

# "FAKING" SOUND REPRODUCTION (SEE PAGE 280)

WIRELESS CASTS ITS SHELL

# Popular Wireless

No. 625/  
Vol. XXV.  
May 26th, 1934.

SILENCING YOUR  
MAINS

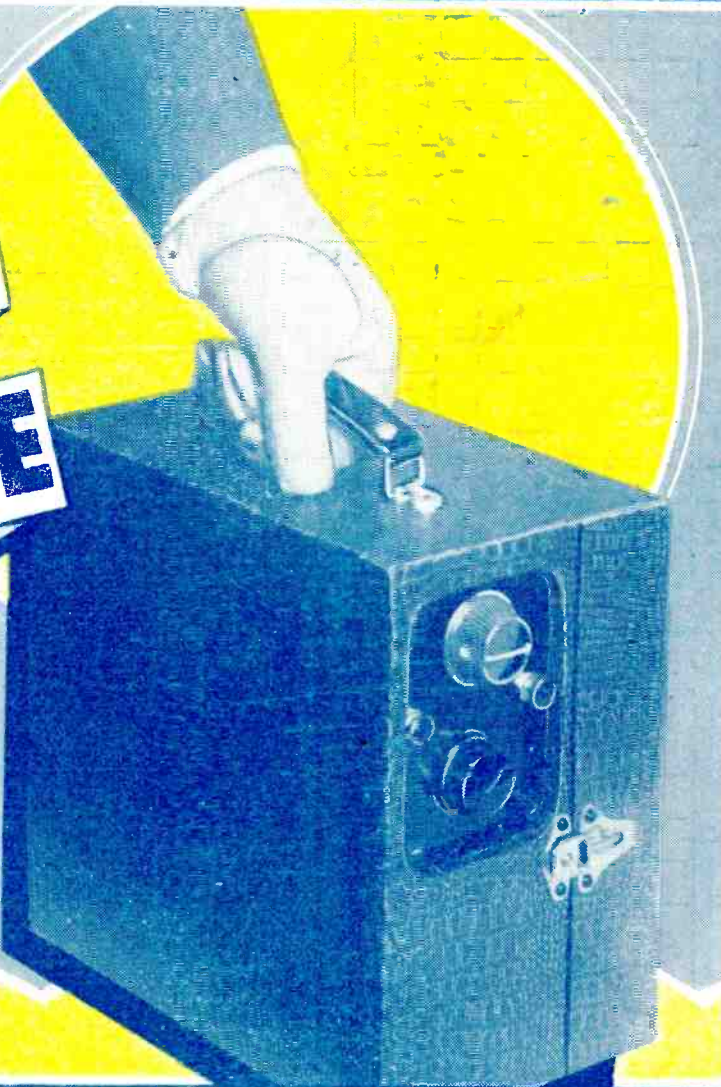
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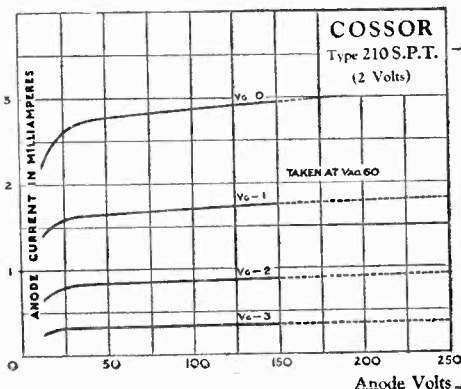
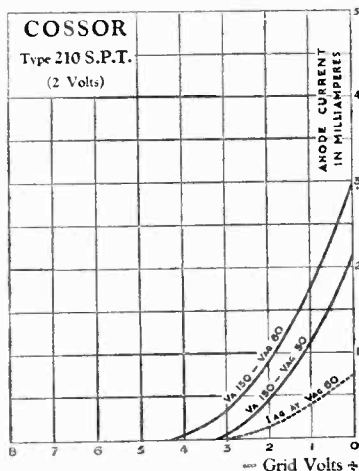
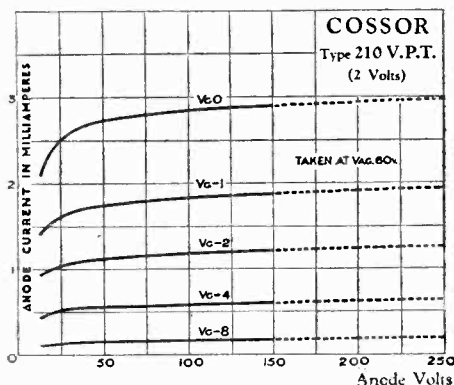
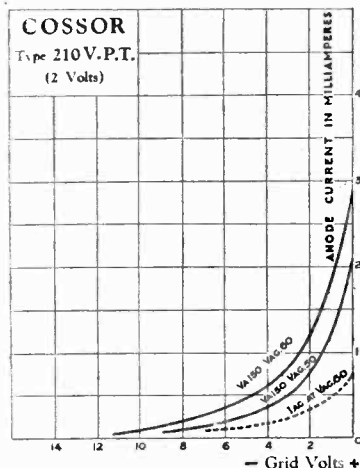


KINGS OF THE AIR

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**15/6**

## COSSOR 210 S.P.T.

### BATTERY H.F. PENTODE

Filament volts 2.0; amps 0.1; Max. Anode Volts 150; Max. Auxiliary Grid Volts 80; Mutual Conductance at  $V_a 150$ ,  $V_{g0} 60$ ,  $V_{g0} = 1.3 \text{ m.a./v.}$

**15/6**

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P.W., 26/5/34.



# POPULAR WIRELESS

## THE FIRST AND FOREMOST RADIO WEEKLY FOR THE CONSTRUCTOR & AMATEUR EXPERIMENTER

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FINDING WORK  
 MORE RED TAPE  
 DE-BUNKING  
 RADIO VOTING

## RADIO NOTES & NEWS

PUNJAB'S PROBLEM  
 CLEAR WHISTLES  
 MUSICAL MILKING  
 TELEVISION NEWS

### Why Not Try It?

A YEAR or so ago I suggested in these Notes that the B.B.C. should assist the unemployed by broadcasting news of vacant situations. Nothing of the kind has been done, and I suppose that, even if it were considered, a large number of very fine reasons against the experiment would be unearthed. I can see plenty of practical difficulties myself.

Meantime, it has been tried in Hungary, and during 1933 work was found for 7,000 people by means of a radio labour exchange.

### Chilly "Customs."

IN the same hour that I read about the Turkish Customs demanding duty upon the wreath which the recent pilgrimage party took to Anzac, I came upon a report of Prof. J. S. McLennan's lecture to the I.E.E. on the subject of "Electrical Phenomena at Extremely Low Temperatures."

Now, for the low temperatures required, use is made of liquid helium, and some of that would have been very useful at this lecture; but having been discouraged on previous occasions by *customs duty and red tape*, the Professor had not brought any from Leiden, where these classic experiments were born.

### The Champion De-bunker.

BROWSING idly amongst some North-country papers, what should my eyes meet but the effusion of the King of De-bunkers. How he wallowed in his bath of bunk! Henry Hall's band is the worst on the wireless! The variety "compèring" is "supposed-to-be-clever tripe." Chris Stone—well, "surely anyone can put a record on a gramophone." Thus he.

I now turn to the result of a vote on light entertainment recorded by over one million listeners. First place, Gracie Fields; second, Henry Hall; third, Chris Stone.

### America's Applause Meter.

THE device to which I referred a fortnight ago for enabling listeners to vote by lighting electric lamps was, I thought, intended to be used for ascertaining whether a given programme

item was deemed worthy of applause. I find, however, that the U.S.A. radio people are more interested in learning how many listeners a certain station has at a certain time. They live by selling "ether time."

There is a conflict of opinion in America

### ON OTHER PAGES THIS WEEK

"The surest way of dispensing with hand-capacity effects on short waves is to add a screened-grid stage of H.F." Page 277  
 "Why is it that the quality of the headphone is so pleasing?" Page 280  
 "An ordinary house-fly alights upon a steel bar, a quarter of an inch square. What happens?" Page 286

about the utility of the radio voter, arising from the belief held by some people there that radio "circulation" is not susceptible to exact measurement. Quite so! But the volume of "applause" for one artiste, compared with that registered for another, would be useful to the B.B.C.

### WILL HE BROADCAST?



Mr. Richard Austin, the 31-year-old musical director of the London Coliseum, is to succeed Sir Dan Godfrey at Bournemouth. The commencing salary will be in the neighbourhood of £1,000 a year. It is likely that the broadcasts of the Bournemouth Orchestra will continue under Mr. Austin's direction.

### Are Punjabis Bored by Radio?

THE Punjab Government is considering plans for experimental broadcasting in rural districts, using an ex-B.B.C. transmitter. The object of the experiment is said to be to find out whether a satisfactory programme can be broadcast which will interest the listeners after the novelty has worn off. How like home! Why, that is precisely what we wish the B.B.C. to do. I hope that the Punjab and the B.B.C. will pool their findings.

### The Nameless Club?

SINCE last October monthly meetings of "hums" living in the Shortlands, Beckenham and Bromley districts have been popular, and I hope that before long we shall see a great Kentish radio club in full swing.

The repeated invitations of one of the live wires of Shortlands to pay him a visit, and my repeated excuses, make me feel a little ungracious; but the veil is not mine to lift. And why am I so often credited with residence in that snug suburbia? Are there not handsome and accomplished journalists everywhere?

### A "Strong" Choir.

THE Kilsyth Male Voice Choir, whose fine work has won for it premier awards at most of the Scottish musical festivals, consists largely of men employed in coal mining and stone quarrying. (How do they keep their whistles clear?)

That they are a stout-hearted set of fellows is proved by the fact that during the general strike of 1926 they tramped eleven miles to compete at the Glasgow Festival, won first place in the open section and tramped back the same night.

### Inquiry for Glasgow.

WOULD any member of a wireless club within reasonable proximity to the Pollokshields district of Glasgow kindly get into touch with Mr. J. McDougall, 8, Leven Street, Pollokshields, Glasgow, who is anxious to hear about any such body?

The Shettleston club is too far from his home. Perhaps here may be an opportunity

(Continued on next page.)

# THE RADIO SET IN THE MILKING SHED

for Mr. McDougall or another to found a new club in his own district.

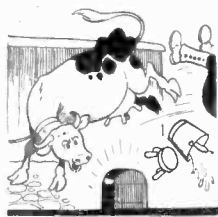
## More P.R.S. Royalty News.

THE Performing Right Society has proposed a new and lower scale of royalties for residential hotels and boarding houses, covering the entertainment of guests by music, and radio apparatus is included. For sets or gramophones, excluding radiograms, the yearly royalty is a guinea for a maximum of 15 bedrooms, with a guinea extra for each additional 15 bedrooms.

For radiograms or sets plus gramophones, the fee is £1 11s. 6d. for 15 bedrooms, with £1 11s. 6d. for each additional 15 bedrooms. Who would have thought that the composer of "I travel the road" would compute his earnings at so much per bedroom!

## Musical Milking.

A GLOUCESTERSHIRE farmer, having visited a very up-to-date agricultural show, made his ancestors roll over in their graves by installing a radio set in his milking shed, in the faint hope that the delivery per cow would be facilitated and, possibly, augmented.



The experiment was a dismal failure. The cows kicked, plunged, sulked, snorted and did everything that

bad, bad cows usually do.

A friend of mine who heard of this took a walk to the farm and asked permission to see the thing tried out again—and got the same results. But he found the reason. The milkers were unconsciously trying to beat time to the music with their hands!

## The "Latest" about Television.

THIS week's dictum is that of Mr. C. A. Wall, of the National Broadcasting Co. (U.S.A.), who declares that, although television transmission is all set and ready, the receiving apparatus is still too expensive for mass distribution.

Television seems to be like the Promised Land, but I hope the regulation forty years in the wilderness will be considerably reduced for us. If it is not, my great-grandchildren will have to describe the screen scenes to me—if any. I mean if there is any *me* worth bothering about.

## Yet Another Society.

A TELEVISION society has been formed for Cheshire and South-West Lancashire, and all those interested can get particulars from the Secretary, c/o Messrs. Jensen and Base, 223, Seaview Road, Wallasey.

It is hoped to carry out television transmission as well as reception, and intending members would help the organisers by stating their present activities in television and what type of apparatus they have. A meeting place will be arranged at an address most suitable to the majority of members. Good scanning to the new venture!

## Stand Up and Blow.

EVER restless, the Americans have now turned their fevered minds to the task of improving radio orchestras, with the result that the musical director of the N.B.C. has discovered that when an orchestra plays standing there is "a marked tonal difference."

One can well believe it. I notice that the pianists, cellists and harpists are exempted from the vertical position, and therefore I beg to suggest that the conductor should kneel.

Let them try also the effect of a recumbent trianglist and a saxophonist suspended in mid-air like the pantomime fairy.



## ON THE AIR NEXT WEEK

### GRETA KELLER

[National programme, June 1]

Some years ago this Viennese singer journeyed to America, with a reputation built entirely by the B.B.C. She went to New York to appear in a revue. Something went wrong with the revue, so, instead, she became a star of radio, appearing with Rudy Vallée. She has broadcast on more than fifty occasions in London.

## Condensed Communications.

E. B. (Oslo).—Welcome letter too late for use. Thanks. Glad you got required copy of "P.W." J. N. (Cheam).—Dam it! I seem to have aroused a hornets' nest of chemists, bless 'em! Try the "Analyst." F. S. (Rochdale).—Another poet. Hum! Try clay modelling. G. P. R. (Wrexham).—There are no reasons why we cannot communicate with other inhabited planets except that we cannot do so. Which seems to be fairly conclusive, eh?

## The First Wireless Comedian.

THE recent death of John Henry was a shock for listeners who remember his great popularity of only a few years ago.

Contrary to rumour, there was no break between him and the B.B.C. They were, in fact, considering another engagement when his death was announced.

## The Plumber Up to Date.

RADIO devices are more and more being called upon to help us wrestle our way through this vale of tears and smiles, though I believe they cannot cure love-sickness or acute feminine verbosity.



Officials have recently hunted a leak in the water mains of an Ohio town which was said to be losing a million gallons a day, and they used a microphone amplifier for the job.

When the gurgling of the leak was at last heard they could hardly believe their ears,

because the maps showed that the mains did not run there. However, radio cannot lie. So they dug.

Fifteen feet down they found an old, forgotten spur of the mains.

## The Veteran's Lament.

A. J. G., of London, N.20, in a letter which is full of kind words for "P.W.," pipes a lament for the good old days when the construction of a receiver was like a feat of conjuring and the actual reception of signals unbelievably thrilling. Nowadays, he wails, sets can be made and worked in one evening by anyone. In a nutshell, he wants "P.W." to give old-timers like himself "something hard to bite on."

Sighing heavily, I have to remind him that scarred old warriors are in a tiny minority; the present radio generation must be served, as he well knows. Yet I think that, with his experience and his knowledge of the fundamentals of wireless, he should have no difficulty in *helping himself* to find problems worthy of his skill. Ultra-short waves, television—is there *nothing* now to be done, my friend?

## "To What Base Uses . . ."

IT is said that the devil can quote the Scriptures when it suits him, and I am reminded of this by the use to which a radio set was put by three bold bandits of Marseilles.

Entering the flat of M. Matta, an antiquary, they demanded to be told where he kept his valuables. M. Matta, thinking that the inquiry was prompted by other than antiquarian interest, lifted up his voice and yelled for succour. Whereupon the bandits switched on the wireless set and, under cover of its blare, smote M. Matta and masked his outcries, process continuing until M. Matta became a "yes-man."

And the next, please.



## Strictly Private.

MY old pen pal, F. W. (Plymouth), asks me where I intend to spend my holidays this year. Answer: Half of them at home; the rest at Bournemouth. He is pining to get me well and truly bemisted on his native moors, I know. F. W. then goes into a trance and sees all "P.W." sets rise up before him, and the one which lingers as the others fade is that old "Magic Four"! My, what a set that was and/or is!

Ah, and I must not forget to mention that he aspires to establish a Chapter of the International Short-Wave Club in Plymouth. Come, dogs of Devon! Exeter has a Chapter of six. Shall Plymouth lag behind?

Any interested short-wave fans should write to Mr. F. Ward, 37, Embankment Road, Plymouth.

ARIEL.



# SILENCING YOUR MAINS

**C**ONTINUING our search for a complete cure of interference, we must now return our attention to the supply mains themselves and see what steps can be taken to render these innocuous as far as interference is concerned.

Here we have to deal with two distinct problems, both of which are bound up in the fact that the interference energy is being carried by the supply wires.

The first problem is to find some way of preventing this energy either from entering the house altogether, or, if we allow it to enter, to prevent it from "infecting" other conductors in the immediate neighbourhood.

Our second problem is that, if we accept the energy into the house wiring, we must so modify our H.T. smoothing apparatus (this concerns mains and eliminator users only, of course) so that the interference currents do not get into the receiver circuits.

Often the amount of H.F. that gets into the house wiring can be considerably reduced by fitting large H.F. chokes in the supply mains close to the electric meter; but a drawback to the fitting of these chokes is that the job is not one which the average amateur is likely to care to undertake except under expert supervision.

## A Straight Tip.

The wire of which they are composed must be of sufficiently heavy gauge to carry the full lighting and power load of the house, and they are consequently fairly bulky and difficult things to handle and mount.

In view of these difficulties and the problematic advantage to be gained by installing these large-scale chokes, I strongly advise amateurs to leave this job as a last resort, and then only to have the job done by a fully competent electrician.

It is, however, the only way out for the all-battery user who finds that his interference is cured when the supply mains switch is open; obviously, his trouble is due to H.F. currents in the lighting wires, and if the careful earthing of conduit and the aerial precautions indicated in previous articles fail to produce the desired improvement, he must fall back on this means of keeping the interference out of his house.

Let us now turn to problem two. We have accepted the interference currents into the house wiring, and they will be present at the point from which we draw power for the receiver.

## For A.C. and D.C.

We must devise some filter arrangement that will prevent this H.F. energy getting past the smoothing gear while offering no appreciable resistance to the mains "juice" itself.

Obviously, the details of such a device must vary according to the nature of the electric supply, but fortunately the two are identical in requirement.

For both alternating and direct-current supplies we shall require H.F. chokes which will carry the current taken by the receiver; this is not excessive—usually not more than 1 ampere for all-mains sets—so that these chokes need not be unusually bulky.

## Use Good Condensers.

These chokes will effectively block the path to the unwanted interference currents, and we shall now need a capacity path to carry them away to earth. The filter circuit is shown in the diagram. This circuit is

A.C. work as well—have a working voltage of not less than 250 volts, so that there is no danger of them breaking down and short-circuiting the mains. The condenser C1 may be as large as 2 mfd., whilst C2 and C3 should not exceed 1 mfd. each.

And now some details of the H.F. chokes. The size and winding details of these are far from critical, and, with the exception of the wire gauge, considerable liberties may be taken in order to use up existing material. Twenty-gauge enamelled wire should be used and a 2½-inch diameter Paxolin or cardboard former will be found quite suitable.

The greatest possible care must be taken in regard to insulation, since the full mains voltage will be present at all points in the filter circuit, but, apart from this, the amateur can go ahead without any particular instruction.

It may be desirable to mount the filter inside the receiver cabinet.

If the chokes are very close to the receiver wiring, induction may again rear its ugly head and allow a certain

amount of interference to get to the set.

Undoubtedly the best place for the filter is in a separate box—which need be only quite small—away down beside the electric-power point. About 100 turns will be sufficient for each choke, and these should be wound in the straightforward solenoid fashion.

## Coupling May Be Advisable.

The earthing point between the two condensers C2 and C3 should be taken, if possible, to an earth separate from that to which the receiver is "grounded"; this is not always essential, but it may often be found that it is better to leave this point disconnected rather than to take it to a common earth with the set.

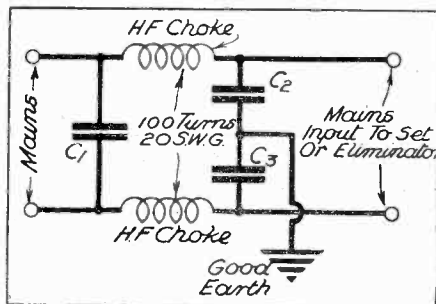
A certain amount of coupling between the two H.F. chokes is sometimes found to be an advantage, and they should then be mounted quite close together, but, of course, not so close that there is any danger of their touching.

By BERNARD BARNARD

Our series of practical articles on "Destroying Man-Made Static" is carried still farther this week by a consideration of the supply mains themselves and of the steps which can be taken to render them innocuous.

suitable for both A.C. and D.C. The condensers must, of course—and this goes for

## "CHOKING OFF" INTERFERENCE



By means of this choke and condenser unit, connected, as shown, between the mains and the receiver power input, interference entering through supply mains (both A.C. and D.C.) can be lessened considerably, if not cured altogether. The connections and the winding details for the choke are given in the text as well as in this diagram.

## LISTENERS' LETTERS

### Our Book Offer—A Memory Aid.

The Editor, POPULAR WIRELESS.

Dear Sir,—May I take this opportunity of expressing my appreciation of your excellent Presentation Book offer?

My volumes arrived by return post, and even a slight examination of them revealed what a wealth of information is contained between their splendidly bound covers, the sections on Astronomy and Engineering being particularly well done.

Thanking you for the chance of obtaining these fine books at such small cost, and wishing continued success to "P.W.,"

Yours faithfully,

J. C. WOODVILLE, Stud.I.E.E.

Tan-y-bryn, Whittington, Salop.

The Editor, POPULAR WIRELESS.

Dear Sir,—From time to time there has been published a formula for easily remembering and using Ohm's Law as below:

Current (amps.)  $\times$  Resistance (ohms) or  $\frac{V}{C \times R}$  where you place your finger on the unknown quantity, the remaining factors giving you the answer to the problem.

But sometimes watts come into the calculations, and where these are concerned the following will give the necessary information:

Watts being volts  $\times$  amps., or  $V \times C$  the new formula becomes:

Watts  $\frac{W}{\text{Voltage} \times \text{Current (amps.)} \text{ or } \frac{W}{V \times C}}$  The two formulae can be used in conjunction with one another for all possible calculations.

Yours faithfully,

A. L. MARTIN.

76, Seymour Road, Stapleton Road, Bristol, 5.

THE B.B.C. is not easing off in its endeavour to get the public to use the twenty-four-hour system of time notation. But the trouble is that the public is not at all impressed and will not be cajoled.

My information is that the B.B.C. will carry on with the experiment much on the present lines for at least two months more.

#### Mr. Aylesworth's Visit.

Mr. Merlin H. Aylesworth, President of the N.B.C., contemplates returning Sir John Reith's visit.

When he comes to London he is likely to take a special interest in British television developments, which are supposed to be somewhat in advance of American methods.

#### "Derby Day."

Alfred Reynolds will conduct the Theatre Orchestra for the broadcast of "Derby Day," the comic opera in three acts which is to be broadcast for National and Regional listeners on Wednesday and Friday, June 6th and 8th respectively. Alfred Reynolds wrote the music for the opera, the book of which is by A. P. Herbert, for production by Sir Nigel Playfair at the Lyric, Hammer-smith, on February 24th, 1932.

Gordon McConnel, the B.B.C. producer, has made an adaptation of the original production, and it is hoped that Vivienne Chatterton, Philip Wade, Roy Russell and Bruce Anderson will take part in this revival. Stuart Robertson is also in the cast.

#### "Men Like Machines."

Martyn C. Webster will produce a new play for Midland Regional listeners, en-

### MUSIC AND VARIETY.

**ARABELLA.**—Act. 3 of Strauss' opera relayed from Covent Garden (*National, Tuesday, May 29th*).

**PICTURE PEOPLE.**—A programme taken from the sound-track of recent film successes (*London Regional, Tuesday, May 29th*).

**RIDGEWAY PARADE.**—The return of Philip Ridgeway and several old favourites after a triumphant provincial tour (*National, Wednesday, May 30th*).

titled "Men Like Machines," by Edith M. Bulman, on June 1st.

The chief characters are a bullying manager, played by Stuart Vinden; an over-worked clerk, played by Denis Folwell, of Leicester; and a typist, played by Cecily Gay.

#### Welsh Variety.

The West Regional programme staff is still plugging away with the idea that Welsh variety programmes will one day be as good as those from English studios. A new artist has been engaged for the next show on Friday, June 1st—Malan Prytherch—who will sing some original songs at the piano, a type of entertainment rarely heard in Wales.

#### Strange Instruments.

The latest gossip of Pentrecwmlorcyn (which it is hoped may become the Welsh equivalent of Hogsnoton) will be told by Gunstone Jones on the same evening, and "The Three Comrades," who have been heard in previous Welsh variety entertainments, will play popular tunes on strange instruments.



STARS AT HOME.—Mr. Hugh E. Wright, radio comedian, photographed at his Hampstead home.

## THAT 24-HOUR CLOCK!

### AND OTHER INTERESTING NEWS AND VIEWS ABOUT BROADCASTING

Another artist in the same "bill" is Haydn James, whose skill as a mouth organist is well known throughout South Wales, and particularly Pembrokeshire.

#### Novelist for Scottish Children.

Mr. Compton Mackenzie, the famous novelist, has chosen a story from his work and his favourite Scottish songs for broadcast in the Scottish Regional Children's Hour on May 28th.

It is hoped that this programme will be the first of an important series to which other well-known Scottish writers will contribute.

#### Northern Air Service.

The new air service between the North of England and the Continent, for which the Air Ministry has granted permission to the Royal Dutch Air Lines to run overland

## LISTEN TO THESE!

to Liverpool by way of Hull, will be inaugurated on Thursday, May 31st, with the arrival at Hedon airport of the first machine from Amsterdam.

The occasion will be the subject of a relay for North Regional listeners of a running commentary on the civic proceedings and the broadcasting of incidental noises—the roar of the plane engines and the cheers of onlookers.

#### In Wireless Touch.

The journey between Amsterdam and Hull is scheduled to occupy rather less than two hours, and throughout its flight each machine will be directed by wireless from the control point at Barton airport, Manchester.

#### Twenty-one Years of It.

Cranwell Royal Air Force College Band, conducted by A. E. Sims, gives its second Midland broadcast from the

Birmingham studio on May 27th.

Harold Mills, who gives violin solos during the interval, is conductor of Birmingham Repertory Theatre Orchestra. Except for war-time service he has been actively associated with the music at the Repertory since it was opened twenty-one years ago.

#### Isle of Man Race.

Major Vernon Brook, the well-known authority on motor racing, and Mr. Victor Smythe, who is responsible for all North Regional "outside" broadcasts, are to be the commentators on the first of this season's Isle of Man motor contests, the "race of the big cars," on Friday, June 1st.

Major Brook will describe the race at the Villa Marina grandstand (the starting point) and Mr. Smythe will be stationed at the Governor's Bridge.

#### Well Worth Hearing.

The race is over two hundred miles, and though the course has been considerably altered since last year, there are still enough hair-pin bends and other difficulties for the drivers to negotiate to make the race well worth watching and the commentary well worth hearing.

#### The Deepest Voice.

Who owns the deepest voice in Scotland? It would seem that Halbert Tatlock has strong claims to this distinction. He will be heard in "Bitter Brevities" on May 29th.

These "Bitter Brevities" are mainly of Mr. Tatlock's own composition, but may include some translations from the French.

Listeners who do not care for the macabre broadcast in sepulchral tones should listen to the alternative programme that evening.

#### Television Committee.

The names of those who will serve on the Television Committee have now been made public. Lord Selsdon will be chairman, with Sir John Cadman as vice-chairman; Mr. Noel Ashbridge and Sir Charles Carpendale represent the B.B.C.; Colonel Angwin, Mr. Phillips and Mr. J. Varley Roberts come from The G.P.O., while Mr. O. F. Brown, of the Department of Scientific and

### TALKS AND PLAYS.

**A TEDIOUS BRIEF SCENE.**—A bucolic interlude for broadcasting adapted from "A Midsummer Night's Dream" (*West Regional, Thursday, May 31st*).

**MANNIN MOAR.**—A running commentary of this famous motor-car race in the Isle of Man (*North Regional, Friday, June 1st*).

**MEN LIKE MACHINES.**—A new play for the microphone by Edith Bulman (*Midland Regional, Friday, June 1st*).

Industrial Research, makes up the eight members.

#### The "Fantastic Battle."

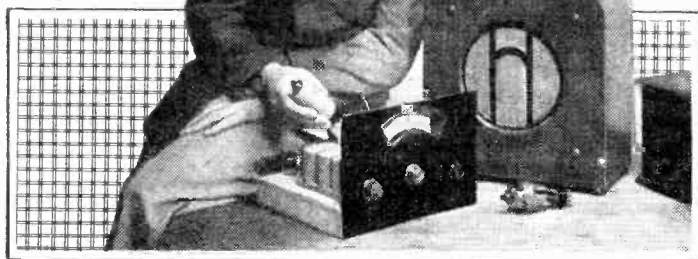
Revivals of popular radio plays during the summer are to include the "Fantastic Battle," which is by Leslie Baily, the author of the renowned "Scrapbook" programmes. The "Fantastic Battle" will be heard early in July, and it is probable that the Dramatic Director himself will be responsible for the production on this occasion.

O. H. M.



# MORE ABOUT

# THE 'DOUBLE P.D.'



LAST week we discussed the main essentials of the circuit and construction of this unusual two-valve mains set—how it works and its general advantages. Now we must finish the story by dealing with such items as trimming and the power-pack connections.

But before we go on we want to make one point in the construction quite clear—a point that may be missed in the wiring diagram. We described how the grid terminal of the double-diode pentode is connected direct to the wire end of one of the resistances fixed in that little bunch of resistances and condenser on the H.F. choke near the V2 valve holder.

If you look at the wiring diagram carefully, however, you will see that under the fixed condenser is a hole in the baseboard marked "E," and through this passes a lead from the cathode terminal of V2. A simple connection, but one that could quite easily be missed or made wrongly if the diagram were not sufficiently carefully studied.

## The Mains Unit.

With the set completed, place the H.F. pentode in V1 and the double-diode pentode in V2. Connect up aerial and earth and loudspeaker, using the pentode tap on the transformer of any loudspeaker you may choose.

Taking the Eckersley "National Three" mains unit as a typical example of a suitable

P.D.," we connect the two leads from the heater terminals of the valve holders to the terminals marked L.T. on the unit and the H.T. to those marked H.T.+2 and H.T.—. The H.T.+1 and the G.B. terminals on the power pack are not used.

## Some Component Details.

Those who have not a copy of POPULAR WIRELESS for January 27th of this year can get one from the Back Number Department, Bear Alley, Farringdon Street, London, E.C.4, or they may decide to build a power pack off their own bat specially for this receiver.

Such a unit requires, firstly, the mains transformer of the 250-0-250 type to give 60 milliamps, and a rectifier filament

current of 1 amp. and a current of 3 amps. for the heaters of the valves in the receiver. A U.10 type of rectifier is employed.

The next requirement is a smoothing choke of good quality and a couple of 4-mfd. condensers for smoothing and reservoir purposes. A valve holder and the necessary odd terminals, mains plugs, etc., complete the unit.

The trimming of the condenser on the set is a task that has to be done carefully, for on accurate trimming depends the sensitivity of the receiver. First screw down the trimmers till they are quite tight, then undo them about two turns. Next tune in as weak a station as can be found on the lower end of the medium waveband.

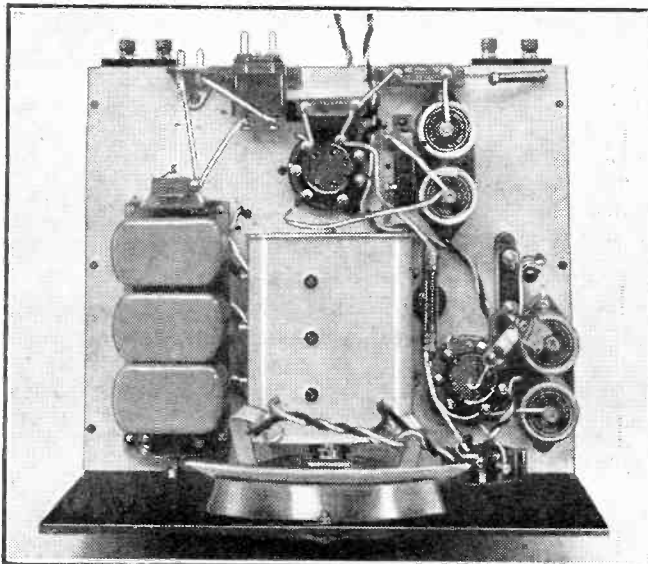
Adjust the middle trimmer for loudest results, and then try the one nearest the panel. This will be the sharpest of the three. If the station becomes loud, tune in another weaker one (not one that is fading, however, as this is most misleading when trimming is in progress) and retrim these two sections of the condenser.

## Keep the Capacity Low.

Finally, adjust the trimmer of the aerial section—that nearest the back of the set. Probably this will be fairly flat, but it must be adjusted carefully for all that. Remember throughout this operation that it is usually best to try to achieve a trimming setting with the lowest possible amount of trimming capacity—that is, with the trimmers not screwed down any farther than is necessary to achieve the object.

(Continued on page 289.)

## ABOVE THE BASEBOARD



A bird's-eye view of the "Double P.D.," clearly showing the three trimmers in the gang condenser. A piece of wood sharpened like a screwdriver is the best instrument for varying the settings of the condensers.

## THE PARTS REQUIRED—

- 1 Polar Star Minor .0005-mfd. 3-gang tuning condenser.
- 1 Polar Arcuate S.M. drive for above (marked in degrees).
- 2 W.B. 7-pin valve holders.
- 1 Colvern G1, G2, G3 3-gang iron-core coil assembly.
- 1 T.M.C.-Hydra type 25 2-mfd. fixed condenser.
- 3 Telsen type W.231 1-mfd. fixed condensers.
- 1 T.C.C. type 501 50-mfd. electrolytic condenser.
- 1 Dubilier 670 .01-mfd. fixed condenser.
- 1 Telsen .0005-mfd. fixed condenser.
- 1 Telsen .0001-mfd. fixed condenser.
- 2 Erie 1-watt 5-meg. grid leaks.
- 1 Erie 1-watt 100,000-ohm resistance.
- 1 Ferranti synthetic (new type) 25,000-ohm resistance.
- 1 Ferranti synthetic (new type) 20,000-ohm resistance.
- 2 Erie 1-watt 5,000-ohm resistances.

- 1 Graham Farish 1½-watt "Ohmite" 150-ohm resistance in horizontal holder.
- 1 Graham Farish 1½-watt "Ohmite" 50-ohm resistance in horizontal holder.
- 1 Bulgin V.C.29 5,000-ohm potentiometer.
- 2 Telsen type W.340 screened binocular H.F. chokes.
- 1 Belling & Lee mains plug.
- 1 Bulgin type F.15 combined mains plug and fuses.
- 4 Clix small type indicating terminals.
- 2 Peto-Scott terminal strips, 2 in. × 1½ in.
- 1 Peto-Scott panel, 12 in. × 8 in.

## —FOR THE CONSTRUCTION

- 1 Peto-Scott double Metaplex chassis, 12 in. × 10 in. with 1½ in. runners.
  - 1 B.R.G. coil "Quikon" connecting wire.
- Screws, flex, etc.

## VALVES

H.F. PENTODE. (V1)—Marconi or Osram—V.M.P.4.  
D.D. PEN. (V2)—Mazda AC/2 Pen.D.D.

## ACCESSORIES

LOUDSPEAKERS.—Rola, W.B., Celestion, Blue Spot, R. & A., Marconiphone, Ferranti, H.M.V., Atlas, Ormond, Amphion.

POWER PACK.—(See text.)

AERIAL AND EARTH EQUIPMENT.—Electron "Superial," Goltone "Akrite," Radiophone "Receptu" down-lead, Bulgin lightning switch, Graham Farish "Fit" earthing device.

### SCREENING.

The magnetic and electric separation of components or sections of a set. The simplest type of screening consists of a vertical metal partition placed so that the coils and other components in adjacent stages do not tend to indulge in undesired coupling effects. But partition screening is tending to give way to the individual screening of coils, etc.

Unless carefully applied, screening can result in considerable losses, particularly where tuning coils are concerned. The introduction of iron-cored coils has enabled screening to be carried out with relatively greater efficiency, for the iron-cored coils are small, and so their "cans" can be comparatively large without the whole component assuming undue dimensions.

When screening is applied to a coil not designed for it the inductance of the coil may be altered so that the coil no longer covers the desired waveband.

An iron screen will tend to increase the inductance if the losses in eddy currents are not large, but a screen of any other metal will tend to reduce the inductance.

Screening, or shielding, as it is often termed in the following connection, is not easily applied to low-frequency apparatus. Often the thin metal that is quite successful in an H.F. capacity is insufficient to accomplish any noticeable effect in the shielding of, for example, mains chokes and transformers.

Stout iron sheeting is required.

Generally speaking, all screens, whether of the partition variety or cans or casings on components, should be earthed.

Frequently it is necessary to resort to screened wiring in H.F. amplifiers in order to achieve stability. Where

instability in an H.F. amplifier fails to be cured on the application of the usual expedients, such leads as the lead from the screened-grid terminal of the S.G. valve, control-grid leads, etc., should be screened with the flexible metal tubing sold for the purpose. Or, alternatively, screened wire all ready to use can be purchased.

### SECONDARY BATTERY.

A term applied to the accumulator. Full details of this accessory have been given on a previous occasion, while refer-

ence to PRIMARY will explain both SECONDARY CIRCUIT and SECONDARY WINDING.

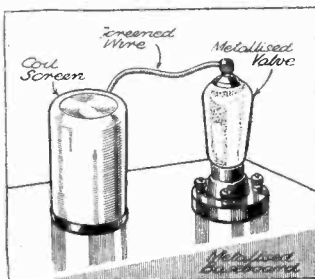
### SELECTIVITY.

The power to select a desired station while, at the same time, giving no ingress to any other station. The selectivity of a set primarily depends upon its tuning circuits, and, loosely, the more tuning circuits it possesses the greater will be its selectivity. Selectivity increases, with single or two-circuit-tuned sets, are seldom possible without a consequent reduction of sensitivity.

### SELENIUM CELL.

A device for transforming light variations into current fluctuations. Selenium is a substance somewhat similar to sulphur. While it is kept in the dark it has a fairly high electrical resistance; but when light shines upon it its resistance drops very considerably, the actual extent of the effect depending upon the intensity of the light applied to the cell.

### WELL SHIELDED



Four commonly used methods of screening—the coil "can," screened wire between coil and valve, valve metallising and metallised base-board. In this diagram all the screening is confined to the H.F. stage. Screening at the L.F. end of the set is often not so successful.

material on the wire and must, therefore, form a small condenser.

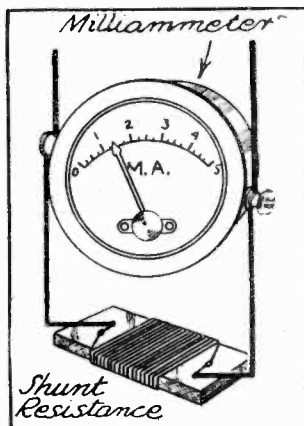
The total capacity built up from these small condensers in a coil is known as the "distributed capacity" or "self-

capacity." The larger the winding and the closer the proximity of the turns, obviously the greater will be the self-capacity. It is in order to reduce this as much as possible that the turns of wire on, for example, an H.F. choke are divided into sections.

Self-capacity is present in other pieces of apparatus. For instance, capacity exists between the electrodes of a valve.

Self-capacity in a coil gives it a natural frequency

### VARYING RANGE



### SELF-CAPACITY.

Any two objects which conduct electricity and which are insulated from each other will constitute a condenser. The adjacent turns of wire on a coil will be at different potentials, and these are separated by the insulating

which is a product of this capacity and its inductance.

### SERIES.

When two pieces of apparatus are connected together so that the same current must pass through each in turn they are said to be joined in series. Battery cells in series are connected so that their unlike poles are together—positive to negative and negative to positive.

### SHORT CIRCUIT.

The introduction of a path of very low resistance. This may result in the current rising to a very high value and causing damage.

A typical short circuit is when the two leads of an accumulator accidentally touch. The path for the current is then of extremely low resistance (in other

words, it is a *short circuit*), and the current may rise to such an extent that it actually melts the wire.

A short circuit of a dry H.T. battery does not melt a connecting lead of normal thickness, because the current is limited by the internal resistance of the battery. However, the battery itself may be badly damaged by such treatment.

### SHUNT.

A resistance for connecting across a meter in order to vary its range of measurement. The shunt diverts a proportion of the current. By means of shunts of various resistances one meter can be made to carry out a wide range of different measurements.

A simple method of using a shunt can be given by way of an example of the method.

A milliammeter is designed to read from 0.5 milliamperes, and it is desired to make it measure currents up to 10 milliamperes. In order to do

that it will be easy to see that half the current must be diverted from the meter. That is to say, when there are six, seven or eight milliamperes or any other current up to ten milliamperes flowing, only half must flow through the meter.

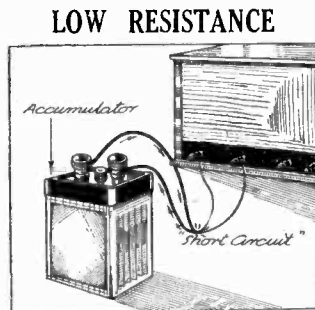
If it is known that the meter receives exactly half the current, then it is simple to calculate the actual current flowing merely by multiplying the meter reading by two.

In order to halve the current a resistance must be joined across the terminals of the meter which is identically the same resistance as that of the meter itself.

A voltmeter works by current measurement. It may help you to think of it as a milliammeter having a very high resistance. The movement of its needle is caused by the current, and obviously the amount of current which will flow through it depends upon (1) its resistance, which is fixed, and (2) the voltage across its terminals.

From this it follows that a voltmeter can be made to give higher readings by placing resistance in *series* with it. In any case, it is not desirable to shunt resistance across a voltmeter, because it is generally advisable to keep its effective resistance up and to avoid reducing it.

Shunts are used with ammeters in high-power electrical engineering with the object of passing all the current except a small amount which goes through the measuring instrument.

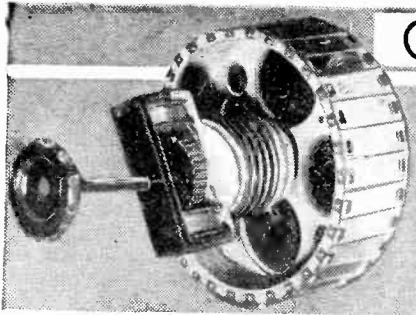


The diagram above shows how the touching of two wires whose insulation is faulty causes a short circuit and sets up a path of very low resistance for the accumulator current.

On the left is illustrated the method of connecting a shunt resistance across a meter (in this case, a milliammeter) in order to give a different range of readings with the same instrument.



G. P. Kendall, B.Sc., on Television



# LINING-UP THE MIRRORS

**T**HE best advice which can be given to the user of an assembled mirror drum or mirror screw is *not* to make any adjustment of the individual mirror settings unless he is quite certain that it is necessary.

Even if it is decided that the mirrors are out of line, it must be remembered that re-aligning them is definitely a delicate job which calls for care and patience. Unless the owner is prepared to spend time and trouble upon it he would be wiser to send the drum or screw to the makers for resetting.

## The Usual Indications.

The need does not often arise, of course, but there is always a chance that the situation may occur after some considerable time of service. I feel it is only fair to make these points quite clear before I proceed, because I am going to give actual instructions for carrying out the job, and I do not want to encourage anyone to tackle it without due warning.

It may be helpful to explain here how one may decide whether the adjustment is becoming necessary: the almost invariable sign is to be found in the appearance of one or more dark streaks running down the picture, sometimes with extra bright lines alongside.

The method of resetting which I am going to describe is a more or less standard one, but I shall give some practical hints as to the best ways of carrying it out which I think will be found to make a great difference to the otherwise possible difficulty of the task.

The method consists, briefly, in placing a sheet of white paper on the back of the viewing screen and observing the track of the light spot thereon when the drum or screw is turned slowly by hand. The setting of each mirror is then adjusted until the spot follows precisely the right track at each sweep.

All of which looks simple enough on paper, but it is apt to be far otherwise in practice unless one sets about the operation with certain precautions. The first point to be observed is that the sheet of paper must have a really dull surface: any trace of glaze will cause trouble.

## It Should Be Secure.

Secondly, the paper must be fastened securely in place. Lacking any other method, it can be fixed with a few spots of Seccotine, which can be washed off when the job is finished. This is important, for if the paper shifts during the operations one has no choice but to start over again.

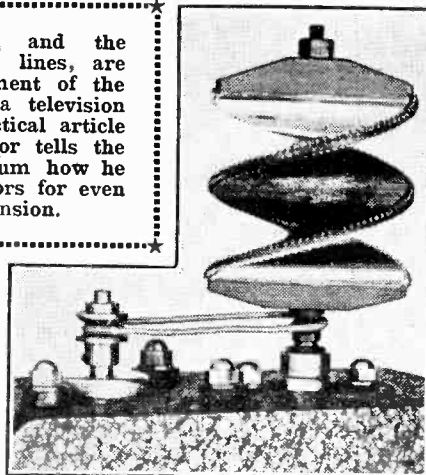
Next, there is the question of getting a spot of sufficient brightness for easy

observation. If the apparatus includes a light valve such as the Kerr cell this must either be removed altogether, so as to give the light beam a clear path, or else persuaded to "open" sufficiently to let a fair amount of light get through.

Removal is usually advised, but is not always necessary. In many cases it is simpler to disconnect the leads running to the valve and apply to it instead a steady pressure of about 50 volts from a battery. This causes the valve to "open" sufficiently to let a fair amount of light through. The result is not so bright as that obtained by removing the valve altogether, but it may be good enough to serve, so it is worth trying.

**Streaky reproduction, and the appearance of black lines, are caused by maladjustment of the scanning mirrors of a television receiver. In this practical article our popular contributor tells the owner of a mirror drum how he can re-align the mirrors for even and effective scansion.**

A typical mirror-screw arrangement, partly dismantled, showing the belt drive and motor housing.



It helps, also, to do the work in as dim a light as may be found adequate to enable one to see what one is doing. It may even be worth while to fix up some sort of shade over the sheet of paper to darken it a little.

## Checking the Size of the Spot.

So much for preliminaries. Now to make a start on the adjustments themselves, the first step being to turn the screw or drum slowly by hand until the mirror is found which sends the spot down the screen at the extreme edge of the picture area.

Now check the adjustment of the various lenses in the optical system, making sure that the light spot is of the correct size. This will normally be done according to the instructions from which the gear was set up in the first place; but it may be useful to remember that the usual size of the picture area is 3 in. by 7 in., and in this case the correct size of the spot for 30-line scanning is a diameter of one-tenth of an inch.

This point being duly checked, mark the exact path of the spot down the sheet

of paper by drawing a pencil line to mark the outline of the streak which it makes. Now turn the drum to bring round the next mirror, which should send the spot down your sheet of paper exactly beside the line you have drawn.

## No Overlapping Must Occur.

There should be no space between, nor should there be any overlapping, and if this condition is not present the mirror setting should be varied until the desired effect is obtained. By the way, mind you get the right mirror when you start this step; the wrong one, i.e. the one on the opposite side of the mirror with which you began, will send the spot down the farther side of the picture area.

When you are satisfied with the setting of the second mirror, again draw a pencil line to mark the outline of the path of the spot and proceed to the third mirror. Once more see that it runs down the paper exactly beside the line you have just drawn, checking its path precisely as before, and then you can go on to number four, and so on until all have been tested and reset where necessary.

The work will take some time if it is done with the care and accuracy which it really needs; but so long as you are methodical and do not hurry you should be able to make a good job of it.

When you have finished, the sheet of paper should be covered with parallel pencil lines one-tenth of an inch apart, the spaces between representing the successive paths of the light spot as it sweeps down the picture. You can make a final check by turning the screw or drum back to the starting point, and then turning it slowly forward and watching the spot run down each pencilled track, keeping a sharp look-out for any signs of overlapping or other inaccuracy.

## Another Method of Setting.

An alternative method sometimes advised is to draw the complete set of lines before starting to trace the paths of the spot, and then adjust the mirrors until it follows each track correctly, but I have found this method less satisfactory in practice than it appears in theory.

The great difficulty is first to be sure that your particular outfit gives a picture exactly three inches wide, so that the one-tenth-inch spacing between the lines is correct, and then to draw the lines with sufficient accuracy. For these reasons I am suggesting the better-known scheme which I have described in detail in this article.



VAL GIELGUD—  
DRAMA  
DIRECTOR OF  
THE B.B.C.

## RADIO DRAMA— OR THE DRAMA OF RADIO?

ELEVEN YEARS OF  
OUTSIDE BROADCASTS

WHAT was the most dramatic broadcast that you ever heard? Was it a Sunday afternoon performance of Shakespeare? Some thrilling stage play brought to the microphone?

Or was it, rather, some "unstaged" performance by people who were not professional entertainers? The roar of aeroplane engines in an international race? The sound of a vast crowd singing the National Anthem as His Majesty the King attended some sporting event? The silence of Armistice Day at the Cenotaph?

### Those Artificial Thrills.

Can artificial drama, the drama of the studio, ever hope to rival the natural thrills, the spontaneous emotions of an outside broadcast? I doubt it.

And yet we hear a great deal about the various departments of manufactured drama at Broadcasting House, and equally little about the men whose job it is to seek out and put over convincingly the all-important subjects of outside broadcasts.

Val Gielgud, Eric Maschwitz, Lance Sieveking: their names and photographs are well known to thousands of listeners throughout Britain and the Empire.

How many of you have ever seen a photograph of that most modest of all B.B.C. men, Gerald Cock? How many have even heard of Mr. Wood or of any other of the men whose job it is to take the microphone up and down the country in the green vans of the B.B.C.?

### In Search of Sensation.

In the early days of broadcasting new thrills were not hard to find. The novelty of radio was of itself sufficient to instil drama into almost any outside relay. The broadcasting of the nightingale, now an annual commonplace, was then considered little short of a miracle. What studio performance of "A Midsummer Night's Dream" could ever hope to recapture one half of the beauty and atmosphere of a relay from the heart of a Berkshire wood?

And so the microphone was sent to capture more of the dramatic. It went up in an aeroplane; it went with a diver to the bottom of the Thames, where it found, you will remember, nothing but empty bottles. It went to more than ten thousand places—horse races, football matches, exhibitions, opera houses. It caught and faithfully passed on the voices of kings and princes, of crossing sweepers and convicts.

For more than eleven years the drama has never deserted the O.B. department. It is harder, perhaps, to find new material for that voracious microphone.

But Mr. Cock has never once proved unequal to the task.

The life of an O.B. man is no bed of roses. Anything may happen, and yet nothing must be allowed to happen.

### The Man in Green.

There are none of the conveniences of a studio. The microphone must be suspended precariously in the most impossible places. Instant decisions must be made as circumstances alter with alarming suddenness. On rainy days they may have to hide their apparatus in a hen house. In the theatre a knockabout act threatens the microphone in the footlights. You probably heard of the mysterious "man in green" at the last Aldershot Tattoo. He was an O.B. engineer whose job it was to keep the microphone within range of the manœuvring troops.

When you listen in ten days' or so to a perfect commentary on the Derby, when you hear the relays from Wimbledon, from Tidworth, from the Isle of Man, remember Mr. Cock and his men, who for eleven years have put the real drama into broadcasting. P.C.

## THE LISTENER'S NOTEBOOK

### CANDID COMMENT ON SOME RECENT RADIO PROGRAMMES

THE B.B.C. has a curious way of dispensing opera: Act 3 first; Acts 1 and 2 to follow later.

There may be method in this madness, only I fail to detect it. It must appear that the reverse manner of "Die Walküre" was not an accident, since "Turandot" is to begin with Act 2, followed by Act 1 five days later. Perhaps we shall be enlightened.

The immense sums of money paid annually by the B.B.C. on these relays surely entitles listeners to something better than this odd back-to-front manner of production.

I was enthusiastic over Leslie Bailey's microphone medley that he called "Scrapbook for 1914." The author modestly refuses to call it history, and thereby robs it of a lot of its value.

Scrapbooks are usually interesting. "Scrapbook for 1914" was no exception to the rule. Scrapbooks can also be collections of odds and ends. "Scrapbook for 1914" was no such thing.

No medley containing such a substantial and impressive thing as the Countess of Oxford and Asquith's reminiscences of those fateful hours immediately preceding our declaration of war on Germany should be relegated to a scrapbook. I thought that this fragment of Leslie Bailey's scrapbook gave the whole thing a unique value.

The Countess was there herself to give these reminiscences. She is no stranger to the studio. We all know her marvellously clear delivery.

I remember her once being before the "mike" to champion the cause of blood-sports, and I wasn't too impressed on that occasion. But this time she rose to great heights. She was the good wine of the feast, but, unfortunately for the feast, she wasn't reserved till the last.

This wasn't the author's fault, however, as he had to follow a chronological order of events. The fact remains that "Scrapbook for 1914" did tend to diminish in interest towards the

(Continued on page 289.)

## The Station in the Highlands

—and news from Ireland.

WORK on the new B.B.C. transmitter for the North of Scotland is likely to start quite soon, after many months of doubt and delay.

At last a site has been chosen at Burghead which, although not in the centre of the district to be served, has been shown by the B.B.C.'s travelling van to be ideal for the purpose.

Ideal, that is, so far as local conditions will allow; for the B.B.C. engineers are not too hopeful as to the results. "Until recently," says the official statement, "it seemed that the results obtainable would not justify the building of a station."

And although a large proportion of the population in the North of Scotland will get an adequate service, a very much smaller proportion of the area will be served.

We can foresee Scottish fireworks in the not-far-distant future.

### Where Are the Plans?

Listeners in Northern Ireland, who were promised their transmitter—a high-powered affair of 50 or more kilowatts—some time ago are also getting restive.

Although a site has been chosen at Lisburn, near Belfast, no start has been made with the building.

In fact, we understand that the plans have not yet been completed.

### And Droitwich, Too.

Noel Ashbridge's announcement that the three English medium-wave National transmitters will not close down until about three months after Droitwich starts working is a welcome one.

The difficulties of long-wave reception are going to take some getting used to, and it will be essential to have a stand-by National programme on the medium waves.

# ON THE SHORT-WAVES

## OUR SPECIAL SECTION for SHORT-WAVE ENTHUSIASTS CONDUCTED by W.L.S.

I WONDER how many radio societies there are in existence that have not at some time or other run a discussion called "Do we need H.F.?", "Is H.F. Worth While?" or something similar. This dear old hardy perennial simply can't be kept under. It's dead—but it won't lie down!

Don't think I'm opening the ball under another name! I want to deal purely with the short-wave aspect of H.F. amplification, which is absolutely and entirely different from any other aspect of the problem.

On short waves we come up against a queer effect—that of an H.F. stage, often useless from the point of view of amplification, yet earning its keep by the countless little advantages that come of it. When I say "often useless" I don't imply that it *need* be useless; but it usually is.

We don't really *want* amplification, after all. We have, I will assume, a fairly sensitive detector which brings in good signals, together with a beautiful selection of mushy noises from trams, cars, mains, commercial stations and what not. An H.F. stage is going to amplify the whole lot, and if that's going to be its only function we may as well dispense with it right away.

But regard an H.F. stage as something else, which I will call, for want of a better name, an "aerial decoupler." If your aerial is tightly coupled to your detector, just consider what may happen. First of all, if the aerial swings about, the tuning of your detector-grid circuit is going to alter.

### A Cure for Hand Capacity.

If the aerial happens to have been cut to an unfortunate length you are going to be worried out of your life with hand-capacity effects that are apparently incurable. Likewise, if someone suddenly lets off (metaphorically) a "big bang" in the vicinity of the aerial, your detector grid is going to become beautifully positive for a split second, causing you to think that the interference is much more severe than it really is.

Interpose a screened-grid valve between your detector and the aerial, and none of these undesirable effects will worry you, because you will have decoupled the detector from their source.

Probably some of my readers will think I am telling fairy-tales when I say that the surest way of dispensing with hand-capacity effects on short waves is to add a screened-grid stage of H.F. Nevertheless, it's a fact. Ask anyone who has tried it.

Similarly, a powerful signal from a nearby amateur transmitter, some distance from the wave on which you are listening, will no longer buffet your detector about as it did before.

The sketch shows an untuned S.G. stage reduced to its simplest terms. Across the grid and filament of the valve is a special choke consisting of 40 turns of No. 36 D.C.C. on a 1-in. former. In the anode circuit is an ordinary commercial S.W. choke, and the anode is coupled through to

condenser marked "see text." There are a few words to be said about that. Take away your special 40-turn choke, insert a short-wave coil of appropriate size, connect the .0001 across it and you have a *tuned* H.F. stage ready made.

### Easy to Rig Up.

It is best to start off with the untuned arrangement, since it is so much easier to handle. As a matter of fact, it usually does the job well enough, and there is no need to go to the bother of an extra control.

The screen, of course, of the S.G. valve will require the usual operating voltage, in accordance with the maker's recommendations. It is not critical, and something between 60 and 80 volts, if the plate voltage is 120, will be required.

Should you decide to try an S.G. unit of this type, I strongly recommend you to leave your present set absolutely alone and to rig up the new unit "bread-board fashion," as shown in my diagram. Most

of the parts will probably be found in the junk-box, and if you don't like it—well, take it away!

What you *should* find is a slight gain in signal strength, complete absence of any hand-capacity effects that may have been present before, absence of threshold howl and a much more smooth and pleasant reaction control.

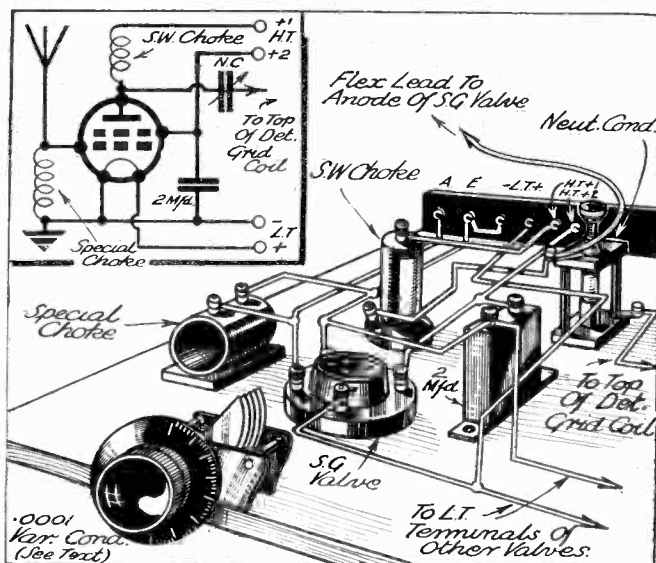
### Try a .0001.

If you decide to try tuning the H.F. stage you will probably find that you have to insert a .0001 preset condenser in the lead from the aerial to the grid of the first valve; otherwise your tuning will probably be extremely flat—which, however, is sometimes an advantage.

If anyone happens to be "sitting on the fence" by the time he reads these last few words I should like him to take my word for it that it is worth trying. In any case, we all call ourselves experimenters, so anything new is worth trying.

## H.F. STAGES HOW TO IMPROVE YOUR S.W. RECEIVER

### EXTRA CONTROLS ARE NOT NEEDED



The practical connections and the circuit of an untuned S.G. stage for short-wave work are given in this diagram and are fully explained in the article.

your existing detector-grid coil by means of a neutralising condenser.

I have not shown the detector circuit in the diagram, because it doesn't matter two hoots what it is so long as it works pretty well already. Note the .0001 variable



ON THE SHORT WAVES—(Cont. from previous page)



**A**BBREVIATED answers must be the order of the day: the post-basket is overflowing. J. C. M. (Biddenden) suggests that those who have not yet heard Sydney should set their dials to W I X A Z the previous night and just give them an upward touch when they listen for him in the morning. Sunday morning is, of course, the time, although he may sometimes be heard on Sunday afternoons and evenings.

D. C. S. (Whetstone) has made a single-valve 5-metre receiver which won't! Sorry, D. C. S., but I can't place the trouble from your details. You must have "left a nought out somewhere." Re your other query: it is an R.A.F. aerodrome station.

J. C. (Mr. J. Case, The Croft, Reydon, Southwold, Suffolk) wants to get into touch with any other short-wave enthusiasts in his district.

Can any reader forward a copy of "P.W." for November 7th, 1931, containing the "S.G. Four," to Mr. T. E. Lowe, 28, Allenby Road, Cadishead, M/C.? That particular issue is out of print, but Mr. Lowe will gladly pay a reasonable price for one.

R. S. L. mentions an effect that I have often meant to deal with. He uses a .0003 reaction condenser in a straight circuit, and finds that, after passing a

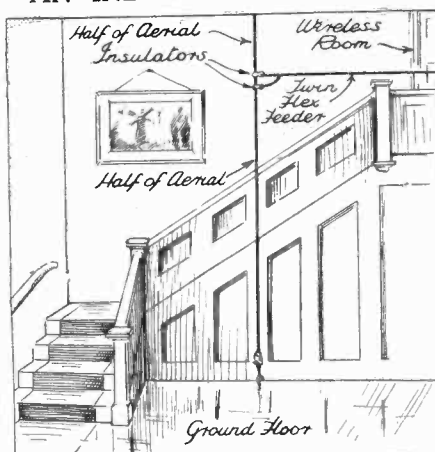
certain point, the set, already oscillating, goes out of oscillation again.

Quite a common thing, R. S. L.; you shouldn't use such a big condenser! It tunes the reaction coil (in series with other components) to a wavelength that produces what is virtually a "dead spot." Nothing to worry about.

By way of showing that quite an effective indoor aerial is possible, a reader has rigged up a fearsome affair that wanders "all over the house." He finds it effective in appearance only; its efficiency is somewhat low. My sketch on this page shows a possible way out, suggested by the said reader, who, unfortunately, can't use it himself owing to lack of space.

Even if there's no room for the "doublet," one half might be quite efficient.

### AN INDOOR "DOUBLET"



This sketch illustrates a reader's suggestion for finding room to erect a really efficient S.W. aerial indoors.



**R**EADERS report the following items of interest during the past fortnight or so: Jeloy, LCL, on 42.92 metres, has disappeared! W 2 X E has suddenly turned up on 25.36 metres with a very good transmission. This station is at Wayne, N.J.

The Venezuelan station, Y V 5 B M O (whom I suspect of being ex-Y V 2 A M), has been logged in the 49-metre band by several people.

The following news items are really useful, as they contain details of definite schedules "straight from the station's aerial." I am indebted for them to W. G. M., of Southampton:

H C J B, Ecuador, on 73 metres—daily, except Mondays, 00.30-02.45 B.S.T.

V E 9 B J, 49.26 metres—daily, 00.10-02.30 B.S.T.

C O C, Havana, Cuba, 49.92 metres—daily, 22.00-23.00 B.S.T.

V K 2 M E, Sydney, Australia, 31.28 metres—Sundays, 07.00-09.00, 11.00-15.00 and 15.00-17.00 B.S.T.

This last item settles the queries of those who write to know whether they stand a chance of hearing Sydney without going through the ordeal of rising early on a Sunday morning!

W. L. S.

**I** SAID last time that we had all missed Ambrose and his band on the air. Possibly by now you will have heard him again, for his differences with the B.B.C. have, I believe, been patched up. But whether or not you have heard him again on radio, you will be pleased to listen to his latest Brunswick record, *Hand in Hand and Somebody Wants to Go to Sleep*. Both these are from the film "The Three Sisters," and show Ambrose at his usual best. (01753.)

As I have started with dance numbers, I may as well continue with another. My next tip is Guy Lombardo (I am particularly keen on this combination) on Brunswick 01743. *Little Dutch Mill and You Oughta Be In Pictures* are the numbers chosen, and once more we are treated to the typical Lombardo style and neatness. It is a good record.

Many of the dance tunes this month, as far as I have yet heard them recorded, I am afraid are rather unimaginative in orchestration. Even Ray Noble seems to be having a rest in his version of *One Morning in May*, and especially so in *You Have Taken My Heart*, which is not nearly as attractive, in my opinion, as it should be. I have heard it done much more appealingly.

Henry Hall's numbers from "Three Sisters" are also dull and not too tuneful. But I must not despair, for I have many others yet to play—but I hope they buck up a bit.

### A GOOD RECORD

Stories about well-known gramophone artists are usually interesting, so here is one about the popular American trio, the Boswell Sisters. They record for Brunswick, and have lately made *I Hate Myself and You Oughta Be In Pictures* (01751). But the tale of how they got into the singing act is one that has much in common with other vocalists—their friends more or less forced them into it.

Martha (the eldest) was a professional pianist, Connie was in the same orchestra playing the 'cello, while Vet, the baby of the trio, tickled the violin. And they did very well. But friends had heard them extemporising vocally and urged them to enter this form of entertainment. For a long time they held out, but at last they consented and determinedly fought their way to fame in the new sphere.

You've heard Marion Harris on the radio, I expect, during the various visits she has made to the British microphone. Well, you can now hear her at her very best on Decca, for whom the Cabaret Queen (as she is

## ROUND the RECORDS

Selections and recommendations from the latest gramophone lists.



called) recorded in the early hours of the morning at the studios in Chelsea. The titles of her numbers are *One Morning in May* and *Oh-oo-oh, Honey* (What you do to me), introducing "Ooh, that Kiss." The disc is F3954, and is one to add to your light vocal records. One of the most tuneful waltzes recently published is *You Have Taken My Heart*, and it has been broadcast many times by various dance bands. The first vocal record of the number I have heard, however, is that of Reilly and Comfort on Decca F3946. You should hear it, for it is really (no pun intended) a most enjoyable recording.

An unusual disc is that made by H.M. Grenadier Guards on Decca K723, called *Eton Memories*. The famous "Boating Song," of course, comes in, as does "The Vale" and a number of other tunes more or less well known by the "outside" world. A vocal quartet assists the band.

Many will welcome another "new-method" orchestral recording by Sir Hamilton Harty, whose record of Balakirev's "Russia," for the Columbia History of Music, actually introduced this big recording advance. This time we have works which will interest a much wider public. Schubert's *Marche Militaire* and Sibelius' *Valse Triste*, and they are such as may be said to create a new orchestral standard.

The *Marche Militaire* is derived from a set of pianoforte duets composed by Schubert. With perhaps one exception this is the most popular of all Schubert's compositions. The orchestral arrangement gives the march a pulsating and invigorating lilt, and emphasises the pulsation of the composition. The contrast with the serious mood of

the *Valse Triste* on the reverse side adds to both items a refreshing piquancy.

The *Valse Triste*, of course, is an excerpt from the incidental music written by Sibelius to accompany a drama called "Kuolema," written by Arvid Järnefelt (a brother-in-law of Sibelius). The music illustrates an episode that needs little explanation. A woman at the point of death is roused by the sound of music, which becomes louder when some ghostly characters enter the room. They beckon the woman to follow them in a dance. In her exhausted condition she cannot maintain the speed at which the waltz is taken, and rests momentarily. Urged on by the seductive music, she continues, and the culmination is reached when the door opens—an apparition of Death appears. The ghostly figures hasten away, and the music declines to a whisper. The performance of the London Philharmonic Orchestra, conducted by Sir Hamilton Harty, is fully worthy of their great tradition. (DX577.)

Radio was well represented at the recent Command Performance, when Henry Hall and Doris and Elsie Waters were among those who were honoured. These latter inimitable artists have just made a record of one of their well-known "wives of famous people" series—this time it is *Old Sam's Wife*, while on the reverse side is one of their Gert and Daisy episodes. This will be a popular record among radio listeners. (Col. DX577.)

It is uncommon to hear a Stanley Holloway record that is not of the Sam type, but such is his latest, showing the former Co-optimist in the rôle of a stage comedian. He has made a record of his latest Drury Lane success, "Three Sisters," and the items, *Hand in Hand* and *Keep Smiling* (a mock sentimental song), portray the famous artist in quite a new light. Many will be surprised at his fine voice, which one would not suspect he had from hearing only the Lancashire dialect records.

One disc that will sell like the proverbial hot cake is the *London Suite* by Eric Coates, on which is recorded *Knightbridge*, the famous march taken by the B.C.C. as the theme for "In Town To-night." It is a twelve-inch record, and with it goes another on which the same composer's *Westminster* and *Covent Garden* are recorded. The companion to *Knightbridge* is Hady Wood's *Forgotten Melody*, a striking contrast to the martial briskness of Coates' world-famous piece. (H.M.V. C2655-6.)

K. D. R.

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K. D. R.

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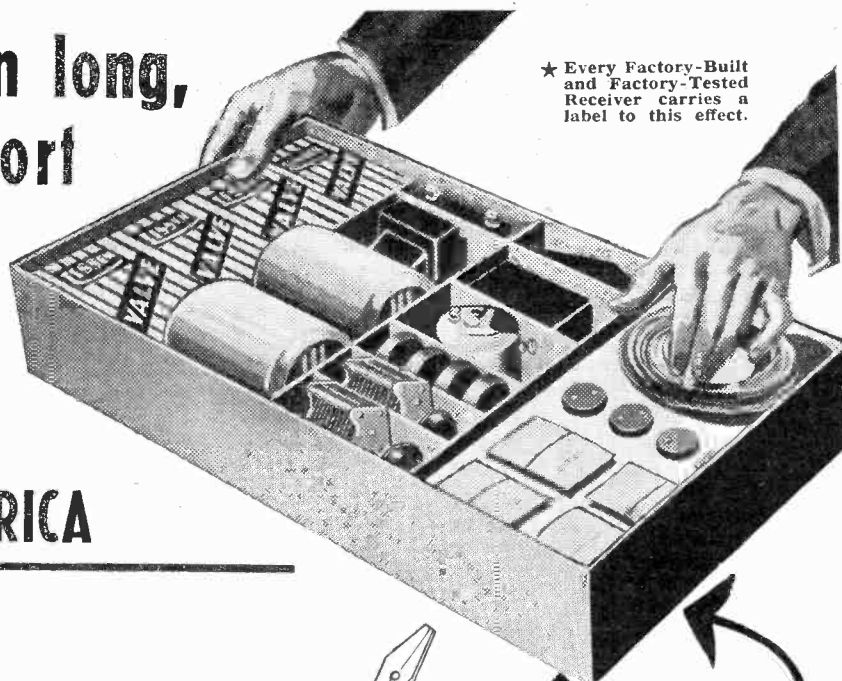
K. D. R.

K. D. R.

K. D. R.

# With the **LISSEN** "SKYSCRAPER" 4

you get radio on long,  
medium and short  
wave stations  
from ENGLAND,  
EUROPE, AMERICA,  
AUSTRALIA, and AFRICA



★ Every Factory-Built  
and Factory-Tested  
Receiver carries a  
label to this effect.

*All you need is*

**A SCREWDRIVER**



**A PAIR OF PLIERS**



and

**THIS**

Read what  
these enthusiastic  
'Skyscraper' owners  
say:

**From SOUTH AMERICA:**

"Kit used on voyage to Buenos Aires with 60 ft. aerial. On the long and medium bands, home and European stations received at good strength. ALL EMPIRE PROGRAMMES CONSISTENTLY RECEIVED AT GOOD STRENGTH. Also received SYDNEY and MELBOURNE."

**From SOUTH AFRICA:**

"London comes through quite clearly. The best battery set we have heard."

**From INDIA:**

"Assembled 'Skyscraper' Four in two evenings. Set worked marvellously. Wonderfully clear. Here in Bombay, am receiving London programme on 49.6 metres as loudly and clearly as ever I heard it on an ordinary Receiver in England."

**From NORWAY:**

"Set working splendidly. Over 60 stations with inside aerial."

*Or you can now buy it completely factory assembled  
and factory tested at exactly the same price.★*

You can assemble these 'Skyscraper' Kit sets in a couple of evenings, and get full-power, moving-coil reception on all wavelengths. Besides the fun of building your own set you have the satisfaction of knowing before you start that the results will be everything you expect—because every component part of the 'Skyscraper' kit has been subjected to vigorous tests under actual working conditions.

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**HOW LITTLE IT COSTS** Chassis Kit, complete with 4 valves . . . **£5.12.6**  
With Walnut Cabinet and Moving-coil Speaker . . . . **£8.2.6**

**USE LISSEN BATTERIES—LISSEN VALVES  
LISSEN ACCUMULATORS FOR YOUR SET**

**POST COUPON FOR FREE CHART NOW!**  
To Lissen Ltd., Worple Road, Isleworth, Middlesex.  
Please send me a **FREE** copy of colour-printed  
All-Wave All-World Skyscraper Chart.  
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I THINK I prefer headphones to most loudspeakers. Of course, people say headphones are inconvenient. But they are more than convenient for people who don't use them—a loudspeaker too often invades all privacy and quiet. If one wants to listen, and another does not, the headphones solve the difficulty.

Then I find that the quality of a headphone is so intimate and unoffending that I disregard its technical imperfections. Someone seems to be particularly interested in entertaining me when I have the headphones on; everybody seems intent on bawling out nonsense when a loudspeaker starts its blurb.

#### "Almost Impossible to Expect."

Why is it that the quality of the headphone is so pleasing? We have got to recognise at once that it does not give us true quality in the sense of reproducing all the sounds equally. In fact, if you look at Fig. 1 you will see a sketch which indicates the sort of characteristic you are liable to get with headphones in particular and moving-iron reproducers in general.

Now, there is a theory, quite unproven as yet, that if you cannot give true reproduction you must make a good fake. I have heard true reproduction, and it is really lovely, provided the original has also that rare quality.

True reproduction comes about when all the frequencies in audible sound are reproduced with the relative magnitude in which they

existed in the original. It is almost impossible to expect machines of reasonable price to get near this ideal. The tragedy of wireless is that the transmission authorities do not allow

us to get as near to it as I believe we might.

On the other hand, let us say a certain band of theorists get a good fake because we can never get perfection. These are the people who might be allowed to talk about the "art" of reproduction—because, of course, art presupposes distortion.

The painter conveys light shining into one's eyes without shining light into one's eyes: he conveys the feeling of three-dimensional space in a two-dimensional

## "FAKING" SOUND REPRODUCTION

A discussion on the relative merits of headphones and loudspeakers in the search for adequate quality.

By P. P. ECKERSLEY, M.I.E.E.

medium. Sculpture may not concern itself by reproducing busts of exactly the same size as the original; it could be even more daring and give one the impression of an emotion rather than a reality.

So in sound reproduction, lacking the ability to give truth, let us convey something which is pleasant to the ear and at least reminds the hearer of the original.

This is a question for the intelligence—not for the technician, who can only think in technical terms.

Some of us think that we get the best fake by having a reproduction curve rather like that shown in Fig. 1. In Fig. 2, Fig. 3 and Fig. 4 I show curves which have self-explanatory headings. Fig. 2 shows what the moving coil and the superheterodyne have done to ruin quality.

#### The Balanced Spectrum.

The noise which issues from Fig. 2 is to me, at any rate, the most offensive of all noises—that characterless thump with a fringe of sibilants which is sold at ten to fifteen guineas a time. In Fig. 3 there is something of what we used to get when stations were widely separated—valves too feeble and loudspeakers too poor to allow bass reproduction, but when, upon the other hand, people were interested in crisp quality: the quality which—perish that awful word!—was not "mellow."

In Fig. 4 I include the sort of quality given by special large-cone speakers: a warmth to please the bass fiends and yet a top which still remembered some of the happy days of Fig. 3.

But my point—because I am one of the theorists who still believe in the "fake" of moving iron—is that of all the compromises Fig. 1 shows the best. It is, by

and large, the quality given by good ear-phones, by good moving-iron loudspeakers of the ordinary type and by the best of mechanical gramophones.

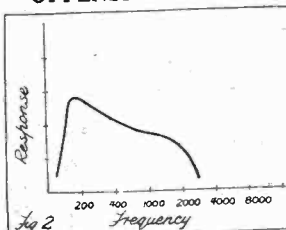
It has to be observed, talking of loudspeakers, that the moving-iron "fake," or let us be more polite and call it "balanced-spectrum quality," is obviously superior when the auditorium has considerable reverberation. On the other hand, in small living-rooms full of (padded) furniture the moving coil, properly fed, is better, because it supplies that richness which the ear craves for in an overdamped room.

#### Enter Infra-Sonics.

And now the ever-ingenuous Mr. Dowding of POPULAR WIRELESS has invented something quite new and ingenious and amusing. It's another fake, but maybe it's a very important kind of a fake and may combine the good qualities of moving coil with moving iron.

Because, maybe, Mr. Dowding has hit on something which wants hitting on harder than it's yet been hit. If they bang a drum, or slam a door, or even clap their hands, the result-

#### "OFFENSIVE NOISE"



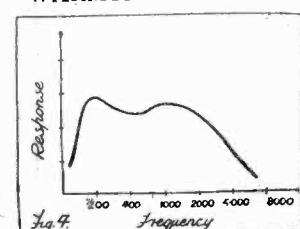
The characterless thump that is found in many receivers which accentuate bass is shown in this curve.

ing reproduction leaves much to the imagination and does a lot for irritation. (No wonder the B.B.C. fade out the applause!)

Each of these "sounds," if you like, has a common quality. They are "transients." They are unlike steady notes because they begin with an almost steady atmospheric pressure increase and then fade away.

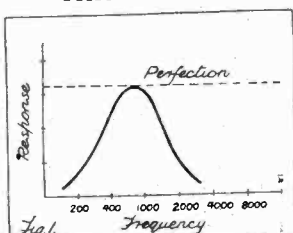
They can be shown to be made up of lots and lots of frequencies. And some of these frequencies are very low frequencies—almost below audibility. And that's where Mr. Dowding comes in. I reserve a special chapter for Mr. Dowding's Infra-Sonics, and say "continued in our next."

#### "WARMTH—AND TOP"



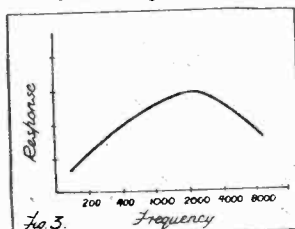
An attempt at compromise between emphasis of bass and the "top" of Fig. 3.

#### "THIS IS BEST"



The dotted line indicates perfect response. The thick line is the response curve of good ear-phones, moving-iron speakers and the best mechanical gramophone.

#### "CRISP QUALITY"



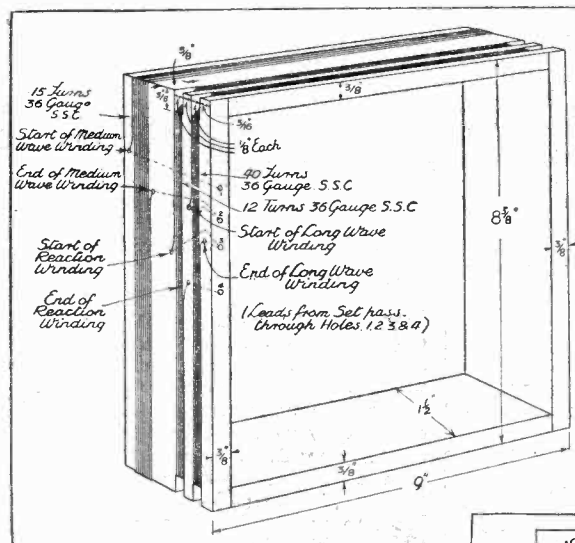
In this curve the bass response is lacking and the high notes fall off rapidly after about 2,000 cycles.





## THE MIDGET PORTABLE

(Continued from previous page.)



Constructing the frame aerial is a straightforward job if the above diagram is followed carefully. The ends of the windings are taken through holes to the inside of the frame, and there joined to the flex leads from the set which come through slanting holes starting in the edge of one of the sides.

Therefore it is very necessary to use exactly the parts we have specified if you want to adhere to our dimensions.

It is true that there appears to be little difference between the sizes of many of the makes of, for example, L.F. transformers, but we can assure you that quarters of an inch mean much in such a construction as this one.

There is also this to remember: While the set can develop a quite respectable power for its size (don't forget its "pick-up" is confined to a small frame aerial of

easy, and all that you will need to know about these can be gathered from the diagrams.

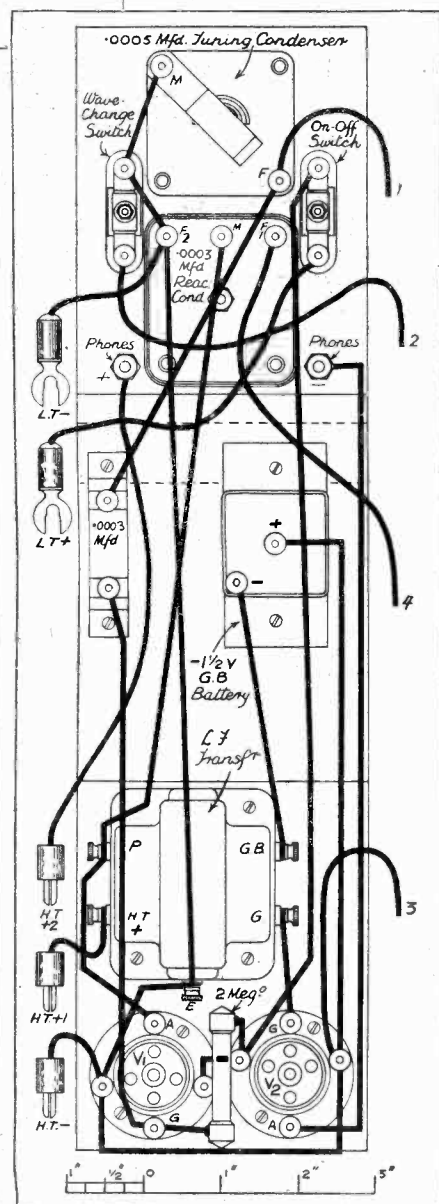
The headphones require to be fitted with plugs to fit the sockets on the panel, and it should be noted that it is usual to plug in the phones the right way round. Though the magnets are of cobalt steel it is common sense so to connect the phones that the H.T. current assists magnetism rather than opposes it.

### Small H.T. Battery.

A 1 1/2-volt grid-bias battery is wanted, and this is accommodated on the baseboard. It supplies grid bias for the L.F. valve.

A 60-volt H.T. battery suffices, the full voltage going to the L.F. valve and about thirty-six to the detector; but you can experiment with this in order to ascertain the best voltage for smooth reaction

### SEEN IN PLAN



### SOME SUITABLE VALVES

Make.	Detector.	Output.
Cossor ..	210H.F.	210L.F.
Mullard ..	P.M.1H.L.	P.M.2D.X.
Mazda ..	H.L.2	L.2
Osram ..	H.L.2	L.21
Marconi ..	H.L.2	L.21
Hivac ..	H.210	L.210
Tungsram ..	H.R.210	P.D.220
Dario ..	T.B.282	T.B.172

the area of a medium-sized biscuit tin) there is not a bushel of decibels to waste in inefficient components!

The main part of the constructional work involved in the building of this set is in the making of the case and its aerial frame and chassis. Not a great carpentering skill is needed: merely the ability to use a saw moderately well.

We propose to give the necessary instructions in detail next week. The mounting of the components and the wiring are very

In the wiring diagram to the right the flex leads which go to the frame aerial are numbered similarly to the holes in the aerial frame through which they pass. The panel and two sections of the baseboard are shown flattened out into one plane.

and greatest sensitivity with your particular detector valve. It is not a critical adjustment.

### Extraordinarily Economical.

An unspillable accumulator is used, and if you purchase any other make or type than the one listed herewith, remember that the accommodation for it is a fixed dimension!

And now a few words about battery consumption. You will discover that this little set is extraordinarily light on both H.T. and L.T. After a long period of use you will wonder when the batteries are going to run down, for they will seem almost everlasting if you have memories of the consumptions of the average loudspeaker portable.

And you must be careful that that does not lead you to neglect the accumulator cell. This ought to be tested at least once

### RECOMMENDED ACCESSORIES

**BATTERIES.**—Ever Ready "Winner," 60-volt H.T. Exide 2-volt accumulator, type P.O. 2. Siemens 1 1/2-volt grid-bias, type G.T.  
**HEADPHONES.**—1 pair B.T.H. high resistance.

a week and charged at regular monthly intervals.

Also, if the little set is to stand idle for any length of time, the batteries should be removed. Not that it does them any harm to be left in position; but when they are tucked away out of sight they are apt to be forgotten.

The "Midget" portable is quite easy to tune. As we have said, the smoothness of reaction depends to some extent on the H.T. applied to the detector valve.

If the reaction tends to be fierce and "hard" the detector H.T. can be dropped to as low as 30 volts with the average detector valve without any really noticeable loss of power.

### A Useful Direction Finder.

Don't forget the directional qualities of the instrument. To obtain the greatest volume it needs to be placed so that it is in line with the direction of the desired station. Tourists will note that the set, therefore, constitutes a rough direction finder.

However, to obtain the sharpest bearings it is generally better to work on the minimum strength of a station, and that obtains when the set is at right angles to the direction of it.

The controls must be turned slowly and carefully, or you will miss some of the programmes that are well within the capabilities of the little receiver.

### BUILD WITH THESE COMPONENTS

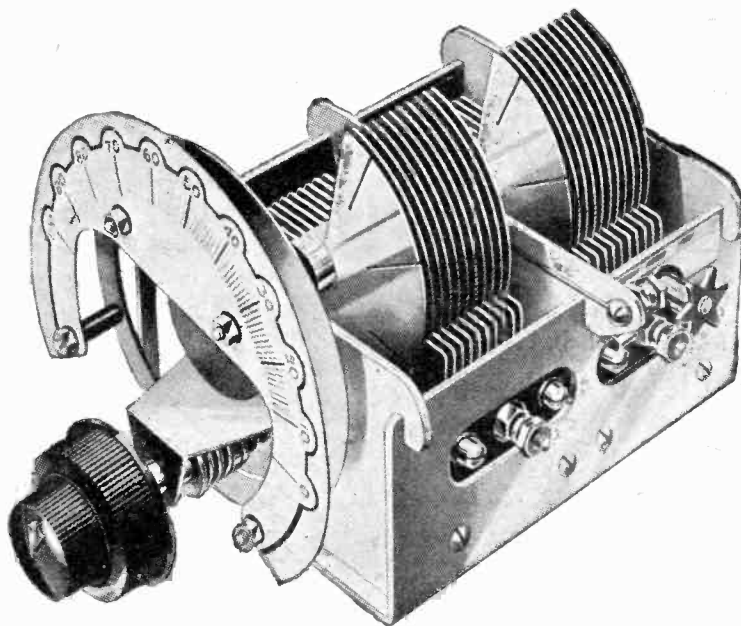
- 1 Graham Farish 0005-mfd. mid-log-line solid dielectric tuning condenser.
  - 1 Telsen 0003-mfd. differential reaction condenser, type W.351.
  - 2 Telsen push-pull two-point switches, type W.107.
  - 2 Clix plugs and sockets.
  - 1 Telsen "Ace" 1:5 L.F. transformer.
  - 1 Dubilier 0003-mfd. fixed condenser, type 620.
  - 1 Dubilier 2-megohm grid leak, 1-watt type.
  - 2 W.B. small type 4-pin valve holders.
  - 1 Peto-Scott ebonite panel, 5 1/2 in. x 3 1/2 in. x 1/8 in.
  - 1 Peto-Scott baseboard, 5 in. x 3 1/2 in. x 1/8 in.
  - 1 Peto-Scott baseboard, 8 1/2 in. x 3 1/2 in. x 1/8 in.
  - 1 coil of B.R.G. "Quikon" connecting wire.
  - 1 oz. Peto-Scott 36-S.W.G. S.S.C. wire
  - 2 Clix accumulator spades
  - 3 Clix wander-plugs
- Wood, covering, fasteners, hinges and handles for case, screws, flex, etc.

# TELSEN

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## PERFECT *Condenser* FOR EVERY PURPOSE

**B**UILT to the highest mechanical standards, and rigorously tested at every stage of manufacture, each Telsen Condenser is the finest of its type it is possible to produce, combining lasting efficiency with exceptional value.



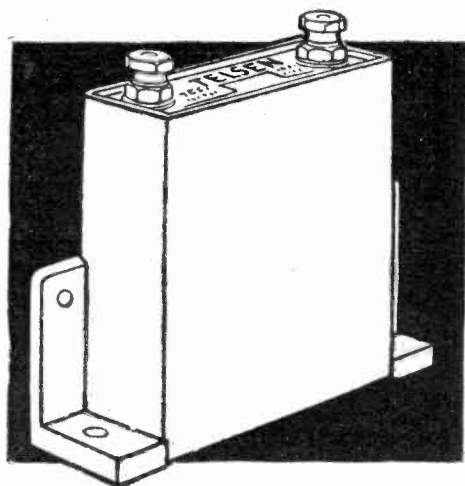
### TELSEN GANGED CONDENSERS

For use where accurate and simultaneous tuning of two or three circuits is obtained by the rotation of one dial. A pressed-steel frame of great rigidity eliminates distortion, the rotor and stator vanes being let into one-piece, high-pressure die castings to ensure accurate spacing. All sections are very carefully matched by means of split end vanes, and trimmers are provided. Complete with knob, pilot light escutcheon and two alternative tuning scales.

Single Unit, Price

8/6

Twin Ganged - - 16/6 Triple Ganged - - 22/6



### TELSEN PAPER CONDENSERS

Self-sealing, non-inductive and hermetically sealed. Give the highest insulation with complete freedom from breakdown. 500 volt test.

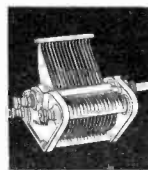
Capacity .01 mfd. . . . .	1/6
" .04 " . . . . .	1/9
" .1 " . . . . .	1/9
" .25 " . . . . .	2/-
" .5 " . . . . .	2/3
" 1 " . . . . .	2/3
" 2 " . . . . .	3/-



### TELSEN TUNING CONDENSERS

Very rigid construction, with high-grade dielectric, ensuring permanently accurate spacing with minimum losses. Exceptionally compact. Complete with knob.

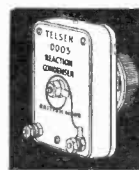
Capacity	Price
.0003 mfd. . . . .	2/6
.0005 " . . . . .	2/6



### TELSEN VARIABLE CONDENSERS

The frame is braced by three solid pillars, the vanes clamped at three points, making distortion impossible. Generous bearings prevent backlash or end-play.

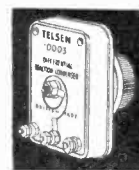
Capacity	Price
.00025 mfd. . . . .	2/6
.00035 " . . . . .	3/6
.0005 " . . . . .	3/6



### TELSEN REACTION CONDENSERS

Incorporate several valuable improvements, the whole unit being enclosed in a strong dustproof bakelite case. Supplied complete with knob.

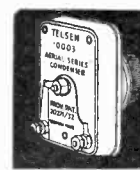
Capacity	Price
.0003 mfd. . . . .	2/6
.00015 " . . . . .	2/6
.0001 " . . . . .	2/6
.00075 " . . . . .	2/6
.0005 " . . . . .	2/6



### TELSEN DIFFERENTIAL CONDENSERS

Similar in design and construction to the reaction condensers. Supplied complete with knob.

Capacity	Price
.0003 mfd. . . . .	2/6
.00015 " . . . . .	2/6
.0001 " . . . . .	2/6



### TELSEN AERIAL SERIES CONDENSER

With switch.

Built on similar lines to the reaction condensers, providing an ideal selectivity and volume control. Supplied complete with knob.

Max. Cap.	Price
.0003 mfd. . . . .	2/6

## TELSEN FOR EVERYTHING IN RADIO

Announcement of THE TELSEN ELECTRIC COMPANY LIMITED, ASTON, BIRMINGHAM



# TESTED AND FOUND?

Being Leaves from the Technical Editor's Notebook

## THE BLUE SPOT "STAR"

DEVELOPMENTS in loudspeaker design appear to group themselves into two distinct classes. In the one are purely technical developments and in the other what I think can be termed developments of application. That is, improvements in the adaptability of the device to the one or more purposes and conditions.

Any fairly good step forward in either class is usually deemed sufficient justification for the introduction of a new model. Very rarely indeed are improvements in both classes coincident.

But this is certainly the case with the Blue Spot "Star," recently introduced by The British Blue Spot Company, Ltd., of Blue Spot House, Rosoman Street, Rosbery Avenue, London, E.C.1.

This "Star" is indeed a star, and constitutes one of the most important radio innovations of the year.

The Blue Spot "Star" looks different from any of its predecessors, and it is distinctive and novel in its design.

Instead of the usual obvious magnetic system, an entirely new arrangement is employed. Special magnet material is enclosed within four chromium-plated tubes, and these lend a quite attractively modernistic appearance to the loudspeaker.

The chassis frame is die-cast in one piece, and is thus very rigid and entirely free from audible resonance and from the possibility of loose parts creating chattering.

Special steps have been taken to exclude dust and to provide protection for the diaphragm and the speech coil. The suspension is particularly good.

## Matched with Any Output.

So much for the technical considerations of the design pure and simple, and I can say right away that they are extremely effective in practice, for the response of the speaker is excellent.

By means of a simple-to-handle plug and socket scheme it is possible to match this Blue Spot "Star" loudspeaker with any output including Pentode, Class B and Push-Pull, either direct from a plate circuit of an output valve or valves or from an existing output transformer.

Also it can be used as an extension speaker in combination with any other, and, because of the flexibility of its matching arrangements, without in any way upsetting the tonal balance of the other speaker. I fail to see why, in many cases, it should not actually improve it.

Well, all this you might think would be enough to justify a fairly high price as speakers go these days, though, as a matter of fact, the chassis model costs only 70s., but there is yet a further development of note.

There is a plug which can be used as an on-off switch or which can be removed for the insertion of a volume-control plug. The volume control is sold separately at ten shillings, complete with a lengthy flex. It is a remote control, and so can be placed

on the arm of your chair, so that the volume can be adjusted exactly to your liking without getting up and without reference to the actual set.

It should be noted that this volume controlling can be done without affecting the volume on any other loudspeaker which might be used with the same receiver.

I consider that the instrument is definitely an achievement, and while we naturally expect great things from Blue Spot, they have on this occasion quite excelled even themselves.

## A FINE WAVETRAPH

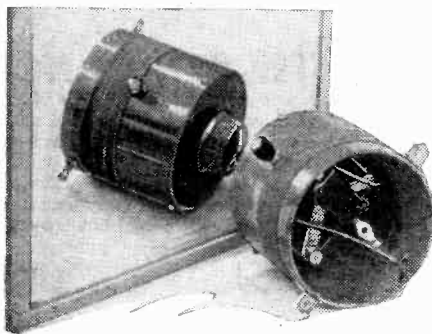
Whatever the Lucerne Wavelength Plan may or may not have done, there is one thing certain, and that is that it cannot have affected to any appreciable extent the average non-selective set.

And, judged by modern standards of reception technique, of which the 1934 superheterodyne is an excellent expression, there must be millions of sets which fall within that category.

The separation of stations on many of these can only be achieved by sacrificing power and a number of the programmes which would otherwise be available.

No doubt quite a large proportion of listeners find that they cannot pick and choose even between the London Regional, Midland Regional and other such stations because of the spread of their local stations.

Perhaps they go so far as to contemplate the purchase or construction of entirely new sets merely so that they can add another B.B.C. alternative or



Both the top and the bottom of the Wearite wavetrapp are shown in this "reflection photograph."

two, for it must be admitted that those Midland and Northern Regionals, for example, seem to be able to devise some very attractive programmes on occasions.

But such a drastic step is quite unnecessary. A powerful, interfering station can be successfully subdued without cutting down the sensitivity of the set by brutal aerial shortening or series-capacity measures.

All that is needed is an efficient wavetrapp. Placed in series with the aerial, this will enable any one station, however powerful, to be so reduced in strength that it no longer interferes.

It is an indisputable fact that the Brookman's Rejector wavetrapp principle is the most efficient of all, and great credit is due to Mr. G. P. Kendall for its invention.

## Perfectly Satisfactory in Every Way.

Quite recently we described the construction of a wavetrapp embodying a modern version of this now-famous principle, and it proved very popular.

But we received quite a number of letters from readers asking if the trap could be purchased ready made. That is not surprising, despite the simplicity of the construction, for a great number of present-day listeners appear to be prepared to pay a little more for such apparatus rather than make it.

However, at the time we had to say that there was no manufactured equivalent available. But this has now been rectified by Messrs. Wright and Weaire, of

740, High Road, Tottenham, London, N.17. They have made a wavetrapp which is the exact equivalent of our design, and it is, therefore, perfectly satisfactory in every way, and has the added advantage of a factory finish.

All those who are still troubled by the spreading of powerful stations now have the best remedy ready to hand. Let me remind you, in conclusion, that such a wavetrapp as this not only does not reduce the power of your set, but in cases actually increases it: further, it improves the general selectivity of the set, to some extent, while eliminating any one interfering station.

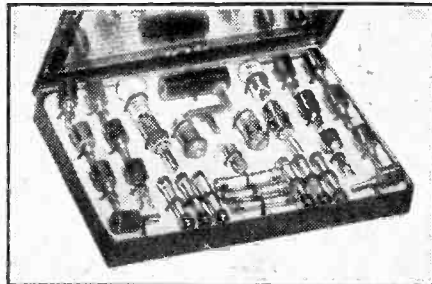
## NEW BELLING-LEE KIT

How often we find ourselves held up completely on a servicing job just because of one small item such as a plug or fuse which we haven't got!

I use the word "servicing" in its broad sense, and not in its professional application only. All of us radio folk, designers and constructors alike, find it necessary from time to time to undertake overhauls and repairs.

Sometimes they are our own sets that have to be seen to, and sometimes we are asked to do the professional man out of a commission!

But, quite apart from repair work, the "Belling-Lee" Spares Kit produced by Messrs. Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex, is invaluable to the experimenter and constructor.



Plugs, sockets, fuses, pilot lamps—all these are included in this useful "service kit" which every constructor will want to possess.

It is contained in an attractively printed tin box no larger than a flat box of fifty cigarettes, and includes the following items: 12 "Bowspring" Wander Plugs, 2 Banana Plugs, 1 four-volt Pilot Lamp, 1 six-volt Pilot Lamp, 2 Spade Terminals, 1 "Wanderfuse," 2 "Scruifuses," 10 Cartridge Fuses, 1 "Twintap" Plug.

These are all arranged in an orderly form, so that exactly the item needed is at once to hand.

While many others will find this outfit of immense value, it is, of course, to the service man that it will undoubtedly have the greatest appeal.

The price of the kit is 10s. 6d., and it might be mentioned that that does not quite equal the total list price of the individual items which it includes.

## THE LINK BETWEEN

Notes of interest to buyers

By G. T. KELSEY.

COINCIDENT with the release of still another recreated record of the voice of the late

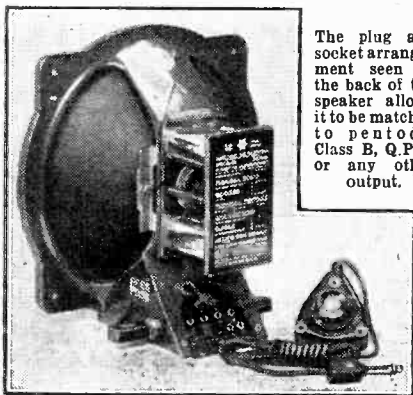
Enrico Caruso, an amusing story is told concerning an experience which befell the great tenor when he was spending a holiday in one of the more rural parts of America.

One day he called in at the local post office to see if there were any letters waiting for him, but to his consternation he was told by the clerk that, although there were some letters, it would be necessary to provide proof of identity before they could be handed over.

Enrico, attired only in a shirt and flannel trousers, confessed that he had not his note case with him, but said: "Surely you can recognise me from my photographs." But the clerk remained obdurate. "No," he said, "other men may resemble Caruso in appearance, and if you want to prove it to me—well, there is only one Caruso in voice."

Much amused, the great tenor asked the clerk what song he would like him to sing, and, clad only in shirt and trousers, Caruso

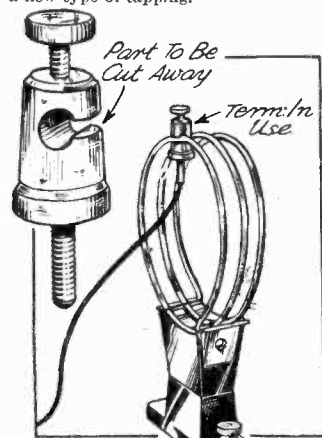
(Continued on page 290.)



# A PAGE of Recommended WRINKLES

## TAPPING S.W. COILS.

WHEN tapping short-wave coils of the 16- or 18-gauge self-supporting type, a crocodile clip is often used. This, however, tends to be knocked loose. For this reason I have devised a new type of tapping.



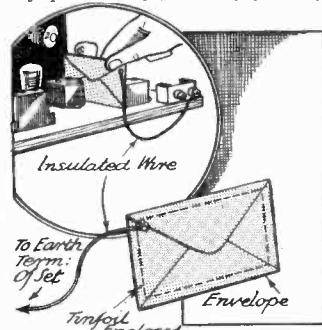
A method of tapping short-wave coils which is efficient and instantly applicable.

A terminal of the telephone type is taken, and the part of it as shown in the diagram is cut away with a hacksaw. When a permanent tapping is desired the terminal is slipped on to the wire and the screw is tightened.

## TO FIND THE BEST POSITION.

WHEN a set is unstable it is often suspected that additional screening will cure the trouble. But where?

If a sheet of tinfoil, with a length of insulated wire attached to one corner (by twisting the two together), is placed flat in an envelope, with the wire protruding from one corner, the envelope may be pushed and bent into any part of the set without fear of



The screen may be moved about without fear of shorts.

short circuiting; and if the other end of the wire is attached to the earth terminal of the set, an effective screen is produced.

When the correct position of the required additional screen is found, a proper one may then be made out of sheet metal and substituted for the envelope.

## ONE GUINEA FOR THE BEST WRINKLE!

Readers are invited to send a short description, with sketch, of any original and practical radio idea. Each week £1 1s. 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 piece of paper, written on one side of the page. Address your hints to the Technical Editor, "Popular Wireless," Tallis House, Tallis Street, E.C.4, marking the envelope "Recommended Wrinkles."

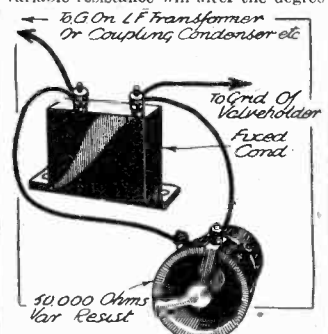
Will readers please note that the Editor cannot, in any circumstances, guarantee to return rejected Wrinkles, and that payment for published hints is not made until ten days after they appear?

The best Wrinkle in the issue dated May 19th was sent by Mr. W. H. Grayling, 8, Milton Rd., Cambridge, to whom a guinea is being awarded.

## A SIMPLE TONE CONTROL.

IN some cases it is found desirable to increase the high-note response of a receiver or amplifier. This can be easily effected by connecting a fixed condenser in series with the grid lead of one of the L.F. valves.

A variable resistance should be connected in parallel with this fixed condenser. Varying the setting of the variable resistance will alter the degree



With these two components you can adjust the high-note response of your set.

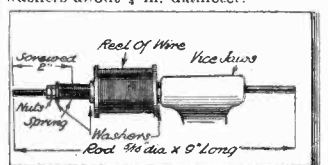
of tone correction. .005 mfd. is usually a suitable value for the condenser, and a 50,000-ohms resistance will give adequate control.

## TENSIONING WIRE FOR HAND COIL-WINDING.

WHEN making coils for home-made sets I have found trouble owing to the difficulty of getting the right amount of tension on the wire to prevent overrunning.

In order to overcome this I adopted the arrangement shown in sketch enclosed, which has proved very satisfactory in use. The rod is simply clamped into the jaws of a vice.

All that is needed is a piece of round metal rod, about 9 in. long x  $\frac{1}{8}$  in. diameter or thereabouts, to suit the size of hole in the reel of wire to be wound. One end of the rod is screwed for about 2 in. in length and is provided with a nut, a spring and three washers about  $\frac{1}{4}$  in. diameter.



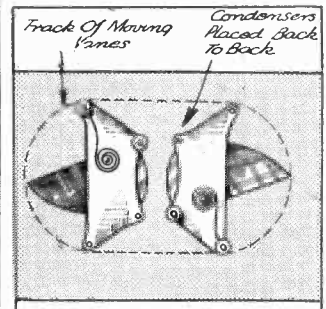
The tension can be adjusted to suit all reels and purposes.

Varying lengths of reels can be provided for by simply pushing the rod farther into the jaws of the vice. The spring can be partly compressed when placing the rod in the vice and fine adjustment made by means of the nut. The wire is wound by turning the former with the left hand against the tension, and with the right hand the wire can be kept close up to that already wound. Counting the number of turns is not necessary if a trial run for, say,  $\frac{1}{4}$  in. is made and the number counted. Thus for a 50-turn coil—say 10 turns for  $\frac{1}{4}$  in.—the coil will be  $1\frac{1}{2}$  in. long.

## FITTING VARIABLE CONDENSERS.

IT is sometimes found necessary to connect two variable condensers in a very confined amount of panel space, as, for example, on the aerial side of the screen where there is only a limited space.

In this case it is necessary to know exactly the very smallest area the condensers will occupy so that they may be used to their fullest advantage. To do this, place the condensers down, back to back (as sketch), on a piece of paper. Find, by plotting points at the tips of the moving vanes, the farthest distance, across the condensers, from tip to tip of the moving vanes. Plot



Arranging the condensers to take up a minimum of space.

also the points at the other extremities. By connecting these lines, as in sketch, and placing the paper against the panel, the most convenient arrangement may be found.

## A CORNER CABINET SPEAKER.

A PLAIN 18-in.-square baffle across the corner of the room, for considerations of space, proved unsuitable both from the point of view of appearance and performance.

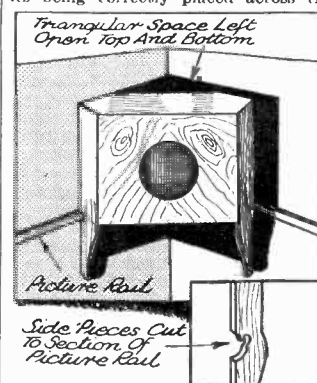
The baffle was then reduced approximately to 12 in. square, and two of the strips sawn off the sides were utilised

for side supports, as shown on the sketch, and cut out as shown exactly to fit over the picture-rail moulding.

The side pieces are at right angles to the wall, and the angle between the sides and the baffle requires careful cutting, but plastic wood is a great help in disguising doubtful joints!

The top and bottom boards of the cabinet are 5 in. wide and cut at the ends from both sides to an angle of 45°, thus fitting the cabinet at the front and resting snugly against the wall at the back. This leaves a triangular opening, top and bottom, at the back between the speaker and the corner.

If the portions to fit the picture rail are accurately cut, the cabinet stands on the rail quite firmly without fixing screws, the shape necessitating its being correctly placed across the



No nails or hooks have to be driven into the wall to accommodate this speaker.

corner; and it cannot fall forward owing to the shape of the side pieces carried below the picture rail.

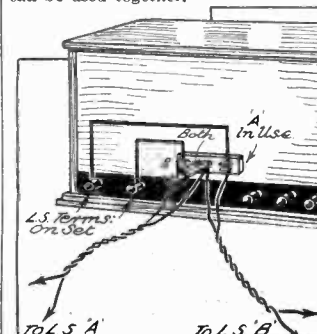
## SPEAKER SWITCHING.

WHERE two loudspeakers are used in series, each in a different room, some arrangement is usually required for switching one or the other off.

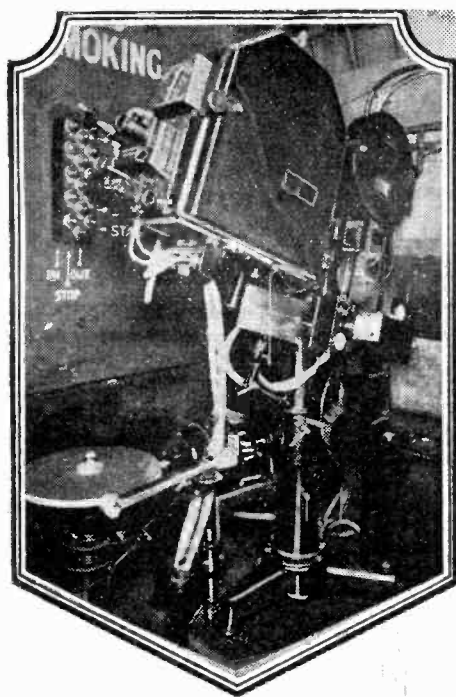
The simplest form of switching for this purpose is by means of a single-pole double-throw switch.

In one direction one of the speakers is in use and the second shorted, while in the reverse position, of course, the second speaker is used, the previous one being shorted.

In the "up" position both speakers can be used together.



Either or both of two speakers can be instantly switched into circuit.



# WIRELESS CASTS ITS SHELL

We are apt to forget that the science of radio is responsible for many valuable developments besides wireless communication. In this comprehensive article, little-known branches of the subject are described

By EDWARD LUPTON, D.Sc., Ph.D.

**T**HERE was a day, many years ago, when wireless was merely "wireless." The science at that time was merely one of communication: that is, the transmission of intelligible signals from one point to another without intervening wires. Things stood thus, more or less, until the advent of the valve or vacuum tube. The first really successful wireless telephone soon followed this.

We all know, of course, that broadcasting itself is only the propagation without wires of signals to be received at the other end. But wireless does not stop here, although the public at large is not aware of the fact that the science of wireless is used for hundreds of different purposes, apart from broadcasting and telegraphy.

The following few remarks may be of interest to those who have not given close attention to the tremendous growth, in every direction, to which wireless has actually attained.

## Broadcasting Foreshadowed.

For instance, as far back as 1908, when wireless was just getting into its stride, the Dynamophone was invented. The Dynamophone was an apparatus whereby it was possible, with the human voice, to start an electric motor or any other electrical appliance from a distance.

Every time words were spoken into a microphone a transmitter would be energised, sending out impulses; whereupon the motor at the receiving side would start and run as long as the words were spoken into the distant transmitter.

While it was at that time but a toy, the apparatus foreshadowed broadcasting, because this was before the days of the wireless telephone, and the human voice actually did create effects at the receiving end.

## Automatic Lightning Recorder.

At a not much later date the Ceraunograph was evolved. This was an automatic lightning recorder, and was constructed from the then existing wireless apparatus.

It recorded, on a paper tape, lightning discharges at a great distance. A similar device, employing the same principle, is in use to-day by a New York power company to record the approach of thunderstorms many hours before they actually arrive in the city. Both of these devices were invented, of course, before the day of the valve.

The marvellous valve makes possible not only the wireless telephone and broadcasting, but also many other important developments. It is really only from the time of the advent of the valve that wireless has left its home sphere and invaded other and older sciences, causing and creating many revolutions in them.

## Long-Distance Telephony.

For instance, up to the time of the perfection of the valve it was not possible to talk by wire over very great distances. The telephonic repeater coils, loading coils and others, as well as the very heavy lines

necessary for long-distance communication, made this feat impractical.

The valve changed the situation altogether, and to-day it is used in long-distance telephony to an extent which the public very little appreciates. That is only one case where wireless principles are applied to line telephony and make possible the bridging of great distances, impossible to cover otherwise.

## The Weight of a House Fly.

An ordinary house fly alights upon a steel bar, a quarter of an inch square. What happens? Perhaps offhand you will say, "Nothing." Nevertheless, the weight of the fly depresses the steel bar to an extent which, impossible as it sounds, can be measured to-day. The instrument, in fact, measures the movement of the incredibly short distance of three billionths of an inch and is called the Ultra-Micrometer.

It is capable of measuring distances 15,000 times shorter than have hitherto been detectable with microscopes of the highest magnifying power. Again, wireless instruments and the valve are called in to achieve the result just cited, because the heavy steel bar upon which the fly alights is but part of a condenser; and the change in the capacity of the condenser, although the fly weighs practically nothing, is sufficient to be accurately measured.

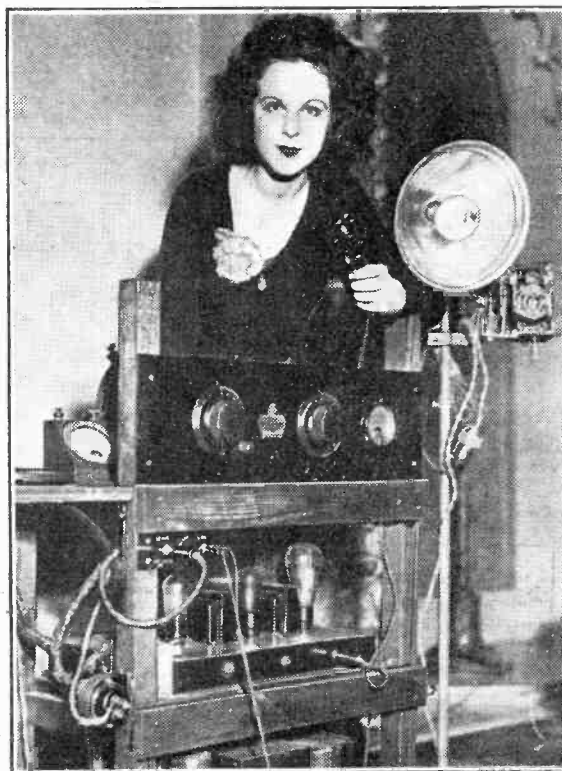
## Modern Recording.

The "talkies" would not be a success if the valve and wireless principles were not used in some of the stages. The same statement is true of the modern gramophone, where both the recording and reproducing are done by means of wireless instruments.

Most readers are probably familiar with the method of trapping burglars by making

(Continued on page 289.)

## BURGLARS, BEWARE!



One of the latest developments made possible by the wireless valve is the burglar alarm illustrated here. This instrument (shown in its experimental form) sends out a radio-alarm signal to the police, and at the same time takes a photograph of the intruder by means of the camera shown on the right.



# RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped addressed envelope must be sent with every article.

All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4.

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.

## QUESTIONS AND ANSWERS

### THE LICENCE QUESTION AND THE PORTABLE SET.

T. T. (Chesterfield).—"How do I stand about the licence for a portable set if I make up a small one in addition to my ordinary set? I'm going camping in Cornwall and Devon—just two of us, and plenty of room for a small set in case we get a lot of wet evenings."

"But, being recently married, I am about 'stony,' and if my expenses on the holiday set will have to include 10s. for another licence fee I shall have to cut down on the portable or else try and take the home set on holiday, with the risk of regretting it."

"What is the position when leaving home with a wireless set?"

It is a condition of the ordinary licence that the licensee, or members of his household, may use more than one receiving set at the licensed address without obtaining an additional licence. So your ordinary licence covers both the original set and the portable at home.

Moreover, if you look at the back of your licence you will find that one of the conditions under which it is issued is the following:

"This licence will be deemed to permit the occasional use by the licensee or a member of his household residing with him at the address of the station of one portable wireless receiving set (1) away from the address of the station (e.g. in the open air) or (2)

at another fixed address at which the licensee is temporarily resident; but the Postmaster-General reserves the right to withdraw such permission and to require the licensee to take out a second licence if he is of opinion that such use is not occasional or such residence is not temporary. The portable set shall be used in all other respects in accordance with the terms of this licence; a person using his set away from the licensed address shall carry this licence with him."

### WHAT DOES EACH COMPONENT DO?

A question that frequently arises in correspondence is that given above—"What does each component do?"

To answer it fully would necessitate much more space than is available, for even in the simplest set each component is kept extremely busy in the electrical sense. But the following description and the photograph will give some idea of the action of the various parts:

Placing the L.T. switch in the "on" position enables electrons from the L.T. battery to flow through (and thus heat) the filament of the valve.

Some electrons are detached from the heated filament and are attracted to the anode across the vacuum inside the valve; so switching on L.T. starts this H.T. current as well. (It flows to the H.T. battery + via the H.F. choke and phones.)

The sounds heard from the phones are due to low-frequency variations of this (H.T.) current, the variations being caused by voltage variations of low frequency on the grid of the valve.

To understand how these are applied, consider the H.F. currents which are flowing in the aerial-earth circuit due to the action of the distant station. They pass through the set via the A and E terminals, crossing the preset condenser and flowing through the aerial portion of the coil unit.

### Sharpening the Tuning.

The object of the preset condenser is merely to alter the aerial circuit's capacity (and thus "sharpen tuning"), so this condenser can be omitted without affecting the fundamental action of the circuit. But the aerial coil is essential, because the magnetic field around it (due to the currents flowing through the winding) links the aerial winding with the adjacent grid coil.

The action takes place across the small space separating the two windings.

Across this grid coil H.F. voltages are thus

created by the aerial coil's magnetic field. And corresponding H.F. currents then tend to flow in the grid (centre) coil, and so to the tuning condenser, which is connected across it.

This condenser-and-coil combination forms an H.F. circuit, having a natural frequency of its own. When adjusted to the same frequency as a transmitting station, the circuit responds vigorously to it, but other currents, from stations working at different high frequencies, affect it to a comparatively small degree.

We can thus, by tuning, select one (the desired) station's effects and reproduce them in the adjacent coil-and-condenser circuit. The effects consist of high-frequency currents, which are varying in amplitude from moment to moment at low frequencies.

### Electrical Counterparts of the Sounds.

These amplitude variations, caused by the speech or music at the distant transmitting studio, are the electrical counterparts of the sounds there. And they are, therefore, as varied and as complex as the sounds themselves.

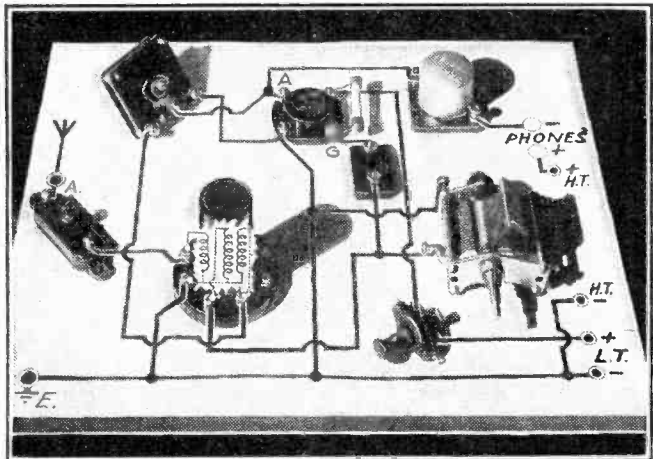
Whatever the sound frequencies—due to piano, harp, voice, drum or any combination of these or other "instruments" in the studio—the corresponding electrical frequencies are to be found in the receiver's tuned circuit as amplitude variations.

How are they detected and made audible?

We already have a current flowing through the phones, but it is a steady, unvarying current, which needs to be altered in amplitude at the sound frequencies in order to produce the required sounds from the telephones.

This can be done, as stated, by virtue of the fact that the amplitude of the plate current of the detector valve is controlled by its grid voltage.

## A RELIABLE ONE-VALVE ARRANGEMENT



The black lines show how the various terminals should be wired to form a one-valve, with leaky-grid detection and reaction. In practice there would probably be a wavechange switch associated with the coil unit, but this has been omitted to simplify the illustration.

The tuned circuit—coil and condenser—is connected between the valve's filament and grid. (The connection is made directly in the case of the filament end, and via the grid condenser to the grid.)

Voltages developed in the tuned circuit are thus impressed across grid and filament, and H.F. voltages appear in the plate circuit. Barred by the H.F. choke, they cause H.F. current to flow in the reaction circuit.

This consists of the differential reaction condenser and the reaction coil winding.

The reaction condenser enables more or less of the H.F. current to be passed through the reaction coil, where it is magnetically linked with the original current in the tuned circuit.

(Continued on next page.)

## ABOUT YOUR CONTROLS

### TUNING

Ideally, tuning should be adjustable by one knob and independent of all other controls. In practice, for economical and other reasons, it frequently requires simultaneous adjustments to two condensers; and it is often affected by the selectivity adjustment, and to some small extent by reaction.

Accurate tuning is specially important in a band-pass type of set, because, if a station is a little off-tune, the quality may be badly affected. The best aid to correct tuning is a low-reading milliammeter (usually 1-5 m/a scale) inserted in the detector's H.T. + lead, where it will give a visual indication of exact tuning.

When searching for distant stations tuning can be adjusted in conjunction with reaction, if available, to obtain maximum sensitivity and range.

Details of the correct methods to apply will appear in these columns in future notes "About Your Controls."

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

Thus the degree of feed-back is easily controlled, and the original tuned H.F. impulses can be strengthened to any desired degree within the limits of the system.

When H.F. voltages—whether due to the distant station alone or strengthened by reaction—are thus applied to a valve, the grid attracts to itself some of the electrons from the filament. They form a small current, flowing externally from grid to filament via the grid leak. (The grid condenser is an insulator to such currents.)

When current flows through a resistance such as this there is always a voltage difference across the resistance. As the current varies in average amplitude, L.F. voltage variations appear across the ends of the resistance.

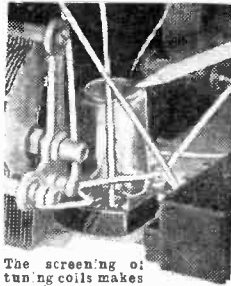
Thus the effect of the grid-leak-and-condenser combination is continually to vary the grid voltage in accordance with the low frequencies of the sounds heard in the distant studio. And as the grid voltages affect the plate current, the corresponding current variations appear in the valve's anode circuit.

Being at low frequencies, these variations in current are not impeded by the high-frequency choke. They therefore pass through it to the phones, which thus operate to produce sounds corresponding to the original ones.

### EASILY MADE MISTAKES THAT ARE HARD TO FIND.

Recent correspondence from readers who have been in trouble with their sets discloses the curious fact that in a great proportion of cases it is the *simpler* faults that are now proving the harder to find.

The complicated circuits of multi-electrode valves do, of course, present difficult problems,



The screening of tuning coils makes possible very compact components and set designs.

### FOR BETTER RADIO

Prior to the general use of high-magnification valves, screening was of a very incomplete character or absent altogether; but

when the valve improved, it became imperative to prevent unwanted feed-back between different stages of the set.

Coils, condensers, transformers, chokes and valves themselves are all commonly screened, the latter by means of a metallic coating on the bulb, joined to one of the "filament" legs.

The coils, etc., usually have a metal cylindrical screen, and this may give trouble unless properly earthed. If it makes contact with a screen holder the contact must be firm, or crackling and instability may result. The fact that a metallised valve's coating is "earthed" implies that care must be taken not to allow battery leads, etc., to touch it accidentally.

but the really elusive fault is often due to something which is "too obvious" to be seen.

One Hornsey reader put the matter in a nutshell when he wrote:

"At last I have solved the mystery. It was

a 'silly-ass' fault, and I think these are the hardest to find. I am almost ashamed to confess that, after all the trouble I have put you to, there was really nothing wrong with the set at all except the fact that I had reversed the G.B. leads!

"Honestly, I can't imagine how I missed it, especially as the possibility was mentioned in your first letter, and I can only suppose that I was so much on the look-out for the out-of-the-way fault that I could not see the obvious one staring me in the face."

Here is another case, reported by Mr. R. C. Thomas, of 132, Queen's Road, Halifax, in a letter to the Editor; and it will be noted that Mr. Thomas found a comparatively tricky fault without too much trouble. But he was thinking of calling in the aid of a coal-hammer!

### Wrong Grid-circuit Connections.

This is what he says:

"I have read with interest the discovery of queer faults in set building published from time to time in 'Radiatorial.' The following may be of some interest to other readers:

"I have just completed a small portable of the Det., 2 L.F. variety which, when completed and switched on, simply refused to utter a sound.

"First the valves were tested: all well. Next a run-through with a flash-lamp bulb disclosed a connection to earth.

"Having rectified this, thinking everything was O.K., I again switched on and received very faint, distorted signals.

"By this time I was considering operations with a coal-hammer, and then I saw it—right under my nose, fairly standing up and yelling at me!

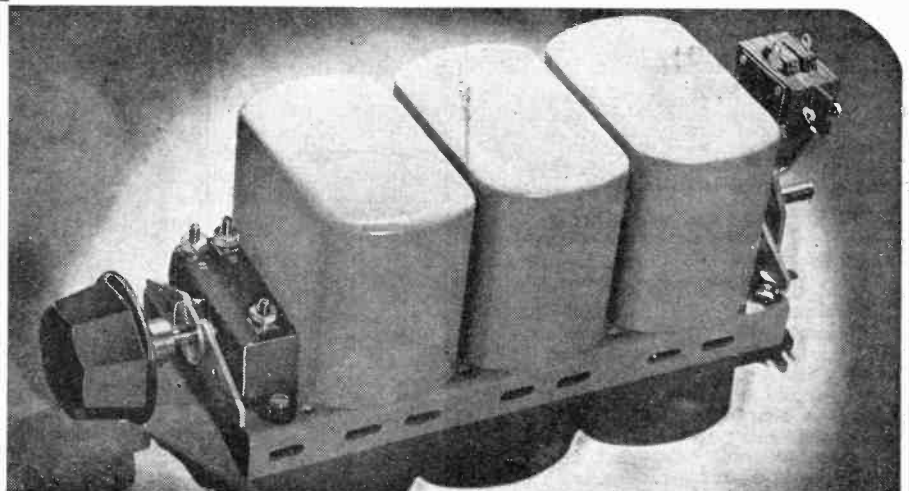
"The grid condenser and leak were connected wrong way round. The end of the condenser, which should have gone to the end of the grid coil, was taken to L.T. +, and the bottom of the grid leak to the coil—the other terminal unconnected."

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## TELEVISION FOR THE AMATEUR CONSTRUCTOR

A new book that should be read by all interested in television.

THE fourth edition of "Television To-day and To-morrow," by Sydney A. Moseley and H. T. Barton Chapple, Wh. Sch., B.Sc. (Hons.), containing a foreword by John L. Baird, has just been published at 7s. 6d. net by Sir Isaac Pitman & Sons, Ltd.

While this book deals almost exclusively with the Baird systems, that does not imply as great a limitation as might be thought, for in their applications these systems undoubtedly cover or are allied closely to much of the general television progress and development that have taken place to date.

There is a considerable amount of interesting historical matter, and the early attempts of the Baird Co. to get their system on the air, which ended in an amicable collaboration with the B.B.C., are dealt with in some detail.

The theory of television is adequately encompassed, and there is a wealth of practical information concerning the subject, the clear and simple text being backed up by numerous diagrams and photographs.

It is certainly a volume which television experimenters will find both readable and helpful.

## THE LISTENER'S NOTEBOOK

(Continued from page 276.)

end. Perhaps 65 minutes was a little too long for such a thing.

Or was it because the main theme in the final stages was war?

The best feature of these productions is that they contain the elements of many varieties of entertainment, all skilfully blended.

I would readily award "Scrapbook for 1914" my weekly bouquet, minus no sprigs, were it not for the Royal Command Variety Show.

But, obviously, before this performance everything else paled. The show was outstanding, and the continuous roar of laughter from the Palladium audience was a tonic in itself. Surely no further proof of the value of an audience to these shows is now wanted.

I take it that it was Christopher Stone's especial care to help the listener to get the atmosphere. Actually, his help was unnecessary. When he might have helped—as, for instance, in the burlesque at the end of the performance—he wasn't able to get a word in. He wisely refrained from trying, and after the turn confessed he had left it all to our imagination.

I should say that the most popular tune to-day in England is the one that was first brought to universal notice by the "In Town To-night" series. I mean Eric Coates' composition from the "London Suite."

It is a fascinating tune, and one that will not pay the usual penalty tunes pay for their popularity—an early demise. I should say it will be added to the list of tunes that will live for ever.

Was that bus-driver hard on the woman driver, or wasn't he? He must have had lots of experience of her, and he should know.

The Mills Brothers have caused me to modify my views of the American crooner. This will strike you as a rapid conversion on my part, considering my denunciation of him last week. In my defence, however, let me plead that these clever brothers aren't typical of their

crooning compatriots. They sing quietly, harmoniously and do not make nasty noises.

Early evening broadcasts have a seriousness these days that can only suit the specialist listener. Surely one must be in the proper mood for most of the items that are broadcast before the hour of 8 p.m.?

And, talking of hours, I wouldn't call the B.B.C. announcers perfect demonstrators of the 24-hour clock system. Mistakes have been rather frequent. But I sympathise with them. They must find the big numbers of the new times confusing, particularly after the simplicity of the old.

I see no advantages at all in the innovation. It is untrue to say that the 24-hour clock is simple and more practicable. C. B.

## WIRELESS CASTS ITS SHELL

(Continued from page 286.)

it impossible for them to approach a safe within three feet. By upsetting the fine electrical balance of a system of wireless instruments it is thus possible to give an alarm before the burglar or safe-cracker has even touched the safe itself.

Some six years ago a method was devised whereby all employees emerging from a factory and passing through a certain gate would immediately indicate to an observer whether or not the employee carried an excess of metals on his body. By means of valve amplifiers it is even possible to detect as small a quantity of metal as the gold or silver filling of a person's teeth.

Another development, also of interest, is the use of a condenser in wireless amplification, whereby the small variations in the capacity of the condenser are used to reproduce gramophone music in a manner of which one would scarcely dream.

It may be said with safety that the surface of what remains to be done has as yet not been scratched. There is scarcely an industry to-day that cannot make use of wireless instruments in some phase of its work. When it is realised that by means of wireless instruments it is possible that the heartbeats of a chicken can be magnified so that an audience of thousands of people can hear the sound throughout an auditorium, it should be apparent how wonderful and how universal the uses of wireless apparatus have become.

## MORE ABOUT THE "DOUBLE P.D."

(Continued from page 273.)

But also remember that to be properly trimmed means that adjustment of any trimmer either way will weaken reception of a distant station. It is not just a matter of bringing the trimmer up to a maximum, but of being able to pass it in either direction and then setting the trimmer on the peak point.

With this task over we can settle down to enjoy the results the "Double P.D." will provide. Tuning is perfectly straightforward and quite sharp. Volume is controlled by the right-hand knob on the panel and wavechange and on-off by the knob on the left.

Remember, in this latter connection, that the mains themselves are plugged into the set, and then the set is plugged into the power pack. That is why the two plugs on the set are provided. The mains do not go direct to the power pack.

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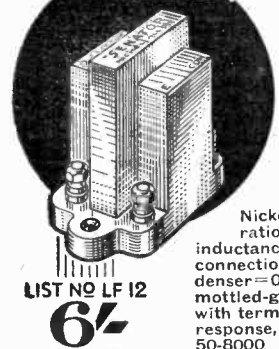
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## THE LINK BETWEEN

(Continued from page 284.)

thrilled the inhabitants of the little American village by singing "Only for You." Of course, the letters were duly handed over, but the anti-climax came when the clerk confessed that he had known Caruso's identity all the time, but that he had bet a friend that he would persuade the world's greatest tenor to sing to him without a fee!

This is a little off the beaten track, perhaps, but it happens to be this very song which is the latest to be recreated by H.M.V.'s remarkable process. It is coupled with "A Vague Resemblance," another Caruso recreation, on H.M.V. record number DA 1,367. It's an ideal record for radiogram work.

### P.W.'s Personal Corner.

Just before I settle down to my usual task of providing points for purchasers, I want to make a brief reference to two important appointments which have recently been made in the radio world.

I am confident that readers will join me in extending good wishes first to Mr. Frank Gill, O.B.E., who has been elected Chairman of Kolster-Brandes, Ltd., and secondly to Mr. Ernest J. Long on his appointment to the managing directorship of the British Elbonite Co., Ltd.

Both of these gentlemen have had very distinguished careers in the radio industry, and there is little doubt that their brilliance in other directions will have pleasant reactions

### OUR POSTCARD SERVICE

Applications for trade literature mentioned in these columns can be made through "P.W." by quoting the reference number given at the end of the paragraph. Just send a postcard to G. T. Kelsey, at Tallis House, Tallis Street, E.C.4. Any literature described during the past four weeks may be applied for in this way—just quote the number or numbers.

in the future activities of the two firms in question. In the typical "P.W." style, we wish them the very best of luck.

### Battery News.

I learn with interest from Siemens Electric Lamps and Supplies, Ltd., that a new "Full O' Power" battery has just been introduced for use with the popular K.B. model 274 "Kobra" receiver. This new battery is 120-volts H.T. and 9-volts G.B. combined, and its dimensions are 7½ in. x 8½ in. x 3 in. The list price is 12s., and when ordering you should quote the reference number 1193.

### Wearite Excel.

I am amazed at the success of the new Wearite Universal coil, although, quite candidly, I think it is very well deserved. It is characteristic of Wearite that when they do a thing they always do it well, and the new Universal coil is certainly no exception.

I think that this time they have excelled themselves, for at the price I know of no coil on the market that can touch it.

It is obvious that the constructing public has realised that too, for the coils are selling in thousands, and I understand that it is very much a case of all hands on deck down at the Wearite factory to keep pace with orders. That's the stuff to give 'em!

I expect that most of you will already have obtained details of this new coil; but in view of the tremendous popularity of the component, I propose to make the literature available through our postcard (No. 86.) service.

## TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio.

By Dr. J. H. T. ROBERTS, F.Inst.P.

### A New Type of Loudspeaker.

I SEE that a new kind of loudspeaker is now being put on the market, based on the piezo-electric principle. In case you do not happen to know what the piezo-electric principle is, it depends upon the use of a substance, generally of a crystalline type, which will expand and contract when electrical potentials are applied to electrodes stuck on the sides of it. A large crystal of Rochelle salt is a well-known example of a piezo-electric substance, whilst quartz (cut in a special way) is another very familiar example. In fact, it was with quartz plates that piezo-electricity was first investigated (by Monsieur Curie, if I remember rightly).

### The Effect of Alternating Potentials.

If the potentials applied to the electrodes (pieces of tinfoil stuck to the sides of the substance) are alternating, then the piezo-electric substance will expand and contract in a corresponding fashion; and if a diaphragm is fixed to one end of it, and the other end is fixed to some fairly rigid support, you will get vibrations of the diaphragm corresponding to the variations in the applied potential. Here you have all the elements of a loudspeaker, but the actual amplitude of motion is relatively small.

Recently, however, methods have been found for greatly increasing the amplitude of this movement, so that practical loudspeakers can now be made. Apart from this, the arrangement has the very great advantage that the phenomenon is a molecular one, and therefore the movements of the substance follow the variations in the applied electrical potentials with extreme rapidity and great faithfulness. So to that extent the system is eminently suitable for use in a loudspeaker unit.

### Excellent High-Note Response.

In the new loudspeaker now being put on the market the piezo-electric arrangement is used in conjunction with a moving coil, and it is claimed that the combination gives very perfect reproduction. With the Rothermel-Brush piezo-electric speaker it has been shown that good reproduction is obtained with frequencies up to as much as 8,000 cycles, and even higher than this.

It is quite likely that we shall hear a good deal more of this type of speaker in the near future.

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

### Some Interesting Battery Tests.

You are always being advised to go in for genuine British-made H.T. batteries and to give the go-by to the cheap foreign article. To show you that this is not merely a question of supporting home industries and all that, and that you really get better service out of a properly made British battery, some very careful tests have lately been made at the National Physical Laboratory, and the results of these are important to all users of battery-operated sets.

In these tests four high-tension batteries of different makes were taken, each with a 60-volt nominal rating, two of the batteries being well-known nationally advertised British brands, whilst the other two were of what we may call "the other kind."

### Finding the Effective Life.

Each of the batteries was discharged over a given number of hours per day until

### HENRY GETS THE BIRD!



Henry Hall and Florence Desmond investigate the new streamlined refrigerator which H.M.V. have recently produced as another addition to their wide range of electrical manufactures. The chicken which Florence Desmond is handing to Henry was placed in the refrigerator and left for a month—before being eaten!

the voltage had fallen to 36 volts. For the purposes of the test we can call the two well-known brands numbers 1 and 2 and others 3 and 4. It was found that in the case of numbers 1 and 2 the effective life came to about 210 hours, whilst with number 3 the figure was about 145 hours, and number 4 about 175 hours.

The deterioration of 1 and 2 was gradual until the end of about 150 hours run, whilst with numbers 3 and 4 the deterioration became fairly rapid after about 60 hours run.

At the end of 150 hours number 3 had ceased to be effective and number 4 had dropped to 39 volts, whilst numbers 1 and 2 registered about 49 volts each.

### Eliminating Interference.

Electrical interference with radio reception is now becoming so widespread that definite measures are being taken by the broadcasting authorities in different countries to see what can be done in the way

of concerted action to deal with it. In this country there are thousands of listeners who wish to install electrical household appliances, such as electric refrigerators, vacuum cleaners and so on, who hesitate to do so because they are afraid that these may cause interference with their radio reception.

A Committee on the electrical interference with broadcasting has been set up by the Institution of Electrical Engineers, and a special meeting of this Committee was recently held, with a representative of the B.B.C. present. I understand that the Committee has come to the conclusion that it is essential to get down to practical methods as soon as possible for checking this interference and for dealing with apparatus which causes it.

### A Standard Limit.

It is suggested that a standard limit of radio interference should be defined and adopted, this standard to be one which would give reasonable immunity for a good set and which, at the same time, would be reasonable also to the manufacturers of electrical appliances of various kinds.

Another Committee is to study the various devices which can be adopted by the listener himself so as to suppress interference from electrical apparatus.

I said something about this in these Notes quite lately, and you may recollect that I have more than once mentioned different devices which are available on the market for this purpose. There is no doubt that the matter is one of increasing importance, and although technically the best way to tackle it is at the offending instrument or machine, whatever it may be, nevertheless personally I believe that the most practical method, at any rate for the time being, is for the listener to try out different devices which he can use on his own set or electric-light wiring system.

### Another New Home Recorder.

I hear news of a fresh development in home recording. You will remember I mentioned in these Notes some time ago a system of home recording in which the record was made on a plastic material, which was afterwards baked for two hours in a special electrically-heated oven. This baking hardens off the material, so that, whilst it is soft for recording, it becomes hard for reproducing.

The baking, however, is evidently a nuisance and something you want to avoid. Well, this latest method does avoid it. The record consists of a thin circular aluminium sheet—conventional size—covered with a layer of cellulose varnish. This is no ordinary varnish, but one which has been carefully prepared after long experiment.

### Cutting the Record.

When in its normal state, before recording, it has a soft, cheesy consistency, and it "cuts" under the recording needle very smoothly and cleanly. A particular point to notice is that it requires very little force to drive the record against the needle whilst it is cutting, so that an ordinary gramophone will serve the purpose. This is where most of the previous systems fell down—the ordinary small home gramophone motor was not powerful enough to drive them when "cutting" the record.

(Continued on next page.)



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S.S.

## TECHNICAL NOTES

(Continued from previous page.)

After the record is made, the disc is left lying about to dry, and after about 24 hours it will have lost most of the "softener" and will be quite hard enough for playing. It can, of course, be played back immediately it is made, but if possible it is better to wait until the next day.

The makers tell me that, if it is carefully treated in this way in the early stages, it will then play for 200-300 reproductions, which is as much as can usefully be got out of most ordinary commercial records.

### Using the Microphone.

Home recording in the past has generally been rather unsatisfactory and for that reason has never seemed to "catch on." But I have always been convinced that, if something really satisfactory could be produced, the public would buy it.

This latest effort certainly seems very simple and appears to get over most of the difficulties of the previous attempts. The reproduction is very good and it is a very simple matter to "record" from one record to another, or from the broadcast or a microphone.

Ordinary "acoustic" or direct recording (that is, without the aid of electrical

### The Curve of the Valve.

The anode-bend detector introduces a certain amount of harmonic distortion—since the so-called "straight" part of the curve of a valve is not really straight at all. It is not so long ago that a large percentage of fans looked with contempt on the leaky-grid detector, the anode-bend being considered the last word in refinement.

Things have changed since then, and it has been found, as I say, that the anode-bend produces a certain type of distortion. Moreover, improvements have been made in the leaky-grid type and nowadays this type is capable of giving excellent quality—particularly where the input to the detector is small. If the input is large, power-grid detection may be resorted to.

### Harmonic Distortion.

If a tone-correcting transformer is used, with anode-bend detection, the harmonic distortion is emphasised. With a leaky-grid detector, on the other hand, excellent results can be obtained, especially if, as mentioned, you operate the detector under proper conditions.

This difference between the two detector systems, when using tone-correction, is rather interesting in view of the old controversy as to their relative merits.

### Automatic Volume Adjustments.

I don't know whether you have ever stopped to think how extraordinarily sensitive the ear is. It has many remarkable properties and not the least of these is its faculty of making itself very sensitive to weak sounds and relatively insensitive to loud sounds.

Perhaps I can best explain what I mean by comparing with a microphone and amplifier system. You know that if you have such a system tuned up for great sensitivity, so that it will reproduce very weak sounds at reasonable strength, and then you suddenly put very loud sounds into it, the whole thing is liable to bust itself.

It hasn't the power of accommodating or adjusting its sensitivity to the loudness of the input. The ear, on the other hand, can stand a most amazing range of loudness variation without the slightest trouble, from a watch-tick to a big gun. It has been estimated that it can hear a sound when the amplitude of vibration (at the ear) is only a millionth of a millionth of a centimetre.

### Loudspeaker Defects Covered.

Another very amazing thing about the ear is its capacity for making up defects in the input. Many people speak very carelessly and leave out half the consonant sounds, but the ear, by practice, is able to fill these in and the listener understands perfectly what is said.

The same sort of thing applies to loudspeaker reproduction. Many a loudspeaker fails to reproduce half the sounds—over-tones and what not—that were present in the original, but the ear blissfully supplies all these for itself and often enough the listener is quite unaware of the crudeness of the sound he is hearing. It often happens, in fact, that the loudspeaker gets the credit that rightly belongs to the ear of the listener!

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amplification) is not, of course, so good, but that is only to be expected. Most people nowadays seem to have radiograms and can easily arrange electrical amplification, so there may be a big future for this latest system.

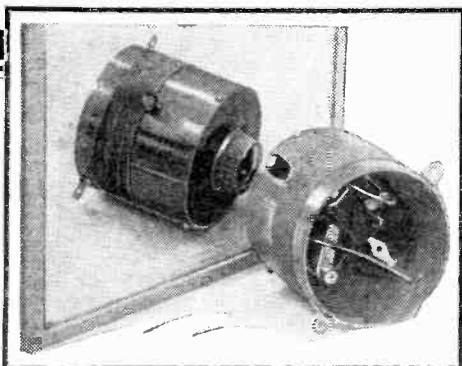
### Tone-Correcting Transformers.

I have often been asked whether a tone-correcting transformer should be used with leaky-grid detection, or whether it can be used just as well with the anode-bend detector.

The popularity of the tone-correcting transformer principle has increased greatly since this type of transformer was first introduced and there is no doubt that, when properly used, it is a good investment.



See full description  
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on page 284 of this  
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