXPENSE OF REPLACEMENT



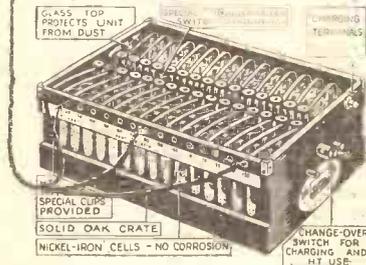
ROBINSON HAS SOLVED THE PROBLEM IN THE RIGHT WAY—HE HAS INSTALLED A



Robinson has H.T. current as smooth and silent as Brown's, as unflinching as Smith's and he has neither the bother nor the expense of recharging. His Milnes H.T. Unit recharges automatically from the L.T. accumulator.

MILNES H.T. SUPPLY UNIT

There are many more unique features about the Milnes H.T. Unit. Send the coupon to-day for descriptive folder.



PRICES IN U.K.
 90 volt - £2 18 0
 120 volt - £3 16 0
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 Electrolyte Extra.

MILNES RADIO CO. VICTORIA WORKS BINGLEY YORKS

Please send me full particulars of the Milnes H.T. Supply Unit

Name

Address

Keir, Dawson—Bradford

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Whole Page £40 Quarter Page £10
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Narrow Column Advts. (3 cols. to page) per inch 30/-
 Minimum Space accepted - - - half inch 15/-

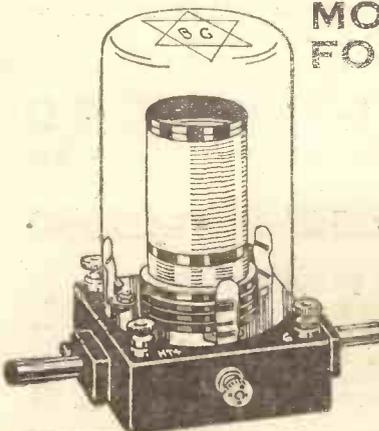
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MORE POWER FOR YOUR SET



Convert the ordinary receiver into a strikingly effective modern set by incorporating these new British General Dual Wave Coils. Enormous improvement in both power and selectivity. Wiring diagrams free. Aerial & Anode models (suitable for ganging) 9/6

FROM ALL DEALERS OR DIRECT

BRITISH GENERAL MANUFACTURING CO., LTD. BROCKLEY WORKS, LONDON .. S.E.4

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1080.)

"I have got a 30-henry choke and 4-mfd. condenser, both on the 'big and hefty' side, so if it is just as good I thought I would put these inside the large loudspeaker cabinet, which is upstairs, instead of downstairs where the set is.

"They can be placed out of sight in the big cabinet, but if downstairs would need a special box, as the set's cabinet is not big enough. Please say if there is any objection from the electric point of view?"

One main object of the filter circuit is to keep H.T. current out of the long extension leads to loudspeakers. So if you fit the filter upstairs it cannot possibly do what is intended, namely keep H.T. current out of the extension leads, because the current must all go upstairs before the filter gets into action.

No. For a satisfactory arrangement you must have short battery leads to the set, and the filter arrangement must be inside the set itself, or else quite close to it and to the battery.

THE ANSWERS

TO THE QUESTIONS GIVEN ON PAGE 1080 ARE GIVEN BELOW.

- (1) Poste Parisien, on 828.2 metres. Generally between 10 and 11 p.m.
- (2) Aberdeen and Newcastle. The former works on 214.3 metres and the latter on 211.3 metres.
- (3) Yes. "Automatic" grid bias (derived from a resistance in the plate circuit) has the unique advantage of being self-regulating; so if H.T. is increased extra grid bias is automatically applied to the valve.

DID YOU KNOW THEM ALL?

Then there is a short and presumably free-from-leakage route from battery to valve, while the long leads upstairs, being "filtered," are relatively unimportant so far as the risk of leakage goes.

USING AN OLD CRYSTAL SET TO GET EXTRA SELECTIVITY.

C. S. (St. Albans, Herts).—"My detector and two low-frequency set is definitely out of date from a selectivity point of view, but as it happens to be all I can afford at the moment, I want to make the best of it *without incurring extra expense.*

"I was very interested in the details given in 'P.W.' for adding a tuned circuit in front of an old-fashioned set to give sharp separation. I should not mind the extra control involved if I could get the additional sharpness of tuning, so I am going to try if you can help me to use my old crystal set, coils and condenser for the purpose.

"This crystal set is in good working condition (it was my first set, and is kept as a stand-by) and uses plug-in coils and a .0005-mfd.

"What would be the connections to use it as an extra selectivity stage?"

It should be a very easy matter to use the crystal set in the manner suggested provided there is nothing freakish about its connections.

Normally, the following alterations would suffice: Take the aerial to the crystal set's A terminal, and join its "E" terminal to the set's E terminal. Then connect a short length of flex across the crystal detector terminals to cut it out of circuit. (Crocodile clips on the end of the flex make an easy method.)

All that remains to do then is to join that telephone terminal on the crystal set which is not at present connected internally to the earth terminal to your set's A terminal, through a very small condenser.

A "neutralising" type condenser is none too small, so if you have no condenser small enough make one for the job by using a three-inch or so length of twisted flex. (If you bare two adjacent ends they act as "condenser" terminals, because of the self-capacity of the twisted leads.)

You can reduce the capacity of such a very small "condenser" by untwisting the flex, or by cutting off a little: and with such an arrangement connected between the set's A terminal and the correct "T"

terminal on the crystal set you should be able to get ample extra selectivity.

SIMPLIFYING THE SWITCHING.

Letters show that a great many readers who have tried their hands at simplifying switching appear to be disappointed that the

IS YOUR SET BEHAVING ITSELF?

Perhaps your switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception? Or one of the batteries seems to run down much faster than formerly?

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers its unrivalled service.

Full details, including scales of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this an Application Form will be sent to you post free immediately. This application will place you under no obligation whatever, but, having the form, you will know exactly what information we require to have before us in order to solve your problems.

LONDON READERS, PLEASE NOTE: Inquiries should NOT be made by 'phone or in person at Fleetway House or Tallis House.

concentrating of different controls on the set so as to work from only one knob should so often prove unsuccessful.

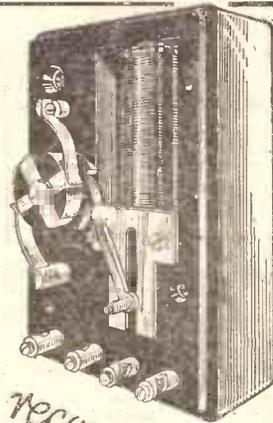
To save further disappointment we should like to stress the fact that such simplification is not chiefly a mechanical matter, as so often seems to be thought.

From the purely mechanical point of view it is often quite easy to make a 3-point switch do the work of two 2-point switches, or to

(Continued on page 1084.)

WATES DISTANCE SWITCH

"can be thoroughly recommended" SAYS H. J. BARTON CHAPPEL



Costs only 9/6. Send P.C. for details of this new trouble-free instrument that gives radio all over the house, fully controlled at every point. Thousands already sold.

STOCKTAKING RECEIVER BARGAINS

A small collection of Wates receivers, battery and all mains to clear.

CALL AND SEE THEM

SET SWITCHED ON OR OFF FROM ANY ROOM

WATES RADIO LTD.

184-188, SHAFTESBURY AVENUE, LONDON, W.C.2

PREH POTENTIOMETERS MEET EVERY KNOWN NEED

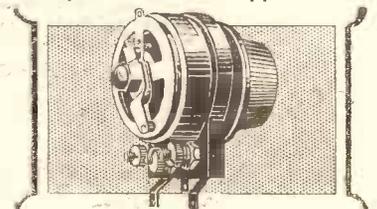
The new range of variable resistances have been designed to meet the demand for a 'component' with a particularly silent and smooth movement.

The curve of the potentiometer is arranged "straight line," which gives a straight line ratio between angular movement and resistance variation.

The resistances can be supplied with "straight line" or logarithmic curves, according to requirements.

In resistances of a value more than 50,000 ohms, the guaranteed tolerances are -15 per cent. and + 30 per cent. of the rated values. In the case of low value resistances the corresponding guaranteed tolerances are + or - 10 per cent. These components are also supplied with a combined switch, making an extremely neat and robust unit. The switch has a quick make and break movement, and will handle 1.2 amperes at 250 volts without arcing.

Prices for your special requirements on application.



Preh

POTENTIOMETERS AND RHEOSTATS

PREH MANUFACTURING CO., LTD., Broadwater Road, WELWYN GARDEN CITY,

Manufacturers and Wholesalers only supplied.

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**THE BATTERY THAT
POWERS THE SET
CONTROLS THE TONE**

EVER READY
Regd. Trade Mark.

WIRELESS BATTERIES **FOR LONG LIFE & PURE TONE**

LOOK FOR THE EVER READY TRADE MARK

THE EVER READY CO. (GREAT BRITAIN) LTD., HERCULES PLACE, HOLLOWAY, LONDON, N.7.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1082.)

concentrate "on-off" and the long-wave switching of several tuned circuits on to a multi-contact-switch. The single control will then do the necessary circuit alterations normally entrusted to different switches, but all too frequently the quality or selectivity of the set is impaired.

The reason for this is electrical, not mechanical, and can generally be expressed in the two words "long leads." However carefully the multi-control switch is placed it will generally be found that several long or longish wires will be needed to effect the necessary connections to spaced tuning coil units, etc., and straggling leads or insufficiently-spaced wiring will result in feed-back which would not have occurred if separate switches had been employed for the different circuits.

WOULD IT BE BETTER TO PARALLEL-FEED ?

S. R. D. (Carshalton, Surrey).—"One of the most interesting things to me is the method of parallel feed for a low-frequency transformer, mentioned in an article by Mr. Johnson-Randall, some time ago. This method of connecting up is perfectly clear from what he describes, but I should like to know what you think of the following point.

"As I understand it, the idea of diverting the detector plate current away from the primary of the low-frequency transformer is to improve response to music, etc., and the special advantages of the scheme are as applied to the recently introduced nickel-iron type of instrument.

"But would they apply also to older types of non-nickel L.F. transformer? If so, I should

like to alter two sets (still giving quite satisfactory service, although made by me for friends several years ago) in which such transformers were used.

They are very similar to each other, with connections as described in "P.W.," so if you think improvement would result, it would be an easy job to convert them to the parallel-feed system of L.F.

Unless they were good quality instruments, of the "heavy-weight" type, and capable of good response, parallel-feeding would probably improve them quite noticeably.

It would be worth trying, for generally there is a distinct gain in fidelity when old-type L.F. transformers are relieved of plate-current through the primary. And in any case the change-over is easy, and cannot do any harm.

FOR CURING INSTABILITY.

T. R. (Port Talbot).—"I put up the 'Apex,' using mostly spare parts I had by, but it seems too lively (unstable), especially reaction, and I want to ask if I ought to rebuild with correct parts or if there is anything I can do instead?"

You do not give us much information to go on, T. R., but before going to the expense of rebuilding with the recommended parts, you might try one or more of the following modifications.

Try connecting one terminal of a non-inductive fixed condenser of 5 or 1-mfd. capacity to the S.G. terminal (anode terminal of valve holder) of V1, the remaining condenser terminal then being connected to the filament terminal of the valve holder, which is also wired to the 2-mfd. fixed condenser. A 600 or 1,000-ohms resistance should be inserted in series

PHOTOGRAPHS FROM READERS

The Editor is always glad to receive from readers topical photographs with a radio interest, suitable for publication in "P.W."

10s. 6d. will be paid for each photograph accepted for publication.

with the H.T. +1 lead, and a similar resistance in series with the lead connecting the 1-mfd. fixed condenser (which is between the two Colvern coils) to the 30,000-ohms resistance.

Secondly, if your 2-point wave-change switch is of the type in which the spindle is not connected to either of the two contacts connected to 7 and 3 of the anode coil, when the switch knob is pushed in, a flex lead should be fixed to the spindle, the other end of this flex lead being connected to 8 on the anode coil. The flex lead from the anode (top terminal) of the S.G. valve should be disconnected from the .0003-grid condenser and connected instead to either 1, 2, 4 or 5 on the anode coil, the tapping being selected by trial.

If you are using a mains H.T. unit, it should be noted that a suitable S.G. tapping for H.T. +1 may not be provided, or the voltage given by the S.G. tap may be too high for your valve. In this case two 20,000- or 25,000-ohms resistances should be inserted as follows:

Connect one end of one resistance to H.T. +2, the other end of this resistance, and also one terminal of the other resistance, should be connected to the H.T. +1 lead, the remaining resistance end being connected to earth.

(Continued on next page)

"P.W." PANELS, No. 108.—GENEVA.

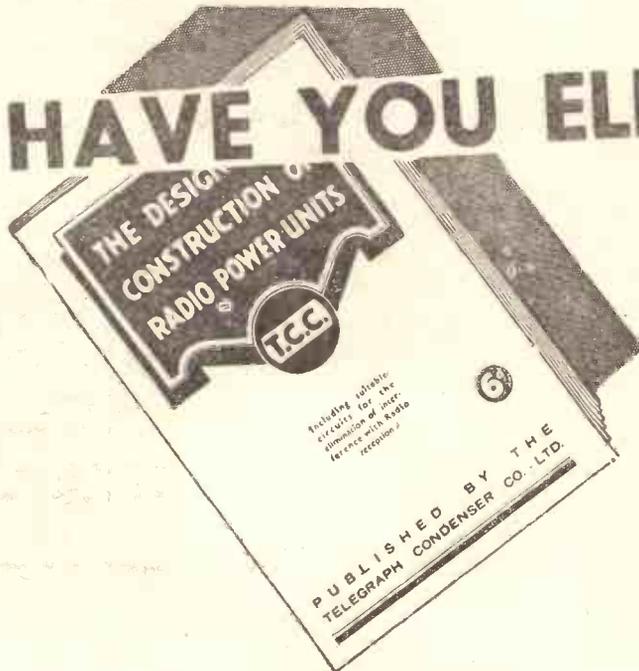
The Geneva station works on the somewhat "inaccessible" wavelength of 760 metres, announcing in French.

Its programmes are generally best heard from Radio-Suisse Romande (Sottens) on 403 metres, so it is seldom listened for direct.

The distance of Geneva from London is 468 miles. Power, 1.5 kilowatts.

HAVE YOU ELECTRIC LIGHT?

-then why not run your set - any set - from it?



This T.C.C. Booklet shows you how to run your set off the electric light mains — how you can be sure of constant power. It tells you how to build four different types of power units for use on A.C., and a whole chapter is devoted to D.C. apparatus. Details of Electrolytic Condensers, Elimination of Interference and a Rotary Resistance Calculator are also included. Send for your copy now!

Ask your Dealer

If you have any difficulty in obtaining a copy of this book, fill in the coupon and post to us with six penny stamps. We will send you a copy by return.

T.C.C.

ALL-BRITISH
CONDENSERS

CONTENTS

- RADIO POWER UNITS — and how to build them
- NOTES ON A.C. POWER UNITS
- OPERATING RECEIVERS ON D.C. MAINS
- ELIMINATION OF INTERFERENCE
- ABOUT T.C.C. ELECTROLYTIC CONDENSERS
- FOUR T.C.C. POWER UNITS (A.C.) with full constructional Details
- ROTATING RESISTANCE CALCULATOR

COUPON

To Publicity Dept., The Telegraph Condenser Co., Ltd., Wales Farm Road, N. Acton, London, W.3.

Please send me a copy of your book "The Design and Construction of Radio Power Units" for which I enclose six penny stamps to cover cost and postage.

NAME.....

ADDRESS.....

P.W. 28/1/33

USE PEAK (All British) CONDENSERS FOR YOUR MAINS SETS

Recommended and used
by leading designers.

TESTED 1500v. D.C.
WORKING VOLTAGE 500v. D.C.

1 mfd. with terminals	2/2	each
25 "	2/4	"
5 "	2/6	"
1 "	2/8	"
2 "	3/9	"
4 "	6/9	"

Write for List No. P.W.1.

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21 & 23, Bride Lane, Ludgate Circus,
LONDON, E.C.4. Telephone: Central 6994

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W. ANDREW BRYCE & CO., Tile St., Bury, LANCs.



GET A GENEROMETER BATTERY SUPERSADER.—No H.T. Batteries needed for your set even if you are not on the mains. An H.T. Battery run down to 30 volts is useless and has to be thrown away. Yet you pay for the wasted volts. The **GENEROMETER** makes H.T. from your L.T. 2-volt battery, rectified and smoothed. Gives 5 tappings and lasts indefinitely. A boon and blessing to all using H.T. Reduced from £3 15s. New and Guaranteed. **37/6** from us only.

PARCELS.—For the Experimental Amateur who wants a useful junk-box of components, our famous Bargain Parcels of Electrical and Radio Sundries from dismantled W.D. sets, surplus stocks, etc., with Switches, Wire, Chokes, Condensers, and Coils, and a host of useful parts, post free. 10lb., 7/-; 7lb., 5/-.
ELECTRADIX RADIOS
218, UPPER THAMES ST., LONDON, E.C.4

SAFE-POWER A.C. UNIT
KIT "C" Complete parts as listed 65/-
KIT "B" Guaranteed alternative parts 45/-
KIT "A" as "B" but giving 120 volts. 15 m/a 35/-
P.W. A.C. CHARGER.
KIT "F" Complete parts as listed 35/-
KIT "E" as above, but giving 1/2 amp. without Ammeter, 7/6 less. 30/-
ALL PARTS SUPPLIED SEPARATELY.
FROST RADIO CO., 21, Red Lion St., London, E.C.1

WE invite readers to support our Advertisers—care being taken to accept only announcements of reputable firms!

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

H.T. + 1 lead is not then connected to the H.T. unit, as the two resistances provide a suitable S.G. voltage.

USING TWO AERIALS.

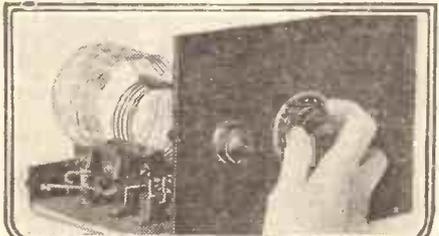
B. T. P. (Ripley).—"Whilst waiting at a doctor's house I noticed the excellent quality of reception he was getting from his wireless, and when I could do so unobtrusively, I inspected this with much interest.

"I was greatly puzzled by the following arrangement. The 'aerial' wire of the set was capable of being switched at the lead-in end to (a) an outdoor aerial, which I know to be an unusually well-erected one; and (b) a small indoor aerial wire

"What I could not make out was why, if a good outdoor aerial is available, there is any need to switch on to the indoor kind, which are supposed to be so inferior."

It is true that the outdoor aerial is usually considered superior, but a really powerful set does not depend upon using a big aerial except for very distant stations.

In fact, such a powerful set is often better worked from a small aerial, because there is still plenty of



DIAL SLIP

Nothing is so fatal to station identification as dial-slip, which allows readings to vary for the same condenser setting.

The grub-screw is often insufficiently tightened because an ordinary screwdriver is too big to turn it, but a filed bradawl will generally make a sound job of it.

Take particular care in the choice of a dial for a short-wave. The slightest looseness is serious on short waves.

power available, but less extraneous and "background" noises and less chance of H.F. overloading. Probably these reasons—quieter background and avoidance of overloading—were the cause of the arrangement which you noticed.

It has the additional advantage of permitting the outdoor aerial to be earthed most of the time, which is advantageous in thundery weather.

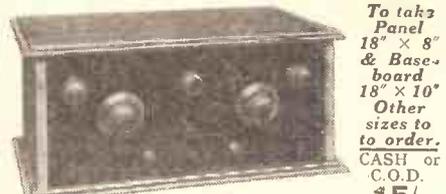
SCREENED GRID ADVANTAGES.

R. G. A. (Reading).—"When putting my 1932 'P.W.'s' away up in the attic I browsed back amongst the older numbers—what good old days! And one thing occurred to me which seemed strange enough to mention. It is this: "Before the S.G. valve came along we seldom had two H.F. stages. Generally we had no H.F., but when we did it was one stage, not two. But nowadays we have plenty of manufacturers putting out '2 H.F.' sets. Why is that, if the old sets were so inefficient by comparison? Surely we should have expected two H.F.'s in the inefficient days, and only one stage now? Especially as stations use more power."

Quite an interesting point, R. G. A. The explanation is that the old H.F.'s were so inefficient that it was difficult to make two work together properly. Nowadays it is comparatively easy, so where circumstances call for it, two stages can be used quite well. Even the best of the old-timers, the neutralised H.F.'s, had drawbacks unknown to the modern S.G.'s.

PETO-SCOTT CABINETS

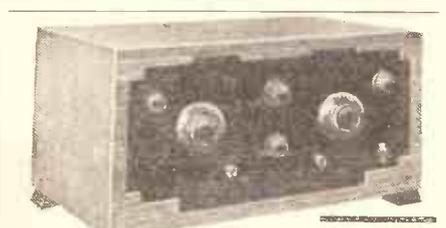
AMERICAN TYPE—OAK



To take Panel 18" x 8" & Base-board 18" x 10" Other sizes to order. CASH or C.O.D. 15/- Carr. Paid

Strongly constructed of solid oak, hand French-polished, with lift-up lid

OAK TABLE MODEL



Cash or C.O.D.

17/-

Carriage Paid.

Figured oak, hand French-polished Table Model Cabinet, designed especially to make an attractive housing for modern home-built sets. Dimensions: 9" high x 17" wide x 10" deep, to take panel 16" x 7". Baseboard 10" deep.

OAK CONSOLE TABLE MODEL



Specially designed and constructed of hand French-polished oak with attractive silk-covered vignette. Speaker compartment suitable for Moving-Coil or other types of speaker, and batteries or mains equipment.

CASH or C.O.D. Carriage Paid. 25/-

Dimensions: 20" high, 19" wide at base x 12" deep. To take panel 18" x 7", with baseboard 12" deep. Speaker compartment, 14" x 10" x 12" deep.

1933 INLAID WALNUT CONSOLE

BUILD YOUR SET INTO THIS BEAUTIFUL CABINET.
Constructed of Solid Walnut with contrasting inlaid Walnut veneer panels.

With vignette front and shelf, ready to take your own receiver. Ready drilled baffle board, 3/6 extra (if required). Dimensions: 5' 2" high x 21" wide x 15" deep. To take standard panels, 14" x 7", 16" x 8", 18" x 7", or uncut front. Speaker compartment, 19" high x 17" wide.

62/- Carriage and Packing 2/6 extra. Or 8/3 deposit and 11 monthly payments of 5/8.

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Dear Sirs,
Please send me by return CASH/C.O.D. H.P.

for which I enclose £ s. d.

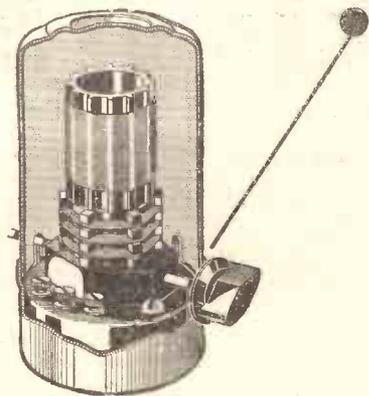
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Address.....

P.W. 28/1/33.....

West End Showrooms: 62 High Holborn, W.C.1.

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THE constructor who builds for efficiency reliability . . . and maximum performance always uses COLVERN COILS . . . they are his guarantee that his receiver will give maximum performance

COLVERN COILS approved by the designer for the "AIRSPRITE."
TYPE K.5 - - 9/6 each

All COLVERN "K" TYPE COILS are accurately matched and fitted with gold-silver switch contacts.

FIT COLVERN AND YOU FIT THE BEST

Send for the COLVERN CIRCUIT BOOKLET R.L.10.

COLVERN

MAWNEYS ROAD, ROMFORD, ESSEX

TRADE JOTTINGS

(Continued from page 1054.)

the finished record had been heard and personally approved by The King.

His Majesty has now given permission for the record—H.M.V. No. R.B.S. 4,359—to be placed on sale for the benefit of the British "Wireless for the Blind" Fund, and all the profits from the sales of this record will be devoted to this worthy cause.

Incidentally, apropos my reference to the "Wireless for the Blind" Fund, I am delighted to hear that, through the generosity of the listening public, further orders for sets have recently been placed with Messrs. Burne-Jones & Co., Ltd.

Some idea of the magnitude of the task will be gathered from the fact that Messrs. Burne-Jones & Co. have now manufactured approximately 20,000 sets, all of which have been fitted with tuning devices in Braille characters.

I sincerely hope that the means will be forthcoming for the good work to be continued.

New Lotus Service Depot.

A new Lotus Service Depot for London and the Home Counties has recently been opened at 24, Larch Road, London, S.W.12. Its service will extend south of a line drawn between King's Lynn and Gloucester, including those two towns.

I understand that the new depot will be fully equipped and adequately staffed efficiently and expeditiously to deal with any servicing that may be necessary to the famous Lotus range of receivers and components. Will interested readers in the areas concerned kindly make a note of the address?

Emergency Lighting for Ships.

A mishap which occurred to a new liner on her maiden voyage to New York recently afforded a striking demonstration of the desirability of all passenger ships being equipped with absolutely automatic power for emergency lighting.

In this particular instance, the bursting of a water circulating pipe resulted in the flooding of the electricity generating-room with the result that the ship was plunged into darkness. As considerable alarm amongst the passengers was reported, it is reasonable to assume that some time elapsed before the auxiliary generating plant, installed above the water-line, was brought into action.

Panic at sea is a source of real danger, and a complete "black out" such as the one reported above could have been avoided by the installation of an automatic emergency lighting plant of the type that comes into operation the moment the main supply fails.

Batteries are used for this purpose, and I believe I am right in saying that automatic emergency lighting plants are one of the specialities of the Chloride Electrical Storage Co., Ltd., the firm to whom we owe so much for the development of wireless accumulators.

MANCHESTER'S CHOICE



Mr. V. Z. de Ferranti accepting the "Evening Chronicle" Silver Cup from Miss Ann Penn. It was awarded to a Ferranti set by public ballot.

"Buttonhole" Microphones.

I was recently privileged to see what must surely be one of the smallest commercially made microphones in existence. It is known as the Marconiphone-Round "Transflux" microphone, and it is very little larger in diameter than a half-crown.

Despite its extremely small dimensions, this new production of the Marconiphone Co. is claimed to be particularly sensitive, and free from blast and glare.

An interesting aspect of this new innovation is that the "mike" is effective over a very wide angle, and it can be "worn" in the buttonhole of a speaker with completely satisfactory results. That, as I see it, is likely to be a very useful application, for it overcomes the difficulty of the speaker walking away from the microphone.

The new "Transflux" microphone takes between 20 and 30 milliamps at 4 volts, and the retail price is £5, or £6 10s. complete with 1/70 transformer.

A Unique Opportunity.

The increasing popularity of speakers of the moving-coil type prompts me to call attention to an

attractive offer that is the subject of one of our advertisement pages this week.

I have always thought that more people do not change over to moving-coil instruments simply because of the element of doubt which exists concerning the improvement that is likely to result. While it is only fair to admit that certain of the ordinary cone types run a very close second to some of the moving-coil instruments, in general there is a very marked distinction between the two.

For all those who may entertain doubts concerning the advisability of making a change-over, the announcement this week by Messrs. E. J. Heraud, Ltd., will be of particular interest, for it contains details of a unique offer whereby readers of "P.W." can obtain an excellent permanent-magnet moving-coil speaker on seven days trial.

All-Empire Coil.

To cope with a demand created by the innovation of the new Empire short-wave station at Daventry, Messrs. J. J. Eastick and Sons have introduced a new coil which covers the waveband embodying all the wavelengths that are to be used by the new station.

The new coil is designed for fitting into an eight-pin base, and it will retail at 5s. It is to be known as the "Empire" Coil.

THE LISTENER'S NOTEBOOK

(Continued from page 1061.)

been. There have been one or two very human touches of late introduced into their usually cold, impersonal announcements. This is all to the good, I think.

Sunday Plays.

It was a pleasing innovation to listen to a play on a Sunday evening. Although London University Dramatic Society's effort with "Juniper's First Sermon" wasn't particularly a brilliant one, it can be said that the faults were due to lack of microphone experience.

The idea of small plays by amateurs is very commendable, however, and if there was always an opportunity for amateurs to broadcast their productions, doubtless such difficulties as the London University players experienced would be quickly overcome, as more attention would be paid to enunciation during rehearsals.

THAT ACCUMULATOR DOPE

Some further details.

CONSIDERABLE interest has been evinced in our recent article on Accumulator Dopes, and a large number of readers have written asking that the formula of the one mentioned should be published.

It was found to be an ammonium tartrate solution and was constituted as follows: Half an ounce of tartaric acid and ten drops of ammonia in one pint of water.

Both these chemicals are, of course, in the "harmless" category and are inexpensive and easily obtainable, so it is neither dangerous nor costly to try the scheme.

The solution is used instead of distilled water to break down the acid, although if the acid solution is already prepared for accumulator use, the tartaric acid and ammonia can be added to it in approximately the above proportions.

Having "doped" the accumulator, it should be given a long, slow charge; say forty hours at 1 ampere for a 20 A.H. cell. Then the acid solution should be poured away and the cell washed out thoroughly with warm water.

It is then filled again with new "doped" acid and the above procedure repeated. In very bad cases a third treatment may be necessary.

The "dope" should still be used when the series of treatments is concluded.

G. V. D.

New Times Sales Co.
EST. 1924



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SAFEST FOR EASY TERMS

AUTOMATIC GRID BIAS FOR BATTERY SETS

(Continued from page 1078.)

It should be remembered that unless the grid bias for the power valve is equal to or greater than the maximum required for satisfactory control of the variable-mu valve it may be found that on a powerful local station the volume cannot be reduced sufficiently, but if this is the case either a subsidiary L.F. volume control may be used or the resistance AB arranged to drop a sufficient voltage for the S.G. valve bias, the power-valve bias being taken from a tapping in a similar manner to the first L.F. valve. The S.G. grid circuit should be decoupled with R3, 50,000 ohms and C3, .5 to 1 microfarads.

Not for Nothing.

It should be understood that automatic bias is not entirely free, as the grid-bias voltage must be subtracted from the H.T. battery voltage. In our example Fig. 1 receiver we assumed that the H.T. battery was of 150 volts, but as we dropped 20 volts for bias in the resistance AB our actual H.T. voltage between anode and filament of the valves is only 130.

However, grid-bias batteries cost almost as much per volt as H.T., and the fact that automatic bias is to a large extent self regulating because as the H.T. battery drops the anode current decreases and so causes a lower grid bias to be applied is a great advantage. This prevents distortion being caused by overbiasing the valves and also saves the trouble of altering the position of wander plugs if battery bias is used.

In addition, if a variable-mu S.G. valve is used with a bias battery this discharges slowly through the volume control potentiometer while the receiver is in use, and therefore periodical battery replacement is necessary. Another point with the battery variable-mu valve is that a switching arrangement is needed to disconnect the potentiometer from the battery when switching off, and this is not required with the automatic system.

Safeguarding Filaments.

A further advantage of automatic bias may well be mentioned, and this is that if any point connected to the H.T. + wiring should inadvertently be connected to L.T. - or L.T. + the short circuit from the H.T. battery will be limited by the bias resistance. If the H.T. voltage is 150 and the bias resistance 1,000 ohms the short circuit current cannot exceed 150 milliamps and, therefore, even if no H.T. fuse is provided the valve filaments would be safeguarded from damage.

It will be evident that automatic grid bias is a very attractive arrangement when consistent trouble-free operation is required, although for the experimenter who frequently wishes to try different types of valves or modifications to the receiver circuit batteries may be preferable.

A minor defect of automatic bias is that the resistance carries the anode current of every valve in the set. It could, therefore, also carry the signal currents of every valve and thereby introduce instability. To prevent this it is imperative to employ full decoupling.

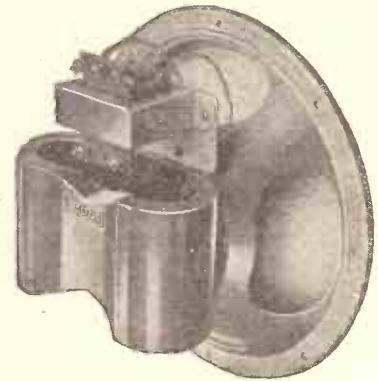
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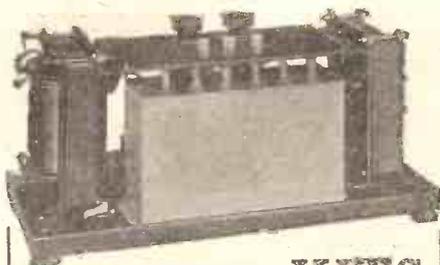
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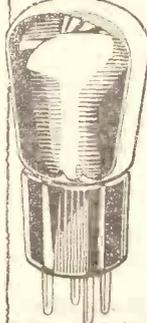
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STATIONS WORTH HEARING

(Continued from page 1066.)

Riga, on 525 metres, can be received with a super-heterodyne or other highly selective set. I often obtain quite good reception from this station, and it is one well worth logging.

Reception Ups and Downs.

Florence is in excellent form at present, and Prague, now working 12 kilocycles away from the North Regional, can be received with fine quality and strength, and quite clear of interference.

Langenberg is operating 10 kilocycles on the other side of North Regional, and again fine reception is the rule. Lyons Doua, on 465.8 metres, is a station that is only to be well received every now and then. When it is good it is often very good indeed, and when it is not it is just the opposite.

Rome comes through excellently, but Stockholm has been suffering from some interference. Madrid is rather weaker than one would expect. The big Athlone station is testing with part of its full output, and promises to be a very fine transmission within a week or two. Katowice is often receivable before dark, but Sottens is not at its best at the moment.

Leipzig, though usually magnificent, shows occasional small variations in volume. Toulouse is still testing with the new 60-kilowatt transmitter. Hamburg comes in well about once a week.

Strasbourg is a reliable station, but Brno is still not up to the mark. Brussels No. 2 is always to be received. To separate Milan, the Poste-Parisien, Breslau, and Göteborg clearly requires good selectivity, for all are so strongly received.

Many Good Alternatives.

On wavelengths below 300 metres the pick of the foreign stations are Hilversum, Bratislava, Heilsberg, Turin, Gleiwitz, Nürnberg, Fécamp and Budapest No. 2, or Magyarovar.

From the stations mentioned, the great majority of which can be received at full loudspeaker strength with nothing ambitious in the way of receiving sets, it will be seen that the choice continues to be a wide one, and that the number of genuine alternative programmes available is very large.

A RAPID REVIEW

Of Some Interesting New Books.

THEORY WITHOUT TEARS.

THE desire to know why is inbred in all of us, and there comes a time when we want to know a bit more about the cause and effect of radio matters. But where to find real theory, without having to dig it out of a whole clutter of advanced mathematics, has sometimes been a bit difficult.

"Modern Radio Communication" is just the book for anyone who keeps asking "Why?" when discussion turns on to radio topics. It is just as useful for looking up things as for making a complete study of the subject. The price is 5s., and the publishers Sir Isaac Pitman & Sons, Ltd. (The fourth edition has just been issued.)

IN A NUTSHELL.

IT is not a rare occurrence for the home- constructor and the radio enthusiast, in the course of their experiments, to hit on something new in wireless. It may be an entirely new circuit, or it may be merely a small improvement in the construction of a minor component.

Whatever it is, the question, "Is it worth trying to patent?" often crops up. And, at the same time, the thought that such a course might be a waste of money is usually present.

There is a lot of really sound advice on the matter in "Patents, Trade Marks and Designs: Their Commercial Aspect and Development," by C. W. Thomas. Price 1s. 6d. from The Ocean Publishing Co. It is Vol. 1 of their Nutshell Series.

HOME-MADE POWER TRANSFORMERS.

THOUGH it is usually appreciated that transformers are among the radio components it is possible to construct at home, few constructors like to tackle them because of a lack of knowledge of the methods of working out core sizes, turn numbers, gauge of wire, etc.

If you happen to be one of these, there is a 9d. book published by Percival Marshall & Co., Ltd., which will interest you no end. It is entitled "Small Transformers," and not only covers the finding of the necessary data in a most easy manner, but also deals very clearly with the practical work involved.

At the end of the book there are also some very useful chapters on the subject of rectification, and the working of various forms of rectifiers, together with suitable circuits for their use. A. S. C.

IMPROVING REACTION RESULTS

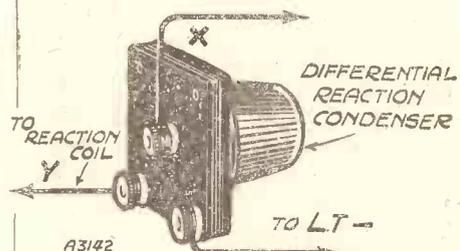
A Practical Suggestion.

THE usual connections to a differential reaction condenser sometimes fail to give good results when tuning at either top or bottom of the tuning condenser, and a spare .0001 fixed condenser will then be very useful.

The commonest fault is no reaction obtainable at top of the dial. In this case

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TO PLATE OF DETECTOR



The leads marked X and Y are easily accessible for the modification suggested.

connect the .0001 fixed between the points marked X and Y, and try again.

Another common fault is too much reaction at bottom of dial. In this case connect the .0001 in the lead marked X, or in that marked Y, whichever is more convenient, and the trouble will probably be reduced or removed altogether.

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TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio technique.

By Dr. J. H. T. ROBERTS, F.Inst.P.

L.F. Filter.

I WAS talking in these Notes a short while back about using a filter in the low-frequency part of the set. I forgot to mention, however, that the position at which this filter is introduced often has an important influence on the results. As you know, when receiving distant stations, you often get a lot of high-pitched whistling and similar interference, and this can largely be got rid of by the use of a suitable filter placed at the proper position.

Not in Power Stage.

The filter may be connected, of course, to the power stage of the low-frequency amplifier, but it is really much better to connect it in with the detector stage. By doing this you nip the interference in the bud, as it were, without waiting for it to go through the various processes of amplification and then attempting to deal with it when it is much more powerful.

This is not the only reason why it is better to introduce the filter at the detector stage. In addition to rendering it easier to deal with the actual interference by taking it in its early stages, the detector filter, by keeping the interference out of the power stage, prevents any possibility of the latter being fully loaded, or even overloaded, by the unwanted signals.

A good filter introduced at the detector stage should give you a great improvement in the quality of distant reception and probably at the same time a noticeable improvement in the reception from local stations.

Automatic Bias.

I said something a short time ago about automatic grid bias, using a resistance in series which the anode current by which the cathode is rendered positive in relation to the grid and therefore the grid by comparison negative.

When you are dealing with a mains set, of course, this automatic grid bias is a definite advantage, because you can use the mains supply for H.T., L.T., and grid bias, and therefore have no requirements for any battery at all.

After all, if a set is to be a mains set in the proper sense of the term, there should be no need to trouble about any battery maintenance whatever, even a grid-bias battery, which only requires attention perhaps every six months or so.

For Battery Sets?

But when it comes to a battery-driven set, I never can see that there is very much point in using the automatic grid bias. It is true that even here it reduces the number of batteries requiring attention from three to two, but the one which is disposed of in this way is by far the least important from the point of view of maintenance.

(Continued on next page.)

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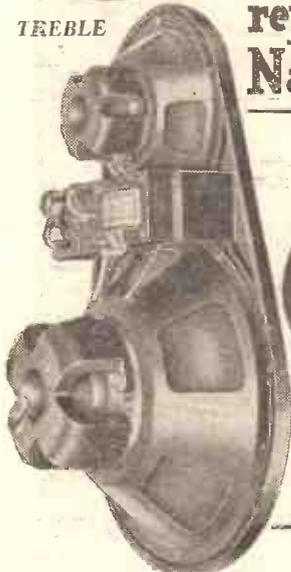
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The Celestion Dual Speaker illustrated consists of two units so coupled that the treble is accepted by the treble unit, and the bass accepted by the bass unit. The performance of the combination must be heard to be appreciated. The illustration shows Model S 29. Price £6.0.0. Other models available.

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P.W.

TECHNICAL NOTES

(Continued from previous page.)

Excellent grid-bias batteries can be had now for a matter of pence, and so there is really nothing in it on that score. On the other hand, if you change over from battery bias to automatic bias you will require other components such as condensers, decoupling resistances and so on, especially if there are more circuits than one to be biased, and you will find that the actual cost will be considerably greater.

A Matter of Opinion.

Even the apparent saving on the cost of the grid-bias battery is something of an illusion, because if you think about the matter for a moment you will see that the automatic bias arrangement really derives its bias from the high-tension battery, because the effective H.T. voltage is reduced by this amount. So you might just as well use an H.T. battery divided for grid bias in the ordinary way.

When people ask me whether they should use this automatic grid-bias arrangement with battery-driven sets I always advise them not to do so, although, of course, it is really a matter of individual preference. Certainly, automatic grid-bias confers certain advantages which make for trouble-free operation.

Television Schools of Thought.

Out of the enormous amount of experimental work on television which is taking place in different parts of the world there arise two main schools of thought, as it were. One of these is what we may call the scanning disc or drum or the "mechanical" school, whilst the other is the "cathode ray" school.

There is, of course, nothing new in the scanning idea, but it has been greatly improved mechanically during the past two or three years and the advent of radio amplification has made possible all manner of developments which would have been impossible otherwise.

The cathode ray tube has a number of advantages for use in a television receiver, but it also has certain disadvantages. I mention the disadvantages more particularly because the cathode ray beam system was at one time hailed as the great new principle which was to make television at last a really practical proposition.

Considering the principles only, there are the absence of moving mechanical parts, quietness of operation, simplicity of synchronisation, ample amount of light and other advantages which have been already known and appreciated in the use of this type of tube for the purposes of the cathode ray oscillograph.

The Cathode Ray Method.

In using the cathode ray tube the beam of electrons or cathode rays can easily be moved across the screen by an electrostatic or an electro-magnetic field and the place where the beam strikes the screen is indicated by a fluorescent spot. The brightness can be controlled by the use of a negative bias on the controlling element.

It is obvious that if we apply to this controlling electrode the amplified impulses from the transmitter and at the same time deflect the beam so as to scan the area in synchronism with the motion of the light beam across the original picture, we shall

get a reproduction, of some sort, on the fluorescent screen.

The cathode ray tube at present requires 2,000 to 3,000 volts for satisfactory operation. It is an expensive tube to buy, and the life is generally much less than that of an ordinary radio valve, whilst the picture is about four inches square.

A Practical Size ?

One particular point about the mechanical method is that with improved mechanical arrangements and better light valves, pictures up to two feet square it is claimed will be practicable for projection on a home screen. The cathode ray system, on the other hand, is limited in the size of its reproduced pictures by prohibitive cost of developing a large size cathode ray tube.

Both methods are, however, of great interest and large numbers of experimenters in different parts of the world are concentrating on the one or the other.

Improving Mica.

You would have thought that mica was just about one of the best insulating materials in existence, but I see that some of the American radio manufacturers are now spraying the mica with a special type of varnish which they claim reduces surface leakage.

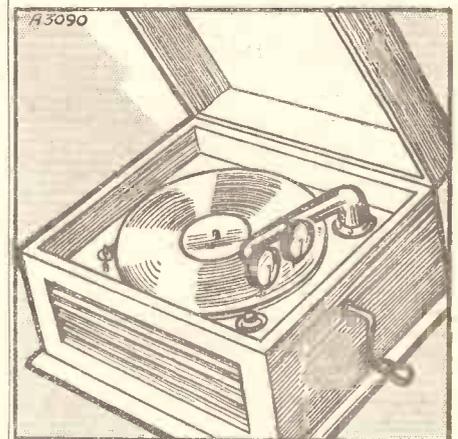
There is no question of the exceedingly high insulating properties of mica as regards actual electrical conduction through the mica, but apparently they find that for extremely exacting requirements the surface leakage may in some circumstances be too high, and this they get over by the varnishing process mentioned above.

A Gramophone Experiment.

A short time ago I mentioned how the B.B.C. superimpose artificial echo on the output of a studio microphone.

You can get a very good idea of the artificial production of echo by fitting (or even holding temporarily) a second sound-box

HOME-MADE ECHO



This is the scheme referred to on this page.

to your gramophone. The two sound-boxes will need to be placed in the same record groove, but will obviously be at different positions on the groove, so that the sound which is reproduced at any instant through the one soundbox will be reproduced at a later instant through the second sound-box, the time-interval between the reproduction

(Continued on next page.)

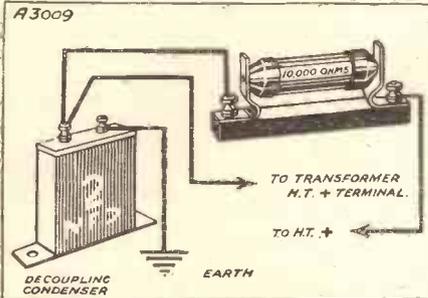
TECHNICAL NOTES

(Continued from previous page.)

from the two boxes will naturally depend upon their distance apart on the groove and the speed of the record.

This arrangement often produces a very realistic echo effect, since you get first a sound and then a little later a repetition of the same sound, precisely as you get in a

EASILY FITTED



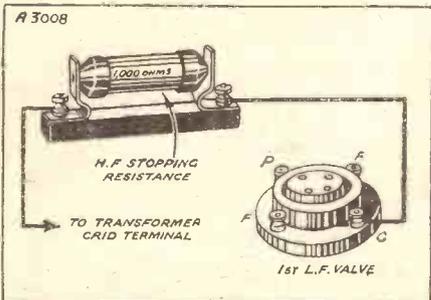
The usual decoupling arrangement.

hall when the sound is first received direct from the source and, secondly, after reflection from the walls.

Motor-Boating.

The usual device when you are troubled with motor-boating is to use a decoupling circuit, a resistance of, say, 10,000 ohms and a condenser of a couple of microfarads, in order to stabilise the anode circuit. This motor-boating is often set up with the modern detector, especially if a particularly efficient inter-valve transformer is used in the anode circuit. Apart from this decoupling circuit, however, it is sometimes useful to put a stopping resistance in the grid-lead to the next valve following the detector. This dodge is particularly useful

FOR GREATER STABILITY



How to insert a grid "stopper."

when there is only one stage, and that a power stage, after the detector. The resistance may conveniently have a value of about 1,000 ohms.

A.C. Mains Valves.

When you are using A.C. mains valves these are, as a rule, designed to be operated with current at a voltage of four volts. This voltage may vary slightly owing to fluctuations in the voltage of the mains, or if the transformer is designed for an input of, say, 220 volts there will be slight variation when the transformer is connected to a mains voltage of 230 volts.

However, these variations are very small and relatively unimportant, and you are not

(Continued on next page.)

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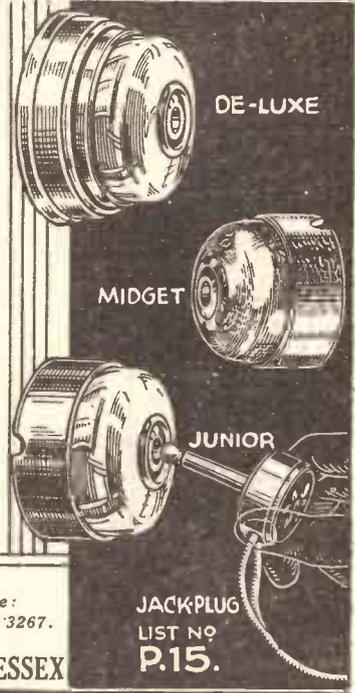
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TECHNICAL NOTES

(Continued from previous page.)

likely to do your valves any harm with these variations in voltage, nor is there any danger of the life of the valves being materially shortened.

"Regulation."

What is much more important than this is the "regulation" of the transformer, that is, the ability of the transformer to maintain its output voltage at the rated value when the load upon the output is varied.

For instance, suppose you have three valves loaded on the output of this power transformer and you pull one of the valves out of its socket, the load is materially reduced and consequently the voltage on the remaining two valves will rise; the extent of this rise depends on the "regulation" of the transformer; the better the regulation the smaller will be the change in the voltage due to the change in the load.

As a rule, it is rather difficult to make small transformers with very good regulation, and in some which I have examined the regulation is practically non-existent;

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if you pull out a valve the voltage just jumps into the air, whilst if you increase the load on the transformer the voltage may go down to about 2½ or 3 volts for an alleged 4-volt output.

Sound Effects.

Since the advent of broadcasting and talking pictures, sound studio technique has developed by leaps and bounds, and one of the most important individuals in the business is the "sound effects" expert. I dare say you know that a sound made before the microphone will not necessarily "come over" at all like the original.

Fortunately, regular musical sounds and the sound of the voice are reproduced very faithfully; it would be very awkward if they weren't! But some other sounds, particularly what are described as "effects," come through quite differently from the original.

For instance, in a talking picture in which an egg was broken into a frying pan,

the noise over the microphone sounded like the roar of a cannon. The correct sound was eventually got by the crushing of an ordinary small matchbox.

For a battle scene the sound of rapid firing machine-guns is produced by slapping a leather cushion with two flat wooden sticks. The roar of a cannon is made by striking a brass drum with a padded stick (or by breaking an egg, as above!), whilst the whirling of an aeroplane propeller is imitated by holding a piece of light paper against the blades of an electric fan, the fan being moved to and fro to produce the effect of the aeroplane approaching or receding.

The crackle of a burning wooden building is produced by crushing a piece of transparent wrapping paper in the hand close to the microphone. Sounds of the surf rolling on the beach are made by rolling small lead shot backwards and forwards over a cowhide frame.

MIRROR OF THE B.B.C.

(Continued from page 1054.)

capital, and the opposition he received from people who disapproved of machinery generally, Arkwright won through; and although much of his life was occupied in litigation with people who claimed he had no right to his monopoly, and trouble occasioned by the destruction of his mill near Chorley by a crowd hostile to labour-saving devices, he succeeded in amassing a fortune before he died at the age of sixty.

He was also given a knighthood (hence the title of the play "Sir Richard Arkwright"), and as became a sheriff lived in a fine castle.

Traditional Scots Dancing.

It is a long time between now and April, but I am able to inform Scottish listeners of an interesting little broadcast now being planned for the early part of that month. By that time the series of lessons in Scottish Country Dancing will have ended, and it is hoped to have a winding-up programme in the form of about three-quarters of an hour of Scottish Country Dance Tunes played by the Studio Orchestra.

It is hoped that in hundreds of households throughout Scotland parties will be formed to dance in [the traditional way to the music from loudspeakers.

A Versatile Artiste.

Broadcasting artistes have not much opportunity to display versatility in front of the microphone, which perhaps places them at some disadvantage compared with many performers on the theatre and music hall stage. It may be that the B.B.C. is not keen to encourage artistes to show all they can do in the entertainment line, preferring to give as many people a job as it possibly can.

I don't know that there is any definite ruling on the matter, but seldom have I come across such an instance of versatility as will be heard in the concert to be conducted by Joseph Lewis on Thursday, February 2nd, when Clara Evelyn is to play the Grieg Pianoforte Concerto, after which she will sing some classical songs from the musical plays in which she has made her name. And then, to finish up, she is contributing a group of light songs at the piano.

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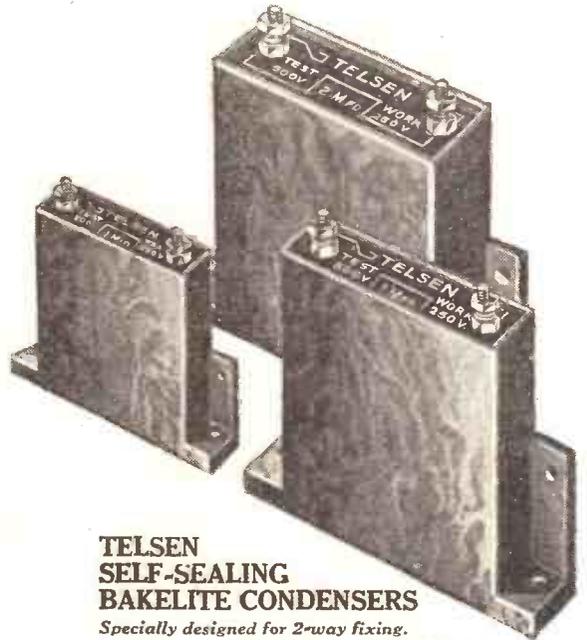


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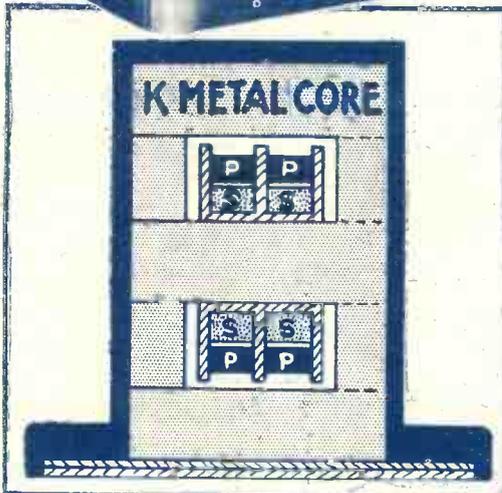


Illustration shewing "K"-METAL CORE and method of winding as employed in the "Hypermu."

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The "Di-Feed" is equally suitable for parallel-feed if this method be preferred. It is a small transformer and therefore right for compact set building. "Di-Feed" is without doubt a fine job, the accuracy of assembly and neat finish are fully up to the high standard introduced by R.I. in their first transformer in 1922. It is fitted in a beautiful bakelite case.

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