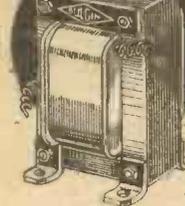


NEW COMPONENTS OF INTEREST TO EVERY RADIO ENTHUSIAST

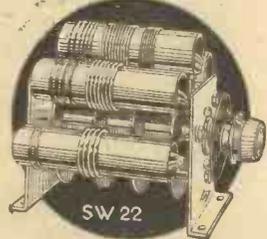
BULGIN FOR SKELETON L.F. CHOKES



A large range of skeletonised L.F. Chokes is available. These have electrical efficiency factors which are in every way as good as the cast and zinc-plated counterparts, but a great saving is effected by the omission of Case, Terminals, etc. Flexihlo leads are provided for connections. Range—
 L.F. 14s. 20 H. at 50 m/A. 400 ohms, 3/6 each. L.F. 15s. 32 H. at 30 m/A. 600 ohms, 3/6 each. L.F. 17s. (G.T.) 50 H. at 25 m/A. 1,000 ohms, 2/6 each. L.F. 18s. 10 H. at 60 m/A. 320 ohms, 8/6 each. L.F. 21s. 15 H. at 100 m/A. 450 ohms, 13/6 each. L.F. 34s. 100 H. at 10 m/A. 1,800 ohms, 10/6 each. There is a type for every purpose, every purpose and every requirement.

FIVE-WAVE BANDS without coil changing

This super-efficient coil-holding chassis has a special built-in switch which controls three-poles—i.e. Aerial, Grid, and Reaction, and selects to five coils. Only the earth connection remains common. The switch has definite location and snap action; it is quite trouble-free and makes positive contact under all conditions of use. The whole chassis measures only 5"x5"x5" approx. Seven coils are available, of which five can be used and selected at any one time. The wave-ranges covered can therefore embrace 10 metres approx. at one end, and 2,000 metres at the other, and the chassis will facilitate CONVERTERS, S.-W. SETS, ALL-WAVE SUPER-HETS., and all kinds of apparatus. One user made an ALL-WAVE WAVE-METER!



List No.	Range	Price	List No.	Range	Each
S.W. 23	10-22 m.	3/6	S.W. 26	85-170 m.	3/6
S.W. 24	20-45 m.		S.W. 27	130-240 m.	3/9
S.W. 25	40-90 m.	Each	S.W. 28	200-500 m.	4/-
			S.W. 29	1,000-2,000 m.	4/6



COMPLETE PROTECTION FOR 2/6

A guaranteed safety device which will give complete protection at low cost. It may be mounted on the window frame near the lead-in. The safety features provided are: a discharge gap which is always in circuit; a fuse-link in the aerial lead to the set; and a snap-action switch with self-cleaning contacts so that the aerial may be directly earthed. The positions of the soldering are always shown through indicating apertures. In moulded bakelite case, completely enclosed and protected.

Letters Patent No. 394,805. List No. S.99. 2/6 EACH.

FREE £100 INSURANCE GUARANTEE
 that in the event of loss or damage we will replace your apparatus.



FLUSH MOUNTING THREE-PIN MAINS PLUG AND SOCKET

A new irreversible mains connector for all types of mains apparatus. A third pin is provided for an earth connection to be made simultaneously. Terminals fitted to both parts. Highly polished bakelite. Absolutely shockproof.

List No. P.73, 2/3 EACH.
 As above, but two-pin, List No. P.74, 2/- EACH.

POWER RESISTANCES OF ALL TYPES

The special non-ferrous nickel-chrome wire is spiralled on a new heat-resisting core internally stiffened and this is wound on a threaded porcelain tube. The tapping bands are only incidental to connection to the element; the wire is self-retentive on the former, so that the bands may be adjusted to give non-listed values. The dimensions, approx., are 3"x1"x1 1/2" high (overall). Suitable for the highest-power amplifiers and sets. When run near rating adequate ventilation must be provided. Available both in horizontal and vertical types. For vertical types, add "V" to List No., otherwise horizontal will be supplied.

List No.	Ohms.	m/A.	List No.	Ohms.	m/A.
P.R. 22	50	632	P.R. 8	3,000	81
P.R. 23	100	447	P.R. 9	5,000	63
P.R. 24	200	316	P.R. 10	7,500	54
P.R. 1	300	257	P.R. 11	10,000	45
P.R. 2	500	200	P.R. 12	15,000	36
P.R. 3	600	180	P.R. 13	20,000	31
P.R. 4	750	160	P.R. 14	25,000	28.3
P.R. 5	1,000	140	Price 2/- Each.		
P.R. 6	1,500	117	P.R. 15	30,000	25.8
P.R. 7	2,000	100	P.R. 16	40,000	22.3
			P.R. 17	50,000	20.0

Price 2/- Each.

COMPACT THREE-WATT VOLUME CONTROLS



These efficient volume controls have silent "squash-plate" action for the moving contact. There is no wear whatsoever on the elements and long-life is assured. The special element in these is wound on a resilient former with non-squash-plate washers are supplied. Dust-proof case. With knob and dial, as follows:—

List No.	Ohms.	Max. m/A.	List No.	Ohms.	Max. m/A.
V.C. 21	500	75	V.C. 32	10,000	18
V.C. 24	1,000	55	V.C. 34	25,000	11
V.C. 26	2,000	39	V.C. 35	50,000	8
V.C. 29	5,000	25	V.C. 40	100,000	5.5

Price 3/- Each.

Price 3/6 Each.



JUNIOR WALL JACKS

A little larger in size than the popular Midget types, this robust fitting will be found ideal for institutions and hospitals, and will stand years of hard usage. Designed to take standard single entry telephone or speaker plugs. Black or brown bakelite, with nickel-plated cover for parallel wiring. Terminal connections. Wall-jacks provide the only safe means of making L.B. or head-phone extensions so that dangerous cross-connection with mains outlets and wall-points cannot ever arise. Don't risk your family's lives with cheap 2-pin 5-amp. sockets for speakers! List No. W.J.8, Black. List No. W.J.9, Brown. PRICE 2/- EACH.

A MOST USEFUL SWITCH

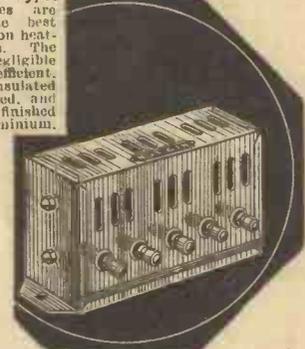


This switch will fulfil a multitude of purposes. It is a rotary quick-make-and-break double-pole, fully insulated, and most suitable for mains use. The newest regulations specify double-pole switches, so by all means use one—but see that you get BULGIN, the best. In many ways this type can be used in modern sets, Radiograms. Switching is an obvious use; the second pole will short an H.F. Coil—to prevent "radio-leakage"—or will switch indicating lights. Double-pole switching of mains between a charger and an illuminator is another obvious use. With certain coils it makes an excellent wavechange switch.

MAINS RESISTANCES

D.C. and A.C./D.C. Types

These Resistances are wound with the best nickel-alloy wire on heat-resisting formers. The wire has a negligible temperature coefficient. Clearly marked insulated terminals are fitted, and the metal cases, finished in frosted aluminium, make shocks an impossibility. The cases should be earthed. Available as under, without need for resistance calculations. Each type is suitable for mains of 200-250V., and for any number of valves at will.



List No. M.R.2, for 2-6 15v., 0.25 A. "Osram" or "Marconi" valves.
 List No. M.R.3, for 2-6 0.1 A. "Mazda" D.C. valves (one at 35v., up to 6 at 20 and 25v.)
 List No. M.R.29, for 2-6 20v., 0.18 A. Mullard etc. valves, for A.C. or D.C. nets.
 List No. M.R.56, for 5-7 Marconi or "Osram" A.C./D.C. valves at 15v., 0.3 A.

15/- EACH

BULGIN RADIO COMPONENTS ARE OBTAINABLE EVERYWHERE



SWITCHES OF ALL TYPES

Mains switches for all purposes. Including double-pole models. All have quick make-and-break action with low contact resistance (0.01 ohm average under 100% overload) and high insulation resistance. Circuit-breaking occurs at a different part of the contacts from the rest position. All types are fully insulated; the fixing may be earthed. Indication plates are interchangeable. For panels up to 3/32" thick. British made throughout.

TOGGLE.		ROTARY.	
S.89, D.P. 2-way ...	3/-	S.91, S.P. On-off ...	1/9
S.98, D.P.D.T. ...	2/3	S.92, S.P. 2-way ...	2/-
S.123, D.P. On-off ...	2/3	S.124 S.P. On-off, key type ...	3/-
S.88, D.P. On-off ...	2/6	S.116, 4-point On-off ...	2/3
S.80, S.P. On-off ...	1/6	S.115, D.P. On-off ...	2/6
S.81, S.P. 2-way ...	1/9	S.114, D.P.D.T. ...	2/9

POST THIS COUPON NOW

To: A. F. BULGIN & CO., LTD.,
 Dept. P, ABBEY ROAD,
 BARKING, ESSEX.

Please send me Catalogue 155P. I enclose 3d. in stamps.

NAME.....
 ADDRESS.....

SCREENED TUNING COILS

These Screened Multi-Coils have terminals for connection, and are provided with moulded green-mottled bakelite bases. They are intended for baseboard construction and assemblies. Terminal No. 8 in each and every coil is the connection to the screen in order that it may be earthed. The screens are finished in frosted aluminium.



Types available:—

List No. C.20*, Aerial ...	5/9
List No. C.21*, H.F. Transformer ...	6/3
List No. C.22*, Tuned Grid ...	6/3
List No. C.23, Band-pass ...	6/6
List No. C.24*, 110 k.c./s Oscillator ...	5/9
List No. C.29, 110 k.c./s I.P. Transformer ...	8/9

* Have plate, or reaction, winding.

THE LARGEST RANGE OF RADIO COMPONENTS IN THE WORLD

SPEEDY-RIGHT!

What is It?

THE NEW SYSTEM OF FAULT-FINDING

Read All About It In

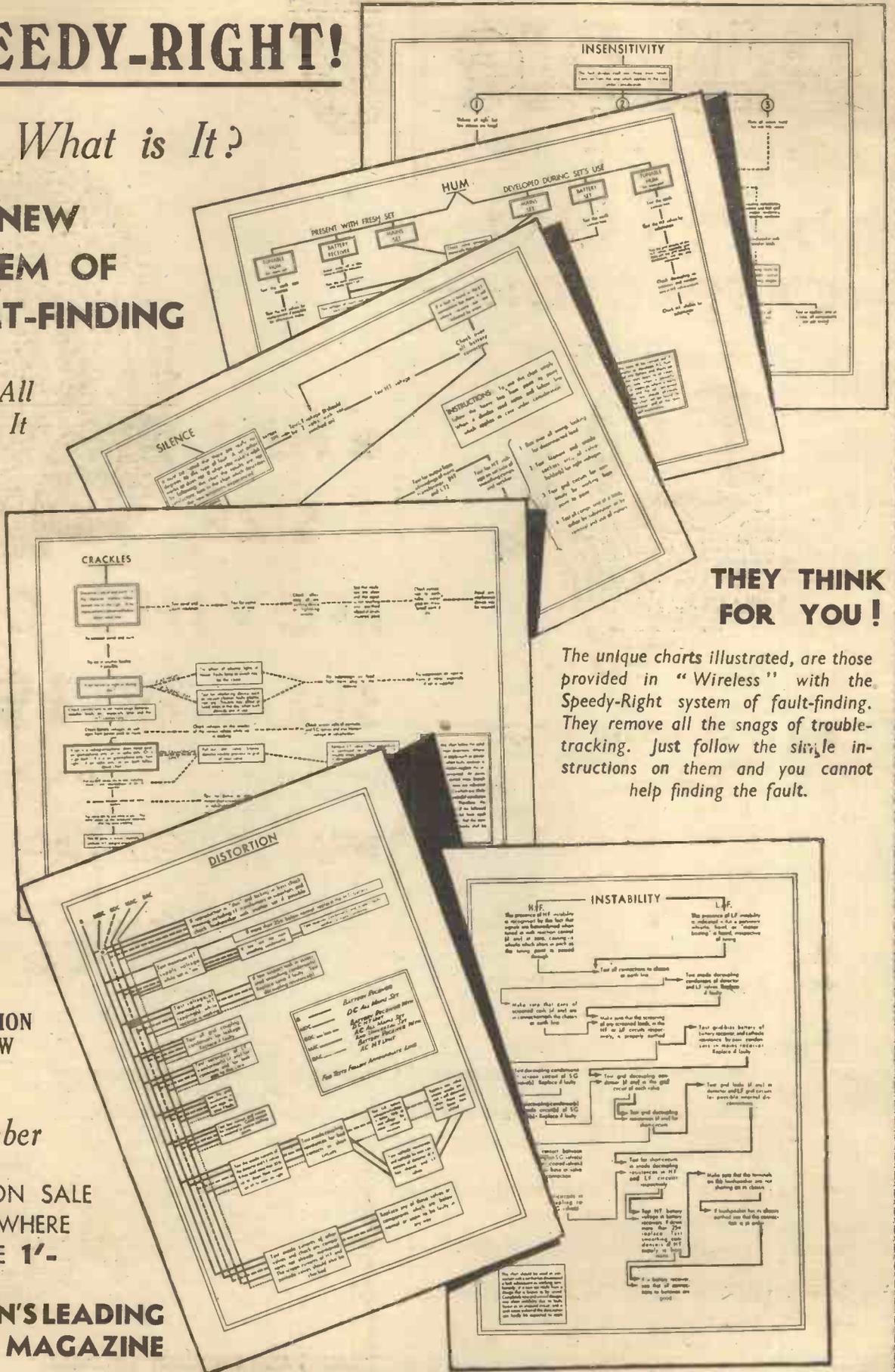
WIRELESS

AND TELEVISION REVIEW

for December

NOW ON SALE EVERYWHERE PRICE 1/-

BRITAIN'S LEADING RADIO MAGAZINE

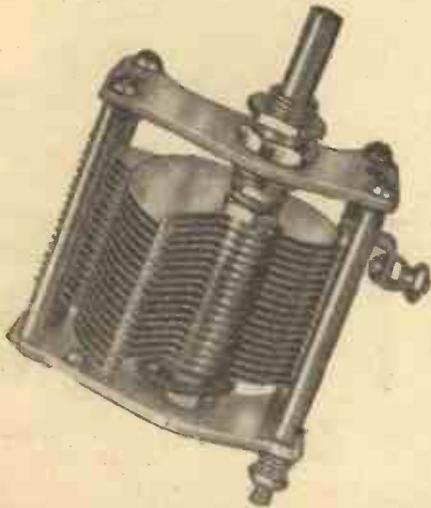


THEY THINK FOR YOU!

The unique charts illustrated, are those provided in "Wireless" with the Speedy-Right system of fault-finding. They remove all the snags of trouble-tracking. Just follow the simple instructions on them and you cannot help finding the fault.

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SPECIFIED FOR THE
S.T. 700
EXTRACTOR



POLAR No. 4 CONDENSERS

Direct drive. Made in aluminium, with brass pillars. Ball bearings.

THREE REQUIRED.

.0005 with knob as specified.

Price each **4/5**

Condenser only 4/-

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POLAR 'COMPAX' CONDENSERS

TWO REQUIRED. .0005. Price, each **2/6**

POLAR—N.S.F. RESISTORS

ONE EACH REQUIRED.

1 megohm	}	Price each 1/-
500,000 ohms		
75,000 ohms		
30,000 ohms		
20,000 ohms		

POLAR—N.S.F. TUBULAR CONDENSERS

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.1 mfd. .. Price **1/4** .25 mfd. .. Price **1/3**

WINGROVE & ROGERS LTD.

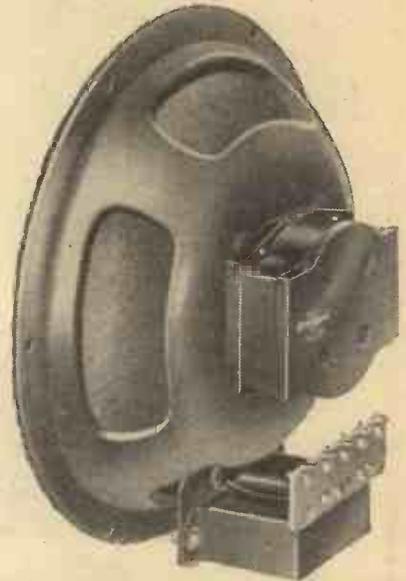
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*Phone: Temple Bar 2244.

Works: Old Swan, Liverpool.



HEAR THE NEW BLUE SPOT SETS



● FULL SIZE MOVING COIL SPEAKER 19/6

Or in cabinet with vol. control 35/6. Other types too.

WHAT A CHRISTMAS GIFT!

Blue Spot—most famous of all Loud Speakers! New high-efficiency nickel alloy magnet. All steel, rigid chassis. Ten point matching—2.5 to 14,500 ohms including Class B. Very sensitive one-piece 7" cone—level response over wide range of frequencies. Reliable performance over long periods. Or there is the "Senior," a peerless instrument, chassis 29/6, in cabinet 49/6.

To the **BRITISH BLUE SPOT CO., LTD.**,
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Pp. 7/12B

Please send details of Blue Spot products.

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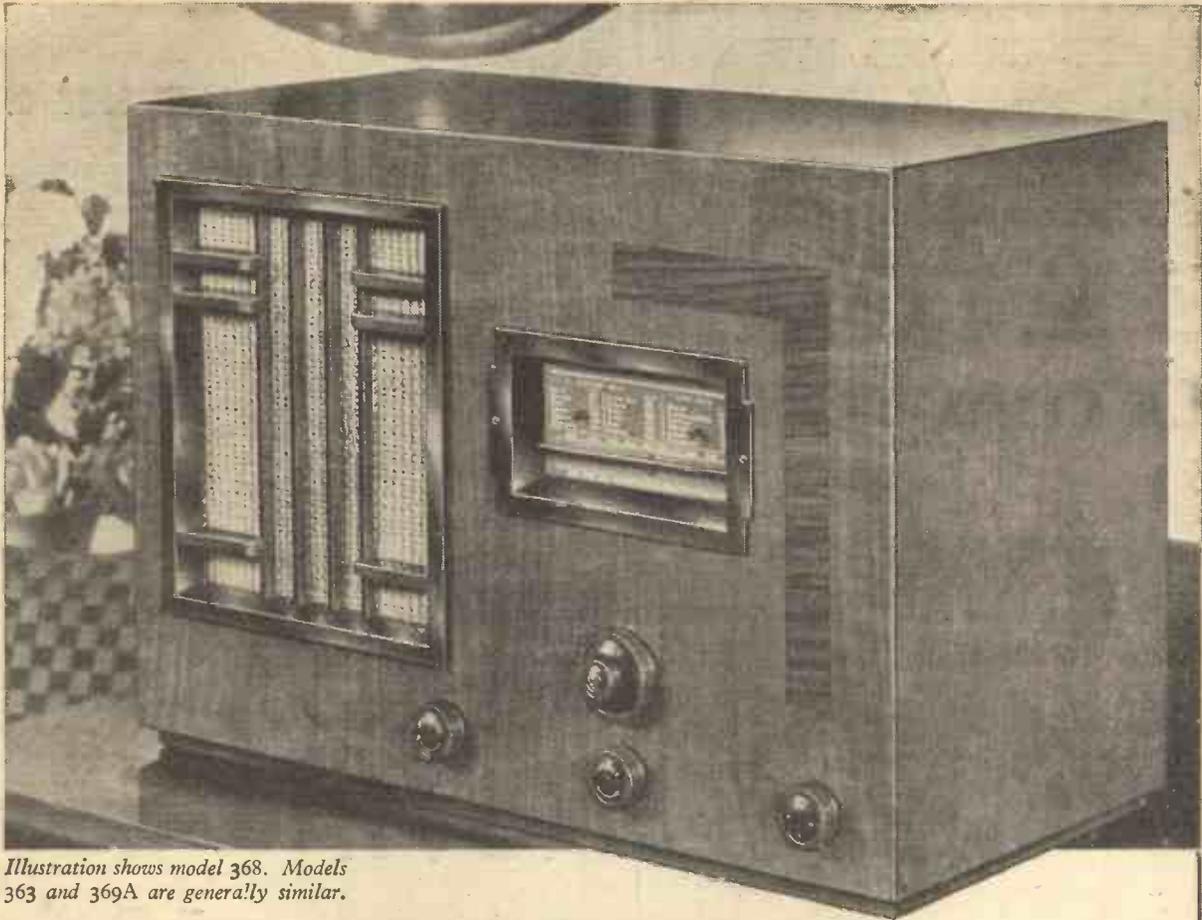


Illustration shows model 368. Models 363 and 369A are generally similar.

COSSOR

A WHOLE host of programmes—but only one at a time is yours to choose from with one of these splendid Receivers. Cossor "Super-Ferrodyné" Models possess high selectivity—they eliminate the annoyance of interference from nearby transmissions. Their reproduction is superb—rich, clear-cut, true-to-life, with ample volume. They are simple to operate and, above all, Mains and Battery Models alike, they are reliable. Ask at any good Wireless Shop to see—and hear—these fine Receivers for yourself.

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To A. C. COSSOR LTD.,
Melody Dept., Highbury Grove, London, N.5.

Please send me, free of charge, a copy of your latest catalogue in full colour giving details of Cossor Receivers and Radiograms.

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B.29

P.W. 7/12/35

RADIO

'SUPER-FERRODYNES'
REGD.

BATTERY MODEL 363

With Variable-Mu Screened H.F. Pentode, Screened H.F. Pentode Det. and Economy Pentode Output. Super-Selective Iron-Cored Coils, 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries. **£6.15.0**

H. P. Terms: 13/- deposit and 11 monthly payments of 13/-.

A.C. MAINS MODEL 368

With Variable-Mu Screened H.F. Pentode, Screened H.F. Pentode Det., Triode Power Output, Heavy Duty Rect. Super-Selective Iron-Cored Coils. 8" Energised Moving Coil Speaker, for A.C. only, **£8.18.6**

200/250 v. (adjust.) 40/100 cycles.
H. P. Terms: 15/6 deposit and 12 monthly payments of 15/6.

UNIVERSAL MODEL 369A

Similar in specification and appearance to Model 368 but with 8" Permanent Magnet Moving Coil Speaker. Works on either D.C. or A.C. without alteration to set. For D.C. 200/250 v. (adjust.) and A.C. 200/250 v. **£8.8.0**

(adjust.) 50/100 cycles.
H. P. Terms: 14/6 deposit and 12 monthly payments of 14/6.

Prices do not apply in I.F.S.



MANAGING EDITOR: N. F. EDWARDS.

TECHNICAL EDITOR: G. V. DOWDING, Associate I.E.E.

ROYAL HOBBY
THE "ALLY PALLY"
WAR NEWS

RADIO NOTES & NEWS

A HOT SEAT
RADIO STRIKE
THE "QUINS"

Presidential Preferences.

IT'S a funny thing, but the Presidents of the U.S.A. seem to favour radio as a career for grown-up sons. Perhaps you remember that the late President Hoover's son, Herbert, was once an amateur, and later became responsible for radio communication on one of the big transcontinental air routes.

Now President Roosevelt's son, Elliott, has hooked up with the Southwest Broadcasting System, which rivals N.B.C. and Columbia with a chain of stations down Texas way.

Add these instances to the many where kings, princes, and even princesses have shown special interest in radio, and one gets confirmation of the idea that it is, indeed, a royal hobby.

London's Television.

NEWS that the first transmissions from the new Television station at Alexandra Palace,

London, will take place at the end of February has caused quite a stir, and there is a general pulling up of socks in the television business in consequence.

I hear that a contract has now been placed by the B.B.C. with a London firm for some necessary structural work at "Ally Pally"—as the locals call it—and there is not going to be much Christmas holiday for the engineers concerned in television development.

Wise guys have already secured their copies of the Book of Practical Television, but laggards are hereby reminded that stocks are not inexhaustible. There is still a chance to take advantage of "P.W.'s" gift scheme, so sign on the dotted line and be ready for test developments in the early spring.

Please to Remember.

MAY I thank the many readers who responded to my hint about the warm welcome that cast-off components would find if taken to an unemployed assistance committee?

And may I ask pardon of one reader—who wrote, I

believe, from Ireland—for not replying to his letter on the subject? I obtained the address he wanted, which is The Personal Service League, 37, Grosvenor Place, London, S.W.1. But then (confound it all!) I lost my correspondent's address, so this is my only means of notifying him where his components can be sent, for distribution.

Two-Way Telephony on the "Tens."
OUR old acquaintance G 5 B Y (the short-wave amateur station belonging to Mr. O'Heffernan) is claiming the first-across record for ten-metre two-way telephone working with the U.S.A. As a result of an experimental call at 2.15 one afternoon, G 5 B Y contacted with a gentleman of Canton, Ohio—a loquacious chappie known to his intimates as W 8 M W L. Strength was good, so the modern Columboes had a nice discussion for over a quarter of an hour on the delights of ten-metre working. One is bound to admit that on that wave-band they are on a good thing.

Europe's Licence Lead.

WE have held the lead in licences for so long in this country that it may be a bit of a surprise to most people to know how Germany is overhauling us. Their increase during October amounted to over 164,000, against

our own steady 50,000 odd.

According to the latest report I have seen, here are the totals for comparison. Britain, 7,274,482; Germany, 6,816,509.

This was how the competitors entered the November stretch, and it looks as though Germany hopes to start 1936 abreast or in front of us.

To "P.W." Readers
The Editor and Staff
wish you all a Happy
and Merry Christmas

If memory serves me right, I've never lost an address like that before. Just too bad that it should happen in connection with a paragraph headed "Please to Remember"!

A POPULAR B.B.C. STAR



Here is Stanelli, of "Hornchestra" and "Stag Party" fame, listening to a programme on a Cossor Radiogram.

Broadcasts from the Battlefields.

PARIS is getting a much closer radio contact with the war in Abyssinia than the B.B.C. is able to give its listeners. One Paris newspaper invites its readers to listen at stated times for the broadcasts from three of its correspondents now radio-reporting with the Italian Army. (See also page 394.)

To show the other side of the picture, *Paris Soir* arranged for its war correspondent, M. Alex Virot, to say what he thought about things in Addis Ababa, where he is garnering news for his paper. The B.B.C. summaries seem a bit flat after this kind of enterprise, don't they?

(Continued on next page.)

REMARKABLE REGULAR FADING PERIOD SUGGESTED

Schenectady Next.

ONE of my letters this week tells me that W 2 X A F will shortly be broadcasting Anglo-American Radio and Television Society concerts regularly. The date of the commencement of these concerts has not been fixed definitely, but it is likely to be some time during December, 1935.

Incidentally, New Year's Eve is to be a big day for the Society at Uxbridge, and a Surprise Dance has been arranged. It is to be a masked dance, and radio will play an important part in the evening's activities. Their last dance—when Radio Normandie broadcast greetings to the assembly—was a huge success.

A Hot Seat.

LIFE in America must be an exciting affair for small boys. Not only are they shot up into college and professorships before you can look round, but when you *do* look round you may see somebody else being shot up or shot down, by gangsters or G-guys.

Perhaps it was this hectic up-bringing that led to a pardonable mistake on the part of a young son of a distinguished lecturer. After a keen college contest his father was cheered, honoured, and appointed to the Chair of Electro-Magnetics. But young hopeful got the facts a bit mixed and rushed home to announce, "Say, Maw, they've put Pop in the Electric Chair!"



Lightning Strike.

A REMARKABLE effect has been mentioned by Dr. Dellinger, of the U.S. Bureau of Commerce, in the *Physical Review*. He says that every fifty-four days there is a rapid but general strike all over the sunlit side of the earth. A strike, not of personnel, nor of apparatus, but of the wave-reflecting layer upon which we depend for long-distance radio communication. On the fifty-fourth day the all-important layers suddenly drop down tools for a few minutes, and operators, all the world over, complain with one voice, "Curse this fading."

The effect was first noticed in Paris, round about noon G.M.T. on May 21st,

"December Cocktail"

(Midland, December 13th)

This is the second topical mixture produced by Martyn C. Webster in which the numbers and sketches chosen deal with events of the month. Jack Hill and Basil Hempseed are again at two pianos, but the other artists are different from those in November. Marjorie Westbury, Dorothy Summers and Bert Brownbill will keep this show lively.

Mr. Brownbill produced his own concert-party, the Kit Kat Kits, which has been relayed. He was formerly a junior official in one of the Liverpool banks, but in 1924 joined a touring pierrot troupe as principal comedian.

Since then he has appeared as a giant in a London pantomime and as character comedian in a Gracie Fields revue, and also been in several Julian Wylie productions.

and U.S. stations were proved to have been affected at the same time. It is suspected that, since the sun turns round on its axis in twenty-seven days, the fifty-four days effect is tied up with this. The next period to watch for is December 14th to 18th, and if it then happens again there will be no question of coincidence.

News of the Stations.

THE long-hoped-for new transmitter at Sottens is now installed, and may be heard testing at any time in the immediate future. It is rated at 100 kilowatts.

Tests now being conducted from Toulouse-Muret round about midnight are not a true measure of what the new station can do, as at first power is being restricted to about 60 kilowatts. Later, however, this figure will be doubled. And if necessary the power can be pushed up to 200 kilowatts.

A correspondent kindly informs me that Y V 2 R C (Caracas, Venezuela) is changing its wavelength from 49.08 metres to 51.2 metres, according to a notification he has received from the station authorities.

Radio-Berne brought new studios into operation on December 1st, while Radio-Geneva, more ambitious, hopes to have a Radio-City of its own before the end of 1937.

Christmas Treat.

ACCORDING to a report from Callander, Ontario, the world's most famous glee-party is going to treat us to a broadcast on Christmas Day. Every member of the party will be only nineteen months old; you've guessed it, the Dionne Quins.



The Misses Yvonne, Emilie, Cecile, and Annette have all been in excellent voice of late, but there was originally some doubt about Miss Marie. Now, however, Dr. Dafos sees no reason why Marie should not join in, for she has been taking her veal and liver with commendable gusto, and her vocal output compares well with that of her four sisters.

An illuminated Christmas tree is being provided, and there is fortunately no need to invite guests, for Yvonne, Emilie, Cecile, Annette and Marie are a party in themselves.

High Achievement.

RAPID and reliable communication is so vital to man that progress in radio always helps further progress in other directions—flying, for example. The recent world's record by two Americans who stayed in the air for *four weeks*, was, largely due to good radio work. During the twenty-seven-days-odd when they circled round their aerodrome they had nearly three hundred chats with wireless stations on the ground.

They mostly used 160 metres, and at one stage severe toothache threatened to bring down the enterprise, but radio discussions with a dentist enabled

"Dancing Through"

(National, December 14th)

Geraldo and his Band are to be featured on December 14th in another instalment of "Dancing Through," for which he has enlisted a squad of vocalists, in addition to his band. During this hour Geraldo will play something like a hundred and fifty popular numbers, one following the other in quick succession. Dance music "fans" will thus have their fill of rhythm melody by one of the best dance bands in London.

one of the brothers to lance his own gums sufficiently to relieve the pain and continue the flight. Good work, by gum!

In the Courts.

AS some rather severe things about wireless have been said recently in the courts, it is refreshing to find that sometimes the judge knows as much—if not more—about set-building than the parties to a dispute.

Not long ago, at Taunton County Court, His Honour Judge E. H. C. Wethered questioned expert witnesses at length, and finally explained, "I know something about wireless, having built several sets myself."

His Honour did not say what sets they were, and it is my duty to point out to all good men and true that there is not a shred of evidence upon this question. Nevertheless, such an experienced judge would brush aside pretensions and select the best! So I wouldn't mind betting . . .

Third Time Lucky.

CONGRATULATIONS to Captain Stevens and Captain Anderson on breaking the record for the highest flight into the stratosphere. As recounted recently in "P.W." they got their U.S. balloon, Explorer II, up to a height of 72,000 feet, and gave the stay-on-the-grounds a real thrill when their radio messages were relayed from 14 miles up.

Too Much Room.

THERE would not be too much room for the vegetable marrows and things if another mushroom comes along like "Portland Bill"—the one just grown at Portland Bill wireless station. The stem is 1½ inches across, and the circumference of the business end was no less than 26½ inches!

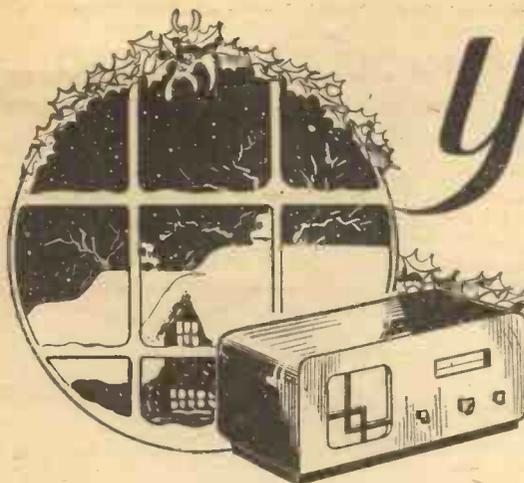
The grower of this living umbrella was Mr. R. Longley, senr., who attributes a great deal of his luck with the fungi to his practice of cutting the stems, instead of pulling them up.

It has been whispered that the wireless waves have something to do with it, but nobody can be sure of this. What is certain is that it will take a heck of a mushroom to beat "Portland Bill."



ARIEL.

Your Set this XMAS



Some seasonable suggestions for ensuring the maximum of service and enjoyment from your radio this Christmas.

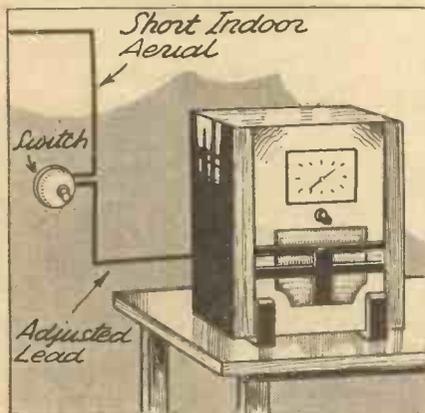
By G. V. DOWDING,
Associate, I.E.E.

TEN months and ten days ago, or thereabouts, someone said to me, "I liked that last Christmas article you wrote." To which I replied, "Thanks very much, but why *last*? Why not say *latest*?" And being frightfully superstitious I sat down at once to write my *next* Christmas radio hints and tips article. And here it is. Started ten months and nine days ago, or thereabouts, but since very considerably revised, not to say rewritten! You see, listening to some forty or more symphony concerts and at least fifty chamber music recitals during the period between then and now, has changed my outlook and widened my experience.

Ideal for Testing.

I am a great chamber music fan. It's grand stuff and the B.B.C. can't broadcast too much of it so far as I am concerned. It is so beautifully unchanging in its themes. The same old phrases over and over again. And all so undivertingly, haphazardly tuneless. Quarts and quartets of quartettes in A or E or F major, all pouring out with-

"QUIET-LOUD" SWITCHING



A switch arranged as seen here will save much twiddling of the volume-control knob.

out so much as a single bar of whistle-provoking tune.

You can test away at your latest hook-up without one moment of time-wasting listening. Variety is, of course, the most dangerous of all broadcasting material for the experimenter, and apparently the B.B.C. realises this and so does not give us much of it. How can one test the grid circuit of a set while Leonard Henry or Gert and Daisy are coming through?

You just have to sit down and wait until they are off the air.

But there come times in the lives of even the most rabid experimenters when experimenting must give way to listening. And one of those times is, of course, Christmas. Not that the experimenter himself ever wants to listen; one of the greatest radio engineers the world has seen once austere observed, "I never listen to broadcasting," though I suspect the reason in his case is that he once tuned-in a children's hour and was shocked beyond belief at such a childish and irreverent use of the inverse function of lambda squared.

However, it is seldom that a household is composed solely of experimenters, *radio* experimenters, I mean, so it is that all over the country at Christmas-time there are periods of heterodyne armistice. There is, though, one thing that is to me a very great mystery. And that is why the radio sets in the houses of radio fans always seem to be the most inconsistent in action.

I expect you have all experienced this kind of thing. You go to the Jones's to spend an evening. Jones is the merest tyro at radio. He built a "Magic" or "Smasher" Three and it gives him marvellous service. It is on all the time you yarn or play cards and just keeps on going on.

Just Groans and Grunts.

Smith, on the other hand, is a keen experimenter. Always building newer sets, knows all about the latest Triode Hexodes and the mu's of new indirects and the virtues and failings of every circuit. Says that if he were the chief engineer of the X Y Z Radio Corporation he'd show 'em how to design a transformer which wouldn't pass out on a three per cent overload.

But does the duo-phase, push-pull, super-regenerative super-het (with delayed A.V.C. and magnified electron coupling), which he proudly brings forward to show how the broadcasting ought to be reproduced, operate with fault-free impeccability? It does not. During the tuning-in there are whoops and groans and grunts. After some minutes of that the local comes in with such a bellow that it nearly blows your jacket off.

To show how the other stations can be handled, he then whoops and whistles all over Europe. Snatches of distorted speech, snippets of cracked-up music.

Finally, after an exhausting, ear-aching tour of a frenzied Continent in the throes of a verbal-musical war (or so it sounds) you arrive back at the "local" and pray for some peaceful radio entertainment à la B.B.C. *carte*.

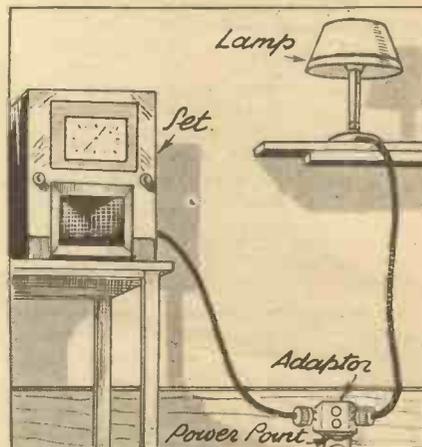
But after about only ten minutes of that the set packs up.

"I know I should use a lower value grid leak," says Smith airily as he dives into the innards of the contraption. "Spot of grid choking, I expect," he adds, as though this is all part of the entertainment his set is able to provide.

Two-Way Volume Control.

Fortunately, the Smiths of this kind are not met in every house. If they were, the popularity of broadcasting as such would diminish in an inverse ratio as with the advancement of Smith technique. And

AN INDICATOR LIGHT



You will not leave the set switched on if you adopt the double-plug scheme illustrated here.

after giving you that one to think over, I think I'd better get down to brass tacks.

I have one or two practical-hints to tell you about, and the first is by way of being an invention. I call it two-way volume control, and it is particularly applicable to those conditions of listening which you encounter at Christmas.

I think most people will agree that they seldom use their ordinary volume controls to the full extent of their infinitely variable possibilities. What I mean is that they generally find that all they want is either "loud" results for normal listening, or "quiet" results when they want the set to supply a quiet background of music, or when they want to keep "half an ear" on the programme so that they can spot when a special item begins. And when this does commence they go over to the "loud" condition again.

(Continued on next page.)

YOUR SET THIS XMAS

(Continued from previous page.)

But simply because the volume control is variable they find that they have to apply a certain amount of critical judgment to the obtaining of these settings, which is rather absurd when you ponder the point, for here we have a control whose virtue is supposed to be its variability, and yet its variability makes it a darned nuisance at times!

And this is where my two-way system steps in. It is extremely simple. All you want for it is an ordinary on-off switch, though one of the moderately low-capacity type is advisable.

You join one side of this switch to the aerial terminal of the set by means of a short length of wire, and then connect the aerial itself to the other terminal of the switch. See the idea?

A Most Convenient Scheme.

You choose the station which you are most likely to want to listen to for long patches of times (at Christmas, for example), and then tune-in this with the switch closed so that the aerial is doing its full work. You then adjust the volume to your liking by means of the ordinary volume control. You now open the switch and without altering anything else, adjust the length of the wire which joins it to the set until you have just the right "quiet" result to suit your requirements.

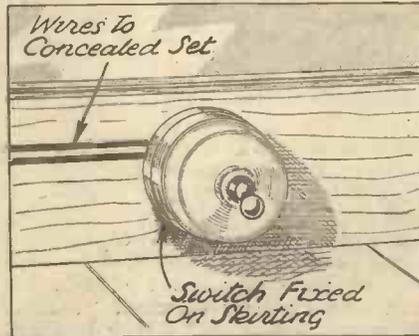
And now your "two-way" volume controlling is ready for use. You can henceforth go straight to the "loud" or "quiet" without any niggling variable adjustments. You simply click the aerial switch. And you will be surprised at the stations to which the control will apply with most sets. I don't guarantee it to

work without re-setting on more than the one local station, though on my home set I find it O.K. for about twenty stations—all the very strong ones, in fact.

It is not hard to see why this should be, because, after all, the relative "pick-up" of the bits of the aerial which lie each side of the switch remain more or less the same on the ordinary waves, and you adjust the set's sensitivity by means of the usual adjustments in order to accommodate any particular station. But I must say I find the effect more consistent with a short indoor aerial as per the sketch on previous page.

Those who operate mains sets might be interested in another minor stunt. This, too, is illustrated by one of the sketches.

AVOIDS FIDDLING



By arranging an external switch for a concealed set you avoid people continually altering the set's tuning.

It comprises the use of an adapter allowing a lamp to be plugged into the same power point as the set, and you must use the power point switch for turning the set on and off—not the set's own switch or the idea falls down.

I use an ornamental lamp. It doesn't give much light; but it is not supposed to. Its object is to act as an easy-to-see pilot light. Illuminated tuning scales and what-not are all very well. But they aren't such

forceful reminders as an illumination which more or less brightly lights the room. You can overlook a dimly glowing set-panel when you are tired, but you won't easily overlook a lighted room! Habit will so much help you. Putting out the cat, bolting the back door, turning out all the lights. Bedtime ritual!

But there is this to remember. I'm not too sure how some electricity undertakings would view such a scheme. It will be quite in order so long as the lamp can be regarded as nothing more than a pilot light for the radio set. But if it gives enough light for easy reading and lighting in the room, then you are obviously, if innocently, evading your electricity contract and taking lighting from the power point. I used a five-watt coloured lamp in a purely ornamental affair, specially designed as a pilot light for mains sets, so I can still look a policeman straight in the face—mostly.

Hands Off the Set.

My final hint is a purely anti-social one. It is designed to allow the set to be tucked away from the hands of those irritating people who never seem to be able to resist the temptation to twiddle the dials of any radio set which appears on their horizon.

You tuck the set away in a convenient hiding place, cupboard, sideboard, etc. The loudspeaker can, of course, be brought out to any convenient position. A robust switch of the ordinary 5-amp. tumbler type is then screwed to the skirting somewhere reasonably near the set and in a not-too-prominent place. Two stout leads are then run to the set and connected across its on-off switch. These leads must be nice thick ones, so that there is negligible voltage drop. Alternatively, you can break the L.T. circuit near the accumulator with the new switch, if that is more convenient.

You are then able to switch the set on and off merely by a graceful flick of the foot, and the set remains hidden away from the predatory hands of the knob-twiddlers.

LEARN THE MORSE CODE

SHORT-WAVE listeners who cannot read Morse are missing an enormous amount of interesting matter. This applies, of course, particularly to the amateur wavebands, in which (in spite of the popularity of telephony at present) fully 90 per cent of the work is carried out in code.

I have no startling theories to propound on the matter of learning Morse. There are three easy stages—learn the characters as you would learn the alphabet; then learn the sound of them on a buzzer; and finally start on the slowest transmission you can hear, and just pick out letters here and there until you find your speed is improving.

The diagram shown here is rather interesting as an aid to the first stage. Rather than learning the letters straight through the alphabet it is advisable to learn them in groups.

Building Up the Letters.

If you want to know the Morse signal for any letter, all that you have to do is to trace an imaginary line down the diagram until you get to it. Then, reading the spaces that you have passed through, in order, you have it.

Starting at the top left, with E, you can go down the left-hand edge with I (.), S (.),

and H (...). If you take the right-hand branch at the bottom you run into V (...) instead. Note that in each little partition the left-hand side represents the dot and the right-hand side the dash.

By starting with "E," you can "build up" letters by adding either a dot or a dash, getting the following "chains"—E-I-S-H, E-I-U-F, E-A-R-L, E-A-W-P, and so on. The same, of course, can be done on the "T" side, each letter on that side commencing with a dash.

FOR MEMORISING

E •		T —	
I •	A —	N •	M —
S •	U —	R •	W —
D •	K —	G •	O —
H •	V —	L •	P —
J •	B —	X •	C —
Y •	Z —	Q •	—

The "accumulation" Morse chart explained in the text by W. L. S.

You will notice four blanks along the bottom row. The first of these (...) represents Ü; the second (...) Ä; while the third (...) is Ö, and the last (...) CH. The first three are German letters, and the CH is used pretty universally, so you should know them.

Numerals, of course, are far easier to learn than letters, since they work through a regular sequence. There is not much point in my dealing with them here.

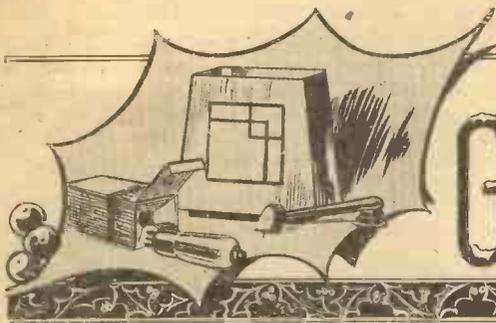
Practice is Essential!

It is useful, when in the early stages of learning the code, to work in the opposite direction to that usually advised. Instead of learning that A is dot-dash, and so on, think in terms of the Morse symbols and learn that dash-dot-dot is D; dash-dash-dot is G, and so on.

Also, it is a good idea to think of the dot as "dit," and the dash as "dah"; "dit-dah" gives one the sound of "A"—"dot-dash" doesn't. But you must know the whole alphabet absolutely "pat" before you even start worrying about the sound of the characters on a buzzer.

If you have a patient friend who knows the code, and can give you ten minutes a night on it, you will be able to read quite well within a fortnight. If you have to work on your own it will doubtless take a little longer. But it's not difficult.

W. L. S.



Some GIFT SUGGESTIONS

WHY NOT BREAK AWAY FROM CONVENTION THIS CHRISTMAS AND GIVE ONE OF THESE ATTRACTIVE RADIO PRESENTS?

EVERY year at Christmas-time comes the eternal problem as to what presents one should give one's friends and relations. The tendency is often for people to follow a set convention, adhering to a particular type of gift year in and year out. Often the recipient gets something he has already got, in which case most of the pleasure of receiving the present is lost.

Many Suitable Things.

There are many very acceptable gifts in radio, both for the enthusiastic constructor and the ordinary listener. An excellent gift may take the form of a permanent magnet moving-coil loudspeaker unit. Most listeners feel the need for an extension speaker—that is, an extra speaker fitted into a room other than the room in which the set is placed. For example, some people have their sets in the dining-room, and would like to have an additional speaker in the sitting-room, and vice versa.

Others might like the idea of an extra

A TELL-TALE BATTERY



A product of a famous battery firm, this Exide L.T. accumulator automatically indicates the state of charge.

speaker in the bedroom. Practically every commercial set is equipped with terminals for an extension speaker, and there is nothing to prevent one from being connected up to any home-constructor design.

There is, of course, the question of

FOR D.C. MAINS



This fine Atlas mains unit makes a splendid present for a friend who is on D.C. mains.

matching up the extra speaker with the output from the set, in view of the fact that the set itself already has one loudspeaker joined in its output circuit. This problem, however, has been overcome by the loudspeaker manufacturers, who can supply special models suitable for all types of output circuits, no matter whether the extension loudspeaker terminals are taken from the primary of the output transformer of the speaker and the set, or are connected across the speech coil to the existing speaker. The only point to remember is that in the one case you need a high-impedance type of extension speaker, and in the other a low-impedance type.

What About These Speakers?

Among the various makers who supply moving-coil speakers suitable both for extension and ordinary use are the British Blue Spot Company, British Rola, Wharfedale, and W.B.

If you have a friend or relative who is a keen home-constructor, do not forget that, apart from the question of the

additional speaker, it may be that he would like a new speaker for use in his existing set. And it must not be thought that the modern moving-coil instrument is expensive. Actually one can buy an excellent speaker for round about 30s. to £2 2s.

Naturally, all the makers list large and small models, so that it is quite easy to find a model to suit one's pocket.

Some Sensitive Units.

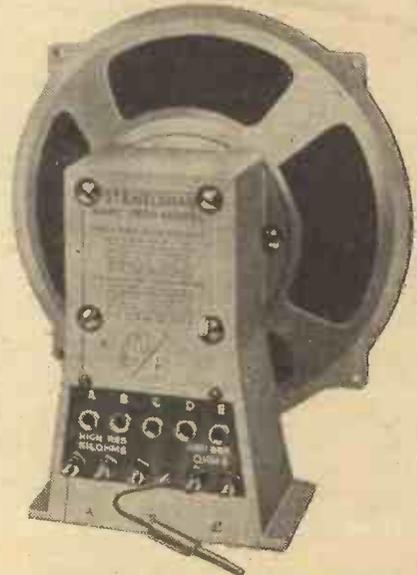
In the Blue Spot range there is the Popular chassis, priced at 19s. 6d., and the Senior, costing 10s. more. The latter instrument has a multi-ratio transformer giving a choice of sixteen matching conditions and four low-impedance tappings for extension work.

In the Wharfedale range there is the "Bronze" chassis, to mention only one model. This particular chassis is 42s. 6d., and is so sensitive that it gives ample volume with a 1/2-watt input, and yet handles up to 5 watts with ease.

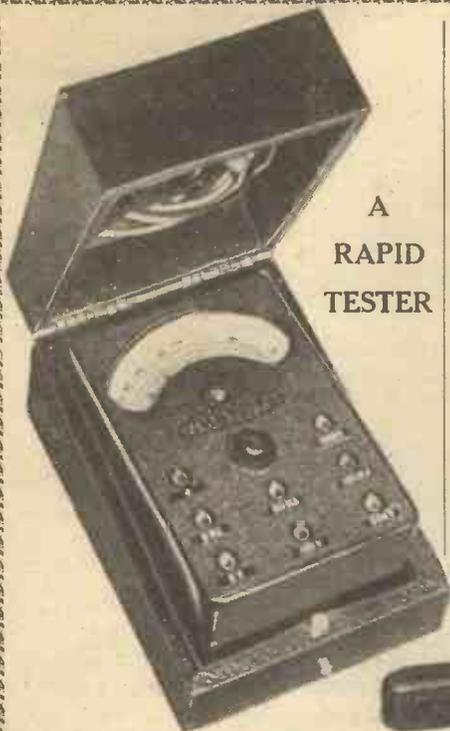
It is equipped with a Universal transformer giving perfect matching of all output valves.

In the Rola range are models for all purposes. In the case of the extension

"STENTORIAN" BABY



The W.B. "Stentorian" Model 36B is an efficient moving-coil unit selling at 23s. 6d.



**A
RAPID
TESTER**

Here is that excellent multi-purpose test meter—the AvoMinor.

types there is the high-impedance model at 35s. and the low-impedance model at 27s. 6d. Both these models have 9 1/4 in. diameter cones.

The well-known "W.B." speaker is available in the Stentorian Baby, Junior and Senior types, and a very simple and efficient matching system is provided.

Finding Faults Quickly.

But speakers are not the only gifts which you can give. What could be more acceptable to an enthusiastic set-builder than a multi-range testing meter? These invaluable instruments comprise several different meters in the one unit. With them you can measure voltages up to 300 or 400, and currents up to 200 or 300 milliamps. Some of the meters also measure resistance direct, so that you can carry out any radio test, whether that necessary for simple, straightforward



★
The Blue Spot Senior has four low-impedance tapings for extension speaker matching. It is also available in cabinet type.
★

voltage or current readings, or for finding an obscure fault.

Two particularly useful instruments are illustrated on these pages. Each of them is supplied with the necessary length of flex and test prods to facilitate

the taking of readings without having to dismantle part of the set.

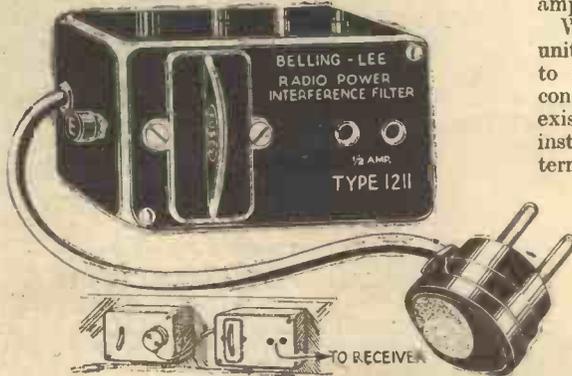
Many mains set users suffer from interference picked up on the mains wiring. This annoying form of interference is due to stray H.F. currents flowing along the mains wiring, which acts as an aerial, and passing through into the set. The resultant noise may be a steady hum or a crackling background.

Fortunately, special devices are now available to overcome this trouble. They are called "Suppressors," because they suppress the interference. Messrs. Belling & Lee have carried out a great deal of research work on mains interference, and are able to supply a number of compact units which can be mounted either on the wainscoting, near the mains power plug, or at the point where the mains enter the house.

Also, there are suppressor units for use in conjunction with domestic appliances, such as refrigerators, vacuum cleaners and so forth, and other apparatus which causes interference with the broadcast programmes.



The new B.T.H. Piezoelectric pick-up made by Edison-Swan Radio. It retails at 42s.



If you have a friend who suffers from interference picked up by the mains, don't forget this splendid Belling & Lee suppressor. It is screwed on to the wainscoting, close to the power-supply plug.

A unit of this type is an ideal present for a listener who suffers from this sort of interference.

For the battery set user who has mains supply in his home there is, of course, one of those efficient H.T. eliminators. An eliminator is plugged into the mains and joined up to the set in place of the existing H.T. battery. The existing H.T. tapings on the set are plugged into sockets on the

eliminator giving the required voltages. An eliminator takes up no more room than an H.T. battery and, in fact, very often requires less space, and so those who have self-contained sets, that is, sets with batteries enclosed in the cabinet, can often place the eliminator in the space previously occupied by the H.T. battery.

Check Current Consumption.

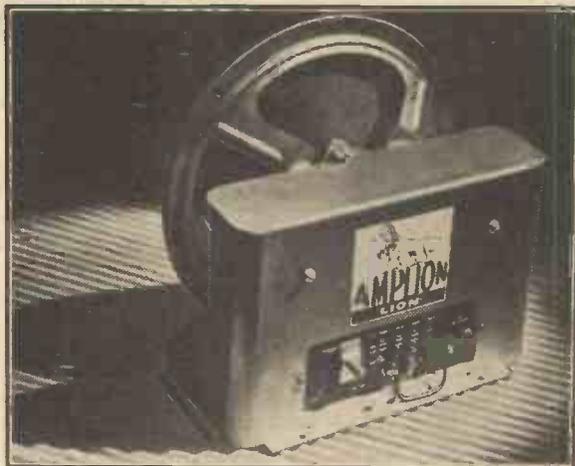
Eliminators are made in a variety of types, both for D.C. and A.C. mains. Before purchasing one you should find out what type of set your friend has. Or, better still, get him to tell you the total anode current taken by the valves. This is to guide you in choosing a suitable size eliminator. It is no use purchasing a mains unit which will not supply sufficient current for the set because the valves will not then work at their full efficiency, and consequently the results given by the set will be poor.

And sometimes there will also be a background of hum present. But a suitable unit will give years of trouble-free reception.

For the average three- or four-valve battery set, generally speaking, a mains unit giving 20 to 25 milliamps is about right. Twenty milliamps is usually ample for the average three-valver. But, naturally, the type of output valve used must be taken into consideration, because this is the stage which requires most current. Some battery power valves need as much as 15 milliamps.

When giving a D.C. mains unit as a present do not forget to remind the recipient to disconnect his earth lead from the existing terminal on the set and instead to join it to the earth terminal on the mains unit. The necessary instructions will always be found on the pamphlet supplied by the mains unit makers, and these should be followed.

Another acceptable gift for a battery user is an L.T. accumulator. Those



Here is the well-known Amplion "Lion" moving-coil speaker. Plugs and sockets are fitted so that the speaker can be readily matched.

who have only one L.T. battery can always do with another, so that they have one in use and one at the charging station, and in consequence are never faced with the problem of having to send their one and only battery to be charged just when a particularly attractive programme is scheduled.

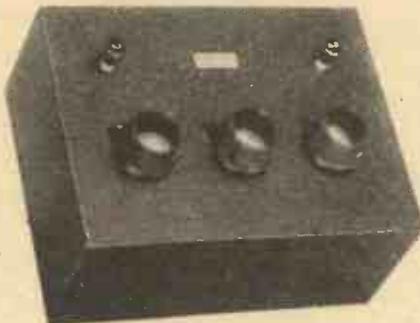
Special Batteries.

The broadcast listener has a lot to thank the battery maker for. These days everything is made as simple as possible for him. He is not left in doubt as to the state of charge of his battery. He knows just how much juice there is left in it and exactly when to send it to be charged.

The Exide people, for instance, supply a very neat little two-volt accumulator which has a "tell-tale" indicator. This indicator points to the word indicating the state of charge, so that the owner can at once tell whether he should send it to the charging station or not. Moreover, these "tell-tales" are also a guard

of the models on this page, and there are three others available. These lamps are very decorative, as can be seen by the illustration, and when wired up they serve the useful purpose of indicating whether the set is switched on or off.

A WEARITE UNIT



Wright and Weaire are supplying this S.T.700 Triple Extractor especially for those who desire a ready-made unit.

Priced at 10s. 6d. each they can be obtained for mains or battery use.

There are also many listeners who, while possessing a radio set,

Buy your friend a good pick-up, so that he will only have to provide himself with a turntable. Or alternatively, buy him the turntable portion, leaving only the pick-up for him to get.

Those who already possess gramophones of the acoustic type can utilise their existing turntables, and in these cases a pick-up is all that they need for the playing of records electrically, and those who have never tried a pick-up will be amazed at the wonderful improvement in reproduction obtained by this means.

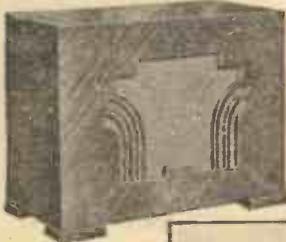
Improved Quality and Bass.

The modern pick-up reproduces a range of frequencies that no acoustic sound-box can compete with. The bass response with a pick-up is infinitely superior to that given by the acoustic method, and, of course, with a pick-up one can so easily control the volume to suit one's particular needs.

The present day pick-ups are very sensitive and so are suitable for connection to practically any set possessing L.F. amplification. If the receiver has only one

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One of the fine Rola cabinet speakers. The cabinet is lined with special "Celotex" front to enhance its acoustic efficiency.



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against under-charging and therefore a check on the charging station.

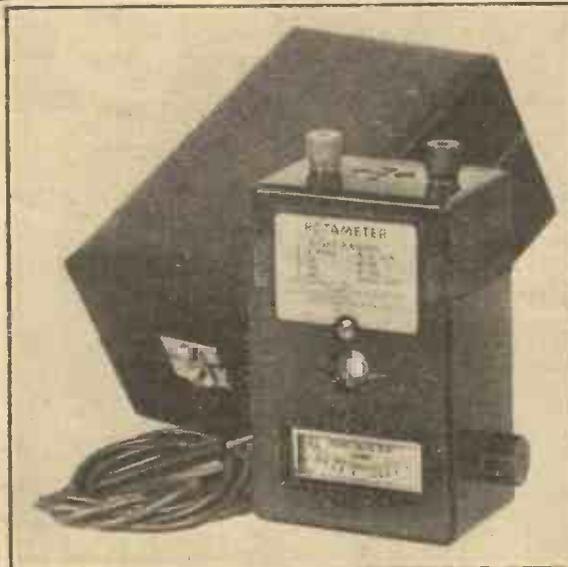
All Sorts of Items.

These suggestions by no means exhaust the list of possible gifts. There are many constructors who would jump at the idea of getting a new component they particularly want. For example, such items as gang condensers; sets of short-wave coils; screened tuning coils, L.F. transformers; a new valve to replace one that has seen long service; a dry rectifier for use in a home-constructed mains unit, or all-mains design; one of those handy little "Westectors" for the superhet enthusiast. There is no end to the list of possibles in radio.

Then again there are gadgets, such as switches, patent dials, and so on. One particularly attractive gadget is a unique signal lamp made by Messrs. A. F. Bulgin. We illustrate one



One of the artistic signal lamps in the Bulgin range. Four models are available.



The Pitco Rotameter enables voltage, current and resistance measurements to be carried out with the one instrument. It has eight ranges.

have no radio gramophone equipment to enable them to play records. There are not many sets to-day that are not equipped with pick-up terminals to enable the low-frequency side of the set to be employed as a gramophone amplifier.

All that one needs is a clockwork or electric turntable, together with a pick-up. Here again is a suggestion for a present.



The "Westector"—a small metal rectifier designed for use as a second detector in superhets.

stage of L.F. it is a good plan to insert the pick-up in the detector stage.

By using a simple switching scheme the radio side of the set can be cut out of circuit, leaving the detector—which then becomes an L.F. amplifier—and the output stage for amplifying the voltages from the pick-up. Most detectors used in this way need about one and a half volts negative grid bias.

Alternative Position.

If, on the other hand, the set has two L.F. stages, the pick-up can be inserted in the grid circuit of the first L.F. valve. Here again a simple three-point switch may be used to cut the radio side out of circuit, although this is not absolutely essential, provided the tuning controls on the set are adjusted to some position in which no radio comes through.

This can often also be done by placing the variable-mu bias potentiometer at zero—a method well worth trying.



The "Bronze" Wharfedale moving-coil chassis. It has a high-efficiency magnet system and handles outputs up to 5 watts.

YOUR CHRISTMAS PROGRAMMES

Alan Hunter has been investigating the programme sheets of the B.B.C. for Christmas to find what we are going to have as radio entertainment during the festive holiday. Here he tells what he has discovered.

BY the time we have settled down into that delightful—or awful—comatose state inevitably following turkey and plum pudding, most of us will be far beyond the lure of further fare, I fear. But perhaps I am speaking for myself alone. Anyway, for those who can keep awake after the annual tuck-in on Christmas Day, the B.B.C. has benevolently thought out some cracking good items.

If these do not succeed in rousing you from your coma, they will at least help to lull you into a sense of complete well-being. More than that it would be churlish of us to demand of the B.B.C. at such a festive season. Besides, there is the reawakening in the evening, when, miraculously enough, we can actually contemplate the cold stuff under which the dining-room table will again be groaning.

"This Great Family."

To be serious. In the morning of Christmas Day there will first of all be a relay from Leicester Cathedral. This will start at 10.45.

In the afternoon at 2.30 comes the *pièce de résistance*—forgive the Gallic phrase. Under the happy title of "This Great Family" the King will once again speak to home and Empire listeners, in a stirring message that will thrill—as always—the blood of every Britisher.

This year the round the world interchange of Christmas messages is being cut down to half an hour—but it will be none the less interesting for that. Ten items will be broadcast in five pairs—a home item alternating with one from the Empire. Canada, South Africa, India, Australia and New Zealand are the points of Empire with which we shall make ether contact.

It is instructive to one's geographical sense to realise that, whereas we shall be listening at 2.30 p.m. on Christmas Day to these items, it will then be Canada's breakfast-time on the same day and New Zealand's early hours of Boxing morning. The idea is to travel round the clock, starting with Canada and ending with New Zealand to achieve this very striking effect.

Busy Time for Engineers.

A busy time for the B.B.C.'s "O.B." engineers under Mr. Wood. He will actually be stationed at Sandringham, from which place His Majesty will deliver his message, as in preceding years. Special microphones are now being tested for installation up there, as well as land-line tests through King's Lynn for the bringing of the telephone currents into the B.B.C.'s system.

It will also be a very busy time for the Post Office engineers at Faraday House, where all the beam telephone circuits are concentrated. Indeed, one ought to realise what a triumph for the Post Office this round the Empire relay is.

Felix Felton will be in charge of the production side of this show—a young man who normally works with Laurence Gilliam, whose fine work in this kind of programme is too well known to need emphasis. Everyone with a radio set ought to make sure of "dating" it for this broadcast, for it is quite one of the most thrilling of the whole year.

It does not need a great amount of imagination to be thrilled at the thought of the far-flung millions who will also be listening to the show. The B.B.C. is making very special efforts at Daventry to see that every part of the Empire has the best possible reception through its Empire short-wave stations there. GSD, the old Chelmsford short-waver now installed at Daventry, will help GSG to provide a good East to West service. GSF will provide the North to South radiation.

Music by Henry Hall.

Well, so much for the King's programme. Then during the really sleepy part of the afternoon the B.B.C.—being only human itself—goes off into the lightest of light music until 5.15 p.m., when Henry Hall endeavours to bring us round with some lively dance numbers. At 6 p.m., when even the sluggards have recovered, there is a short bulletin giving sports news.

From 6.10 to 7.10 p.m. the B.B.C. has arranged a religious programme to appeal to those who like to take their Christmas Day rather more quietly. Of its kind, this promises to be a very good effort. But for those with other ideas a Regional alternative will be offered in the form of a Vienna potpourri.

Another highlight of the evening will be a relay of the famous Boar's Head ceremony from Queen's College, Oxford. This is a real slice of Merrie England—the crowning glory on the bounteous table of Queen's College, the highspot of their Christmas festivities.

But, you may ask, what is there to broadcast in the simple process of bringing in the Boar's Head? A great deal, I find, for this ancient ceremony is accompanied by quite a ritual, which will be relayed. First, there are carols by the choir in the Gallery of Hall. Then at 6.20 p.m. they form up into a main procession, headed by the singer and followed by the Boar's Head itself, which may weigh as much as 90 pounds!



Henry Hall will have a busy time during the coming holidays, for the B.B.C. Dance Orchestra will have to work hard over Christmas.

At 6.30 p.m. the Fellows enter Hall in procession to High Table. After rapping this, the Provost says a short grace. As soon as this is said, a trumpeter sounds a call, first in one quadrangle of the college and then in the other. The main procession enters Hall, with two balts for more carols. And then the Boar's Head is placed in front of the Provost at High Table, who extracts an orange from its mouth, hands it to the singer and distributes gilded holly and rosemary to all present. After that we will draw a veil over the proceedings.

At 7.30 p.m. Eric Maschwitz will give us another two-hour party in the studio, with a host of well-known favourites, who will include Stainless Stephen and the Two Leslies. Charles Brewer is helping Eric, so it ought to be very good indeed, for that boy knows how to make a party go, believe me!

Henry Hall's hour will wind up the evening—and so, we hope, to bed. If we are up in time there is plenty of fun and games arranged for Boxing Day. Harry Pepper and the Kentucky Minstrels, for one thing. A relay from the Drury Lane pantomime is probable too.

A Pantomime Broadcast.

Which reminds me. Ernest Longstaffe, who has made a speciality of such broadcasts, has written, composed and will produce and conduct that old favourite pantomime "Cinderella" for the B.B.C. on December 31st and January 1st.

Before I forget, there will be a new St. Hilary play from Marazion, Cornwall, on December 23rd, entitled "The Stranger at St. Hilary." The two carol services—one from King's College, Cambridge, and the other from St. Mary's, Whitechapel—will, of course, be broadcast on Christmas Eve as in past years.

Radio Magic

You can mystify your friends while entertaining them, and keep the party going with the aid of the simple radio ideas suggested by A. S. CLARK.

EVERYONE likes to have something in the way of a novelty at his party, particularly at Christmas-time. And anything that is mystifying or puzzling will always hold the interest of guests and "go down well," especially if it is entertaining at the same time.

The radio enthusiast has at his disposal the knowledge and skill to produce no end of amazing things which will ideally fill in those little gaps that occur between the fun at the most boisterous of parties. And if he declines to reveal "how it's done," he may amass quite a reputation as a second Maskelyne.

Some Individual Stunts.

Of course, you can have a lot of fun with a simple microphone outfit. You can hold crooning competitions, noise-guessing items, and so on.

But this is an old idea, and one to which many people have become accustomed. There are very few people you can take in these days with fake announcements about their grand-aunts or other unlikely events.

No, the things I have in mind are much more complicated to the looker-on, although just about as simple to carry out. And there is no end to the ways in which they can be employed.

What I propose to do is to describe the individual stunts from their technical aspects first, and then give a few examples of how they can be utilised. These suggestions will show you the multitude of ways in which you can adapt the schemes to your own ideas and facilities.

First of all, the microphone. I propose to deal with this because, although as I have just pointed out, there is nothing novel in its simple application, there are, nevertheless, many schemes in which it will be required in conjunction with other apparatus.

Arranging a Detectaphone.

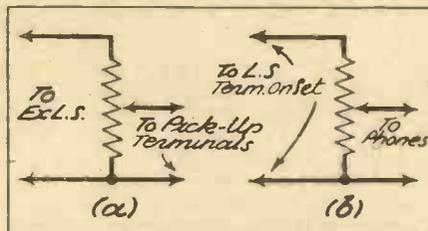
Naturally, you will use a carbon-type microphone, and (also naturally) the more you pay for it the better the reproduction that can be expected. But quite a cheap instrument will give remarkably good results. You will need a microphone transformer and battery of suitable voltage. The microphone, battery and transformer

primary are all joined in series, and the secondary is joined up to the set's pick-up terminals.

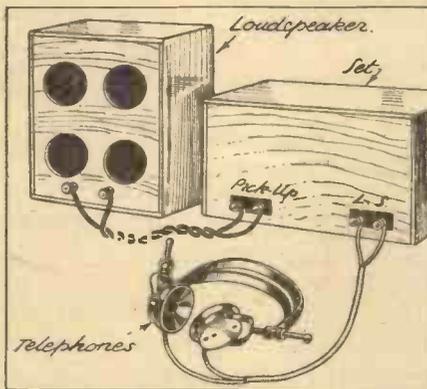
Avoid "blasting," caused by speaking too loudly. And when you are close to the microphone, speak or sing across it and not direct at it. A few tests beforehand to find the best loudness and nearness will help to ensure the success of your stunts.

Next on my list comes the detectaphone.

ADJUSTING SENSITIVITY



Above are shown two methods of controlling the volume when using the scheme illustrated to the left.



With the help of a pair of telephones you can make your set into a sensitive detectaphone.

For this you will need, beside your set, a loudspeaker, preferably of the moving-coil type, and a pair of high-resistance telephones.

The loudspeaker, with its transformer, is joined to the pick-up terminals, and the telephones to the L.S. terminals on the set. The

loudspeaker is hidden in the room behind a light curtain or other object which will not screen it from sound waves too much.

So sensitive may this detectaphone be that you may need a volume control to protect your ear-drums. The method of connecting up a potentiometer for this purpose is shown in one of the diagrams, in which two different schemes are illustrated.

The value of the potentiometer is not critical so long as it is high—anything from 25,000 to 500,000 should be suitable. A potentiometer such as is often used across a pick-up would be ideal.

We now have two items. A microphone for saying things to people in another room, and a detectaphone for hearing what they say themselves. It is best to have separate sets for each, but one will do if you arrange a change-over switching scheme to swap microphone for loudspeaker across

the pick-up terminals, and at the same time to change loudspeaker for telephones on the output terminals. If results from the telephones are very loud, don't get them close to the microphone (when using two sets), or you may get "singing round the ring."

A time-controlled switch is very useful for closing two contacts automatically at some pre-determined time. Normally they are somewhat expensive, but one of the sketches shows how easily a simple alarm clock can be made to do the trick.

The key which winds the alarm must have two holes in it—these can be drilled if necessary—and must rotate as the alarm rings. The idea is made clear in the sketch.

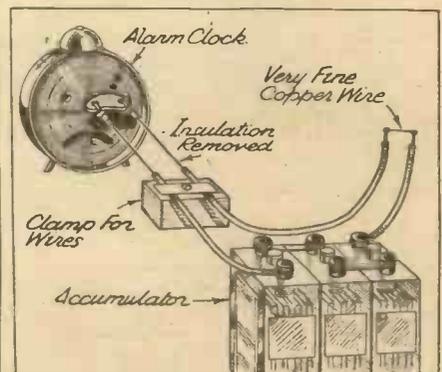
Setting Off Coloured Fire.

At the pre-determined time the alarm goes off. The key twists, and so do the two leads attached to it. As these latter twist together at their base part the connection is completed. It is important to see that the insulation is sound at the point where the wire is attached to the key.

This time-relay can be used for all sorts of things, including switching on the radio for some desired item, or, with the connections shown, to set off some coloured-fire powder. (An idea requiring the latter is dealt with later.)

Thick connecting leads are used, and a very fine piece of copper wire, 40-gauge or less, is connected where shown and covered by the coloured fire. As soon as the contact

A TIME-RELAY



A simple time-relay for igniting coloured fire or for other purposes.

is made it gets red hot with the current and ignites the powder. The force of the powder going off will ensure that the circuit is broken, and that no harm is done to the accumulator, which, by the way, should

(Continued on next page.)

RADIO MAGIC

(Continued from previous page.)

be 6-volt, and have plates of the thin type. The next item is the hidden contact, also illustrated, consisting of two pieces of brass. One of these should be of the springy kind of material, but sufficiently thick to require a fair pressure to make it contact with the other.

The two pieces of brass, to which thin wires are attached, are hidden below the carpet. If they can be sunk into the floor-boards, there is less chance of them being spotted.

The toughness of the springy arm will prevent contact being made until the foot is placed dead on top of the punch mark. The latter should be arranged under a spot in the carpet design so that you can always find it.

As many of these contacts can be employed as you like, and by placing them in different parts of the room you can move about with impunity if you wish. Take care to place them where nobody will tread on them accidentally.

The "Invisible Callers."

An instance of their use is to wire the connection across the front-door bell-push. You can then have members of your own family "on toast" by callers who vanish before the door is opened—even if someone waits for them with his hand on the door-catch!

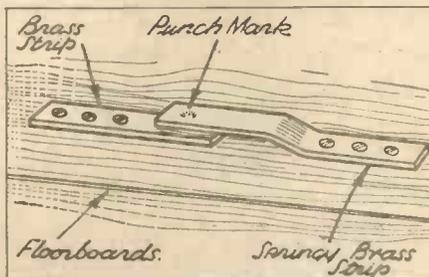
But let's pass on to photo-electric cells. These are a little expensive, but well worth

There are two ways in which they can be used, circuits for which are shown. In one a visual indicator in the form of a galvanometer, or sensitive milliammeter, is used; and in the other the cell is made to operate a relay which can be used to switch on lights, ring bells, operate motors, or anything else desired.

In the first case the cell is connected to a single valve, with the galvo or meter in its anode circuit. It is biased by the centre battery in the diagram to its bottom bend. The value of the resistance depends on the cell.

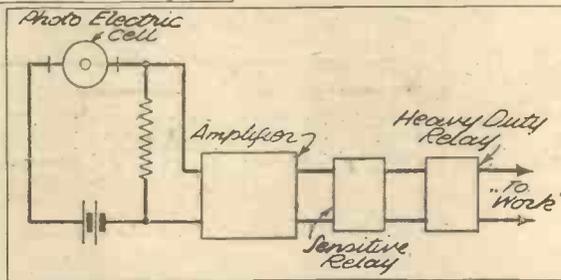
As soon as the light falls on the cell, more current flows through the resistance R and makes the grid of the valve positive. Immediately anode circuit flows and the needle kicks.

A SECRET "CONTACT"



This gadget is hidden beneath the carpet and operated by the foot.

LIGHT CONTROLLED



With this chain of apparatus, lamps, motors, bells, etc., can be controlled by a beam of light.

By sufficient amplification the kicks can be made to work a sensitive relay, as shown in the other photo-cell circuit. Since the contacts of a sensitive relay cannot be expected to carry a lot of current it is usual to make it control a heavy duty relay in circuit with the mains or other electric power supply.

And now with the microphone, detectaphone, electric time-switch, concealed contacts, and photo-electric cells, let us see what we can do to mystify our friends. Of course, it is most unlikely that you will want to use all of these at once for one stunt. So here goes—the séance.

"Yes" or "No."
For this we use the time-relay and a hidden contact controlling a current

through a loudspeaker so muffled that it is impossible to tell where the sound comes from. The audience is told that your "visitor" usually gives one tap for "Yes" and two for "No."

Thereafter, everyone sits round in a circle,

arms crossed and holding hands in a continuous chain. Lights are dimmed until one can only distinguish one's neighbour by his outline.

A Startling Occurrence.

After a short spell of complete silence there is a persistent tapping. You announce the arrival of the "spirit," and invite questions. These you answer by operating the contact beneath your foot.

Just when things are getting tame, you ask the "visitor":

"Is anything exciting likely to happen to-night?"

Tap!

"Shall we come into it?"

Tap!

"Will it be near here?"

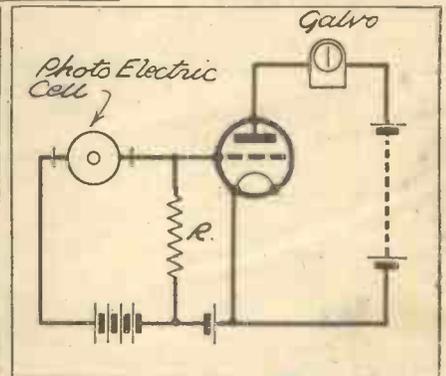
Tap!

After this others will take up the questioning, to find out what it is to be. With a few leading questions you enable it to be conveyed that at, say, seven minutes past nine everyone in the room will be startled.

When the time arrives, with the séance still in progress, even the sceptical jump as a blinding flare lights up the window outside, to die almost as suddenly. Investigation outside reveals nothing, as the wires, battery, and alarm clock are out of sight or buried beneath earth.

The séance is over. The lights go up. Games are started

EASILY SEEN



A simple use of the photo-electric cell to give a visual indication of change in light intensity.

again. But the diversion and puzzlement will have been complete.

Now, here's another idea. It is illustrated by a sketch. An eastern-looking god or goddess houses two flashlamps shining out of the eyes. Hidden behind it and somewhat muffled is a loudspeaker, joined to a mike in another room.

A further hidden speaker acts as a detectaphone. The phones are in the same room as the mike.

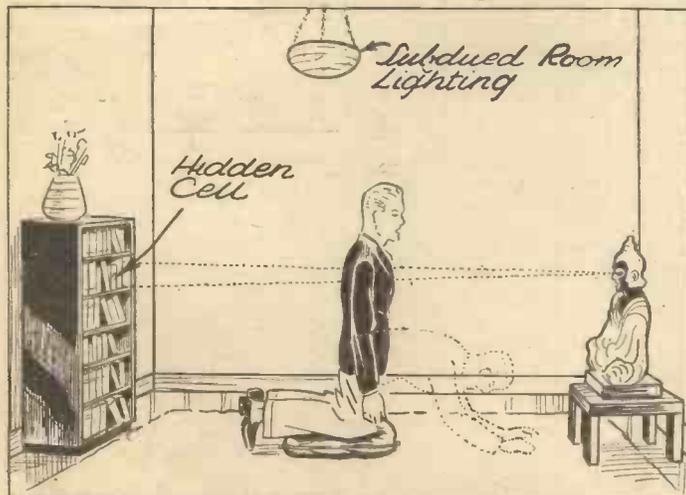
Hidden between two books is a photo-cell, full in the beam of the torch light, but shaded from the subdued room lighting. A cushion is placed between the god and the photo cell, the latter being connected to a meter in the room with the mike.

Guests are invited to ask any questions of the god. All will be answered, but not till the asker bows down.

The person asking a question is made to kneel on the cushion, and cuts off the light

(Continued on page 411.)

TRY THIS ONE ON YOUR FRIENDS



Fully described in the text. The goddess answers any question, but will not say a word until the instant the questioner bows down.

the money. They can be obtained in Westinghouse, G.E.C., and other makes, and care must be given to following out any details in the instructions sent to you with them. But the following general remarks will be found to apply.

On the Short Waves

SOME little time back I devoted a page to the problems of readers who had sets that said, in effect, "Thus far, but no farther!"

In other words, those annoying receivers that suddenly emit a choking noise at, say, 19 metres and refuse to go down any lower.

Since then we have all heard about the wonderful happenings on 10 metres, and practically every reader of these notes who can copy Morse has been trying to stretch a point further and get down there. And that is what starts showing a set up.

You can take it from me that if your short-waver will get down to 10 metres and below without misbehaviour of any kind, simply by using smaller coils, then there isn't much wrong with your ideas of lay-out and efficiency.

Why It Won't Work.

Take the average short-waver. It will probably cover the 19-metre band nicely, with a four-turn grid coil and three turns of reaction. Make up a coil with two and a half turns in the grid winding and two for reaction and plug it in. Will the thing oscillate? No! Why?

Let me tell you. Detector wiring is the trouble in nine cases out of ten. In spite of all I've said on the subject, I don't mind betting that in nearly every case that is the only factor that stops the receiver from going down to 10 or even 5 metres.

Add up the total length of wire in that

SHORTENING THE GRID LEADS

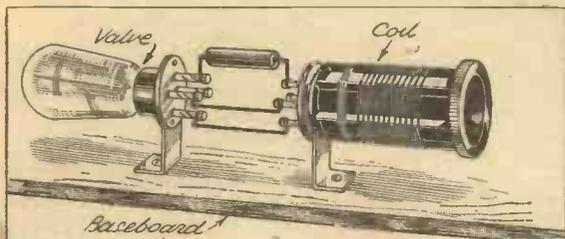


Fig. 1. A back to back arrangement which keeps the grid and other wiring very neat and short.

"inner circle" formed by the grid coil and the condenser that tunes it. Possibly the connecting wires from the coil to the condenser have a total length of 8 or 9 inches. For your 10-metre coil there probably isn't more than that amount of wire on the coil itself, so you must shorten that wiring somehow.

Figs. 1 and 2 give you a couple of practical ideas for doing so. Fig. 1 shows the valve holder and coil holder, both mounted horizontally and placed "back to back."

"IMPROVING EFFICIENCY"

Good advice to those who are not getting satisfactory results from their short-wave receivers.

That, admittedly, doesn't shorten the closed circuit wiring, but it does help quite a bit.

The grid condenser goes straight from the grid pin of the valve holder to the appropriate pin on the coil holder; the anode and filament leads likewise go straight across the gap to the required terminals.

Fig. 2 shows you the means of reducing the tuned-circuit wiring to practically zero—mount your coil holder actually on the variable condenser. Let me tell you the facts of an actual case in which I did this.

Using a coil with nearly three turns in the grid circuit and two turns for reaction, the detector just went down to 10 metres, which came right at the bottom of the scale on a '0001 condenser. Oscillation was difficult to produce—the reaction condenser had to be "all in"; hand-capacity was bad, and signals were difficult to hold.

The coil holder was mounted on the base-board between the variable condenser and the valve-holder, and leads were as short as they are in most receivers.

The coil holder was then mounted on the condenser, as shown in the sketch, and no other alterations were made. The result was that 10 metres came in at just above 35 degrees on the condenser; hand-capacity, nil; signals easy to hold; oscillation perfectly steady and controllable, with the reaction condenser in a sensible part of the scale.

Try It Yourself.

The same set now gets down to about 8.5 metres, and will oscillate with an even smaller grid coil, apparently with the greatest of ease.

Now on these very short waves little alterations like this mean all the difference between satisfactory operation and a heap of trouble. On the "ordinary" short waves the difference will not be so noticeable; but it's bound to be there, all the same.

I guarantee that I could make you a short-waver which, by reason of bad lay-out and

long wiring, would be just as unsatisfactory on even 30 metres as this particular one was on 10. And I firmly believe that 20 per cent of my readers are using just such a set!

Even the Editorial Staff pull my leg about these treatises on lay-out, and hint that I am laying it on too thickly. Just you try it out for yourselves and see whether you agree.

How about other means of improving efficiency, while we are on the subject? Call it "hotting up," if you like, although that's a misleading term. The usual trouble is to produce oscillation where none grew before, so to speak.

Is the Voltage High Enough?

If you have a resistance-coupled detector, as most short-wavers have, I suggest that you lose no time in applying a good high-resistance voltmeter across the anode and filament of the detector valve. You will probably find that it is operating with far too low an H.T. voltage.

If you have a 250,000-ohm anode resistance, for instance, you will find that you can apply 120 volts of H.T. across the far end of this and earth without making the detector uncontrollable or producing ploppy reaction. That alone will probably make

DIRECT MOUNTING

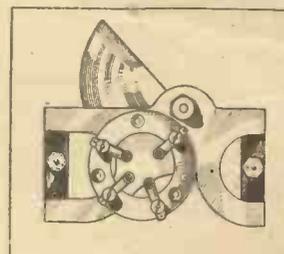


Fig. 2. Short wiring in the tuned circuit is obtained by mounting the coil holder on the end of the tuning condenser.

your set oscillate considerably farther down the scale than it has before.

Next you might get down to it with a filament voltmeter and see whether your valves are really getting the voltage that they are supposed to have. Long flex leads to the accumulator don't help things; and neither do doubtful L.T. switches, loose terminal connections and dry joints.

There's all the difference in the world between 1.8 and 2 volts, as you will find if you make the test for yourself and try to clean things up a bit.

The reaction condenser is another point that often needs watching. I am definitely not in love with the solid-dielectric types for short-wave work, having found out for myself what a difference it makes to put in a good air-dielectric condenser.

ON THE SHORT WAVES.—Page 2.

Points from the POST-BAG

T. W. (Edinburgh) mentions that he has received a Chilean amateur on telephony with his "B.C.L." Two, and asks why Chileans and other South Americans are so scarce. Is it because they are difficult to receive, or owing to lack of stations?

As a matter of fact, I think the South Americans mostly work low-power telephony with each other on the other short-wave bands. Certainly very few of them are heard on 20-metre phone.

A Question of Coil Sizes.

A. T. (Banbury) has a "Simplex" Two, but owing to the size of his tuning condenser the wave-ranges with the coils I specified come out all wrong. He wants me to recommend new coil sizes. My advice, A. T., is—stick to what you have. So long as you cover the whole band it doesn't matter how it is split up.

If selectivity is poor, that's nothing to do with the tuning condenser, probably. Reduce that aerial coupling!

H. McG. (Cupar) wants to know where to obtain a list of short-wave broadcast stations, including amateurs. The Radio Amateur Call-Book is the only thing of the kind, since those two words "including amateurs" add about 50,000 stations to the list in one fell swoop! The Call-Book may be obtained from the R.S.G.B., at 53, Victoria Street, S.W.1.

F. W. C. (Bramley) is running his second short-waver—a chassis set—and likes it enormously, but hankers after something bigger, and sends me a circuit for criticism. It's a tuned S.G. affair, with parallel-feed and pentode output, all A.C., and to my critical eye it looks very good. Good luck with it, F. W. C.

C. V. P. (Middlesbrough) is adding an H.F. stage to his "Simplex" Two, and now wants a layout for adding a resistance-coupled L.F. stage as well, to make it into a real "ripsnorter." I hope to deal with this and give a diagram next week or very shortly.

M. J. B. (South Harrow) has a ready-bought short-wave adaptor that doesn't! The 13-26-metre coil doesn't produce anything at all, and the manufacturers, after having it back, say that it is satisfactory. Sorry, M. J. B., I can't make any suggestions, not having seen the unit. It certainly sounds all wrong.

Try a "Buffer" Valve.

W. L. (Tolworth) gets "dead spots" that are real bottomless pits, which are obviously due to his aerial, since shifting the pre-set coupling condenser moves them about. But by the time he's flattened them out he's lost his signals as well! Short of a "buffer" H.F. stage, I'm afraid I've no suggestions, W. L., unless your pre-set is a dud. Try a neutralising condenser in its place.

The diagram on this page is a pictorial reply to the many readers who have asked for the connections for B.T.S. coils in the "Simplex" Two. Refer back to the

original wiring diagram of the set, and the necessary alterations will be quite clear. The coil holder is turned round to make all connections as short as possible.

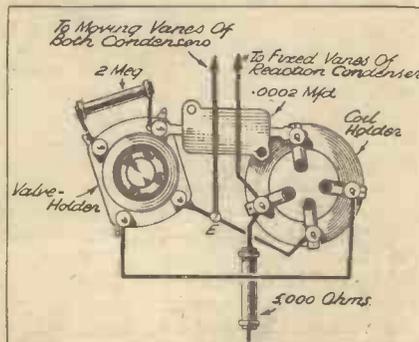
N. H. (Bexley) is very keen on getting in touch with some other short-wave listeners in that neighbourhood. His full address is N. H. Habben, 37, Penhill Road, Bexley, Kent.

J. E. (Shipley) backs me up staunchly in my remarks about the necessity for using the smallest possible reaction coil with the tightest possible coupling. He has completely overcome severe "dead-spot" trouble by rebuilding his coils and keeping this advice in mind.

He has now built a super-regenerator as described in the October 26th issue, and finds difficulty in making it "super." Reaction slides in as usual, and the second valve makes no difference. As it happens, I have just experienced this effect myself with a "try-out" receiver; but I got the "super" going well by connecting a .001 fixed condenser across each of the quench-coils—i.e. across both grid and anode circuits of the second valve.

G. W. G. (who describes himself as my "tame Ipswich ham") writes to say that he has had yet another attack of "newsetitis" and has gone all chassis this time! The set is a three-valve all-mains affair, using S.G.-det.-Pentode, and he likes it better than previous affairs, with which he was well satisfied in their day. He has also become bitten with the 5-metre fever, but

AN ALTERNATIVE



In response to many requests, W. L. S. gives in this diagram the connections for B.T.S. coils in the "Simplex" Two.

finds it rather trying, as there are no local signals to listen to except of the "home-brewed" variety.

R. W. R. (Ramsgate) wants to know "the correct way to report a short-wave station." It is the fading and static tables that bother him. Well, R. W. R., I prefer plain-language reports myself. But, if you like, you just use "F" for fading, "SF" for slow fading, "FF" for lots of fading; and the same with "X" for static, with "NX" for no static.

Anyway, the people to whom you report are only interested in their own signals, and aren't concerned much with static and other conditions of the moment. Readability and audibility are the two main factors, shown on the "QSA" scale (0 to 5) and the "R" scale (0 to 10).

G. P. (Kilburn) wants to meet fellow enthusiasts in that neighbourhood. Full address: G. Plastow, 4, Netherwood Street, Kilburn, N.W.6.

R. D. E. (Great Gransden) thinks that A. W.'s German station on about 27 metres was probably D.F.L on 27.65 metres.



SHORT-WAVE work, with its international interests, has been responsible for a new kind of radio society—the "correspondence group." Many of my readers, I know, have regular correspondents in all parts of the world with whom they exchange notes and ideas on short-wave subjects.

Mr. B. Alterman writes to tell me that an American group would like to correspond with a similar group in England, or with individuals. All letters should be addressed to Mr. C. Zwanzig 3rd, 1404, West Madison Street, Ottawa, Illinois, U.S.A.

A Very Strong Society.

Mr. Leslic W. Orton tells me that the social side of the Anglo-American Radio and Television Society is going strong. A recent dance (to music from America) concluded with the broadcast of greetings to the society from a continental station. W 2 X A F has also promised to broadcast special A.-A.R. & T.S. concerts shortly—probably the first will be during December.

It is hoped to broadcast (via gramophone recordings) selections by the society's All-Electric Orchestra. The Ladies' Section now has representatives in New Zealand, Australia, Cuba, Hungary, South Africa and the Irish Free State.

Talking of ladies' sections, I see that the latest idea from the States is a club for "The Wives and Mothers of Amateur Transmitters"! Presumably these good ladies get together for a little enjoyment while their husbands and/or sons are too busy on the air to recognise their existence.

Incidentally, a young lady of my acquaintance asks why the daughters have been left out. She thinks they have quite a thin time sometimes.

Here is news of another society. The Darlington Radio and Television Society has been formed to promote interest in the town among radio enthusiasts. It has its own club-room and is running a transmitter operated by G 6 M F.

All details may be obtained from Mr. C. W. Ashton, 10, West Powell Street, Darlington, Durham.

Good Ten-Metre Reception.

Conditions on the air are still pretty good, and the surprising 10-metre band has been especially lively during the afternoons. The fact that any long distance came across on 10 metres used to indicate that conditions on the other bands were phenomenally good.

Although I would not say that this is true at the moment, there is certainly nothing to grumble about. Most of the better-known DX stations come in day after day with almost complete reliability.

Two interesting stations "off the beaten track" are HC 2 C W and HC 2 A T, both in Guayaquil, Ecuador, and working on 35.69 and 35.71 metres respectively. They are not on together, but one or other of them may often be heard in the early mornings—1 a.m. onwards. W. L. S.

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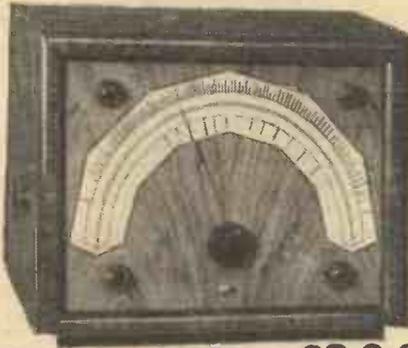


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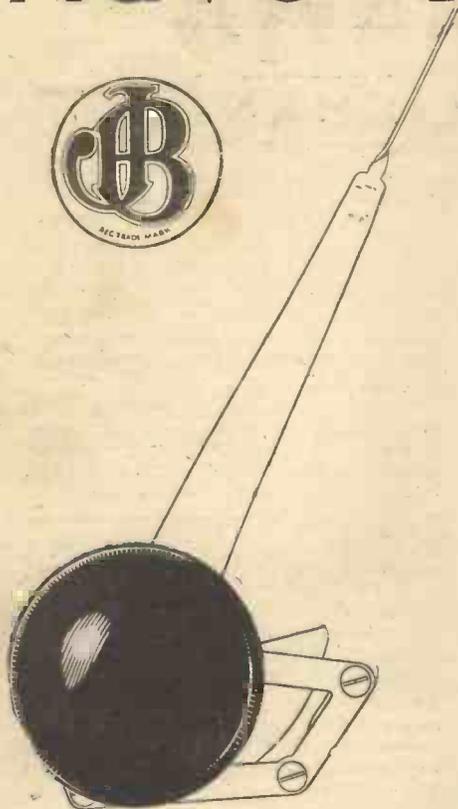
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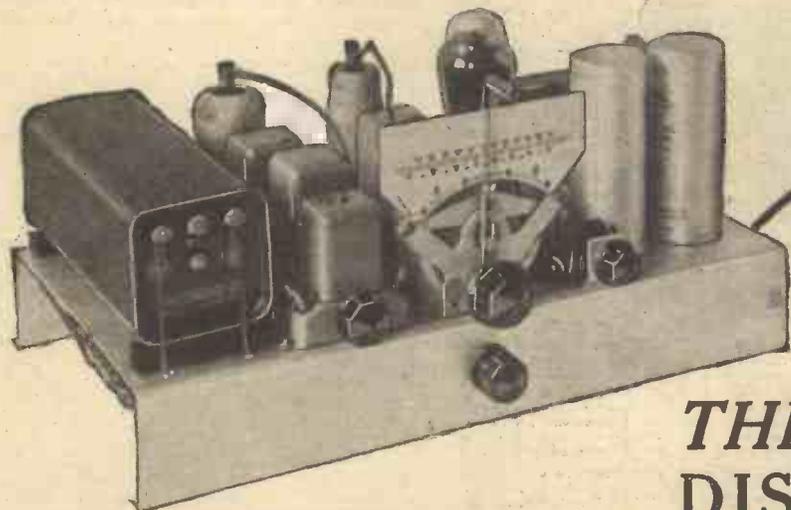
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Programme Problems Probed

4

RADIO DRAMA

By **GARRY ALLIGHAN**

WHAT is the weakest feature of B.B.C. programmes? Ask me that and I reply: Radio drama.

Of all the programme subjects that radio has adopted, drama has been the slowest in accommodating itself to the new medium. It would have been slower still had it not been under the direction of Val Gielgud, a man who is a son of the theatre, whose mind is of theatrical bent, whose enthusiasm for those things of the stage is unquenchable, and who cherishes a high idealism for radio drama. Admiration for Val Gielgud and his passion for the histrionic art must not warp my judgment on the work of his department.

Using Stage Material.

I consider that radio drama has been of very measured success because of two mistakes. The first is in attempting to use stage material for broadcasting. It should have been realised from the very beginning that the stage and microphone make two distinct demands on drama, so distinct that it is often true to say that the quality that makes a play most successful on the stage makes it most unsuccessful on the air. And vice versa.

Stage drama, being visual primarily and aural secondarily, finds its chief virtue in action. The play in which there is least movement is least successful on the stage. The play that is more verbal than mobile is of least suitability to the theatre. The play with, say, three or four characters who come on to the stage and talk, without much or any dramatic action, is the play that is certain to empty the theatre.

All that is reversed with radio. Read the previous paragraph again and you will see what I mean if I say that all the factors that make a play unsuitable for the stage tend to make it suitable for broadcasting. The microphone cannot adequately depict action, only so far as it is action via sound. Therefore, the play in which there is least movement—and is, therefore, least successful on the stage—is most successful on the air. The play that is more verbal than mobile is ideal microphone material. The play with three or four characters, who utilise the play-time with talk instead of dramatic action, makes good radio drama.

Television the Solution.

Many radio dramas have been dependent on the actions that speak louder than words, but which the microphone cannot transmit. For that reason it may be safe to say that the future of drama over the air is centred entirely in television. The reason why Shakespearean plays have been among Val Gielgud's most outstanding successes is that Shakespeare was a dramatist of many words. He was the first and greatest radio playwright.

If what I have written is true—and it is written because I think it is true—the obvious course is to broadcast plays that are specially written for the microphone.

During the past year or two Val Gielgud has been encouraging radio playwrights, and in that he has been wise.

The average author of stage plays (and also the film-story writer) first sees his play in terms of scenes. He writes a scene plot

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**"It may be safe to say that the future of drama over the air is centred entirely in television," says the author of this provocative article.**  
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of, perhaps, three acts; a first act of half an hour, a long second act, with one or two scene changes, and a short third act. Everything, at that stage, is action. The script—the dialogue—follows.

That is sound technique for the stage and thoroughly bad for the microphone. Changes of scene are difficult to achieve and are only conveyed to the listeners by breaking the verbal continuity of the play

SEEN ON THE SCREEN



A scene from a television sketch. With vision to assist sound, radio drama would obtain an invaluable added power.

for an announcement of an alteration of locale. The ideal radio play has no change of scene, no alteration in period, no more than six characters, each with a clear-cut part played by an artist with a distinctive voice. Many of the plays in the Children's Hour, such as Carey Grey's, set the Drama Department a fine model.

In casting a stage play the producer chooses his artists according to the approximation of their normal appearance to that

of the character. Or their suitability to sustain a make-up that will fit. Radio drama demands in an artist a voice, and voice alone, that suits the character. That is why Philip Wade is a radio triumph; he is able to change his voice so that it can suit as many as eight different characters. Instead of filing artists under their names they should be filed, at Broadcasting House, under their voice-styles.

I have tried to show (a) that successful stage material is, because it is successful stage material, not capable of being successful radio drama, and (b) that playwrights should be encouraged to write radio plays, in the microphone idiom, specially for broadcasting. This second consideration immediately raises the finance factor again.

The Question of Cost.

If a playwright writes a play that is a success on the stage he will make from £1,000 to £10,000 for his labour; if he writes a play that is a success on the air he may get £250, providing that he is outrageously lucky. The chances are that his successful radio drama will achieve a £50 to £80 reduction of his overdraft. Why then should he divert his play-writing genius from a gold-paved avenue like the stage for the benefit of the B.B.C.? It is obvious that if there is to be an increase in the quality of radio drama there must be an increase in expenditure—which, probably, means a reduction in the number of plays broadcast.

The fact is that radio drama is expensive. To secure a play, specially written by a competent playwright for the microphone, the B.B.C. may have to pay £500. It will require, say, six good artists who will—or ought to—have to devote at least a full week to rehearsals. That will add at least another £300 to the cost. The overheads—including a percentage of the Drama Director's salary, the salaries of the adapter and producer, engineers, costs of transmission, etc.—will bring the total expenditure for one broadcast to nearly £1,000 and to about £1,250 for a diagonalised broadcast.

"Multiple Studio" Policy.

To a play costing £1,000 only about 10 per cent of the listeners will tune-in. It is, therefore, uneconomic to broadcast a play on such quality lines when only £150 is spent on a variety bill that caters for 80 per cent of the listeners.

The second mistake that I consider has militated against the success of radio drama is the "multiple studio" policy in play production. Certain of the B.B.C. producers have been badly bitten by the "multiple studio" bug. They have delighted in the experience of using half a dozen studios for one play, they themselves seated in glorious power before the Dramatic Control Panel, bringing first one and then another of the studios to the ears of

(Continued on page 411.)

TELEVISION JOTTINGS

Some notes on the latest aspects of the new branch of broadcasting.

IN 1922, when it was first made known that regular broadcasting of radio programmes was to begin before the end of the year, one of the first results was a terrific growth in the number of local radio societies or wireless clubs, which all became full of overflowing with new members who wanted to learn something about "the new art" in plenty of time.

Surprising Lack of Knowledge.

Now that we have a definite promise of television programmes next year I note with some interest that most of the local societies are adding the magic words "and television" to their titles, and I understand from some of their secretaries that there is evidence of a tremendous amount of interest in television among old and new members alike.

The radio societies have tended to fall into a rut. Those that have not taken up short waves have mostly confined themselves to the problems of super-quality reproduction, super-selectivity, and so on, and have found themselves going round in circles.

Television is going to supply just the impetus required to start off these clubs once more as real live bodies of enthusiasts. There is a big demand for television

lecturers who know their job, and a genuine thirst for knowledge on the part of the members.

And now I come to my point. More than one organiser of a club has told me, in bitter terms, of the abysmal ignorance of television principles shown by most of the members. I will quote from a letter: "I find that people who know more about radio than I do are full of the most comic ideas when it comes to television work."

"One man asked me at the last meeting whether he could convert an old six-valve superhet into a television receiver, and roughly how much would it cost. He presumed that the only extra would be a cathode-ray tube, which I firmly believe he thought he could connect in place of the loudspeaker."

This sort of thing makes me wonder whether some people will ever learn. There have been clearly written articles on television in "P.W." for well over a year; most of the aspects of high-definition work have been explained in simple, and even childish, language. And yet people who

are known to buy "P.W." every week are still showing the most complete ignorance of the subject.

Why is it, please? Does no one start getting interested in anything new until the last possible moment? There will be a frantic demand, I suppose, for "plain-language" television articles about next March, when, we hope, the transmissions will have started.

A Tip to the Societies.

Readers who have carefully followed all the authoritative articles on the subject—and those who have taken advantage of the offer made in connection with the "Book of Practical Television"—should be able to make their own receiver by then, without wanting to know any more.

And now to come back to technical points once more. Having discovered how easy it was to fall into the habit of using a certain circuit for every purpose, I recently tried out several different detector arrangements on a locally produced signal in the region of 7 metres, and must admit I was surprised at the variance in results.

The usual series-fed reaction circuit was not the best by any means. Best of all was a push-pull detector using a special form of Colpitts' circuit; and next was the Ultraudion, which everyone used for short waves. I hope to give full details of these experiments at a later date; meanwhile I am improving my signal-frequency H.F. stage on 7 metres—without using an Acorn valve or even bothering to remove the base from a standard type.

L. H. T.

EFFIE ATHERTON AT THE MIKE



A happy snap of the popular member of the "Air-do-Wells" making a record at the "His Master's Voice" studios.

ROUND THE RECORDS

Comments on the latest recordings from the gramophone studios.

CHRISTMAS is nearly here, and then, before we can say "Jack Robinson," we shall have the New Year. Resolutions and all that. And I hope the gramophone concerns will make a few new resolutions, to say nothing of some of our cinema organists and dance-band pianists.

Here is one resolution that could hardly be bettered in its own sphere. "We will give those old timers St. Louis Blues and Limehouse Blues a good rest." I suggest it to the attention of the pundits.

I am looking forward to the New Year. By then we should have sufficiently acknowledged the fact that the wheel of the wagon is broken and shall be reminded of it no more (I hope). Also those brave fisher folk, so often women, judging by the fact that men vocalists address them, will have lowered their red sails, and, with a bit of luck, the diurnal greetings to "my mother" on the occasion of her birthday will have ceased. I hope, without any "returs."

Some Attractive Numbers.

Sorry to be so bitter about it all, but really we do get a good basting. That last number was introduced to us on the radio by Hildegard on Sept. 20th and is still going strong. I heard it broadcast last night. The decrepit wagon has lasted even longer—in song—and is being lamented in all the latest gramophone lists, as well as on the British and foreign radio stations.

But though there are old numbers in the record lists this month, there are also some new ones, and there are some very attractive records indeed.

For instance, if you want a merry record that will add gaiety to your Christmas, Regal-Zono have published one of that popular pair, The Two Leslies.

They have chosen *Down on the Farm* and *So 'Andsome* as the numbers with which to make this debut before the microphone of a fresh recording company. The "effects" in the former record are certainly worth hearing (MR1850). The Two Leslies also "appear" separately in the same list, so their fans should be well satisfied.

If you want some organ music, what about *Torchlight Music*, played on Columbia by Sydney Torch? Full of pep, yet tuneful. Or, if you want something hotter, get your dealer to let you hear the same organist in *Hotter Than Ever*, a selection of snappy numbers, including the inevitable St. Louis Blues (FB1158).

Switching off from musical to vocal, let me recommend Clapham and Dwyer in *Horses for Courses*, a Columbia record that is well up to the standard set by these two stars. It was written by Charlie Clapham, so you know what to expect (FB117).

Do you want to be sentimental? Then hear Hildegard sing *I'm in the Mood for Love*. This young cabaret artist has a personality that defies the mechanical deadness of the recording wax and the chill unresponsiveness of the microphone. Whether you like her style or not you have to admit that she gets her personality over. Her records have "It." So, as I said before, listen to Columbia FB1170, if you feel really sentimental.

One of the old-timers that has been resurrected recently is *Fascinating Rhythm*, and many bands and pianists have been playing it during the last

few months. One of the best interpretations of this double Gershwin (George and Ira Gershwin are responsible for it) number is that by the young Nat Gonella with Harold Hood at the piano. It is on Parlophone F192 and is certainly worth hearing. The other side contains *Hesitation Blues* with Nat singing the vocal refrain.

H.M.V. have always been fond of recording novelties, and they have now issued a record of Elisabeth Schumann singing the parts of both Hansel and Gretel in the *Evening Prayer* from Humperdinck's fairy opera. This duet with herself is certainly effective and Elisabeth Schumann's voice is particularly suitable for this sort of recording gymnastics. I, for one, like the record, and I think you will too (H.M.V. DA1439).

The B.B.C. Theatre Orchestra has done well on its first appearance in the recording world. Under Stanford Robinson the famous orchestra has signed up with Decca and has made two records of popular items. The first is an *On Wings of Song* selection from the film in which Grace Moore stars (K790), and the other is *Lionel Monckton Memories* (K791), which is particularly tuneful. In the first record the orchestra has the assistance of Isobel Ballie, the famous soprano, whose unusually clear voice is ideally suited to the airs the record contains.

Christmas Carols.

Carol records are once more appearing on the market, and first to arrive, I believe, are those of Decca, who issued in November K794, a selection of carols sung by Steffani and his Silver Songsters. Others will follow no doubt, and we shall have a choice of choirs, bands, and what-not before the festive date arrives.

In honour of Christmas Brunswick has prepared a number of albums of records containing a most interesting variety of recordings. Here is the list, and I advise enthusiastic gramophiles to get in touch with their dealers for more information. Here are the titles, then: "Blackbirds," "Show-Boat," "Beethoven 5th Symphony, Selection from Classics, Special Rhythm Album, Short Survey of Modern Rhythm, Purcell, Bliss Clarinet Quintet, and Six Mickey Mouse Records.

A fine choice, my masters!

K. D. R.



"Now is the Time for Dancing"

CHRISTMAS! The time of jollity—and of pudding. And the time for dancing; for after the strain of digestion has somewhat abated we look round for "something to do." And if you exercise a little thought there is plenty with which to occupy your time and to amuse everybody. The B.B.C. does its best during the short holiday (no holiday for the staff of the "Big House," by the way) to provide light and festive entertainment. Pantomime, variety, party fare of all sorts, and—dancing.

Henry Hall and his band will take the air on frequent occasions during Christmas,

and in the following days, while the "hang-over" from the Eating Season still persists, other bands will provide plenty of light rhythm.

But with a good radio set and a pick-up one is not by any means dependent on the broadcast dance bands for one's dancing. As a matter of fact, if you have an acoustic gramophone one need not even have a radio set or a pick-up to provide dance music. But we will assume that the radio and the pick-up are available and without doubt in many cases a complete radio-gramophone.

Every one of your favourite dance bands can be heard on the gramophone, for one or other of the recording companies is sure to have made records of it. And with a

little care a very enjoyable programme for an hour or so of dancing can be arranged with a few records. After all, you need only about eight to ten records. Each side of the ten-inch record will play for three minutes, and with pauses for slight rest and for changing records eight will fill an hour quite easily.

And there is no need to have all dance records either. About half-way through the proceedings it is often preferable to have some light orchestral or vocal number, or perhaps a comedy record so that a slight rest can be obtained from dancing and a change in entertainment achieved.

Making Your Own Announcements.

With a microphone attached to your pick-up terminals, and faded in and out by means of an ordinary fading potentiometer, one can announce the programme items and insert any amusing patter that may come to mind. All sorts of stunts can be arranged with a simple mike.

If you are the lucky possessor of an automatic record changer on a radio-gramophone you can load the machine with eight records and be assured of about half an hour's music straight off, but it is a good idea to fit an on-off switch in series with the motor so that the changer can be stopped between numbers to allow the dancers to regain their breath and have a change of partners should they so desire. A simple switch such as is inserted in the leads to a portable reading lamp will do admirably, and it can be taken out on a flex to any convenient position in the room.

There are one or two things to remember when arranging a dance programme from gramophone records. The first is that the numbers should be varied well and the bands also varied. Do not have the same number twice if you can help it. Also, in the case of waltzes, make sure that they are really suitable to dance to. So many of the dance music records which are primarily made for listening instead of for straight dancing are not quite right in their tempo. Hear all the records at your dealers before you purchase them.

Arranging Your Programme.

Vocal refrains also sometimes upset the record for dance purposes and cause a break in the strict tempo of the number.

Try to arrange your programme artistically. For instance, a start with a record like that of Maurice Winnick's signature tune that has just been released on Parlophone is a good idea. He announces himself and the band and also his vocalists, and gives the impression that a special dance band session is about to commence. The title, of course, is "Sweetest Music this Side of Heaven."

(Continued on page 414.)



An impromptu dance is easily arranged if you have a radio-gramophone, and an interesting competition is also described in this article. Here we see a group of merry-makers dancing to the strains of an H.M.V. radio-gramophone.



The radio station at Akaki, just outside the Abyssinian capital.

WAR NEWS ON SHORT WAVES

A Special Article on the Italo-Abyssinian Campaign by J. GODCHAUX ABRAHAMS

DURING the past few weeks many listeners in the British Isles at times have picked up telephone transmissions emanating from Asmara (Eritrea). On several occasions broadcasts made by war correspondents for the benefit of such radio associations in the U.S.A. as the N.B.C. and Columbia Broadcasting Systems have been heard in this country both direct from Eritrea and through the North American short-wave transmitters.

Running Commentaries.

It is interesting to note that running commentaries on events taking place in the Italo-Abyssinian conflict are now being made regularly every day not only by the Italian authorities, but also by European representatives and, in particular, French reporters. The transmissions carried out for the benefit of the general listening public, fortunately, are not limited to those on short-wave channels, as they are also available on the broadcast band.

In addition to the official Italian war bulletins which are given out in several European languages through the Rome 2 R O transmitter on 25.4 m., broadcasts in the Italian language direct from Asmara are also given daily at G.M.T. 16.00 through all stations in the E.I.A.R. network. In most instances, however, the commentaries made on the spot by foreign correspondents in Eritrea and destined for countries overseas, as a rule, are relayed by the Italian short-wave stations, possibly to facilitate their reception abroad.

Daily Adventures Described.

On the medium waveband British listeners who have a knowledge of the French language may find much interest in the 8 p.m. broadcast carried out by the French P.T.T. stations, and also by Radio Cité (Paris) and Radio Luxembourg respectively on 280.9 m. (1,067 kcs.) and 1,304 m. (230 kcs.). In this case the transmission does not assume so much the character of a news bulletin as a personal account of living conditions experienced by the speaker who, in a breezy and peculiarly unconventional manner, details for the benefit of his nationals—and probably many eavesdroppers!—a description of his daily adventures

Apparently put through the microphone at a camp some 70 miles distant from the Eritrean capital, the speech is conveyed by land line to Asmara, thence radiated to Italy, where it passes over the international telephone network via Lugano, Lucerne, Basle, Colmar, Nancy to Paris for further redistribution in the provinces, and also diverted via Metz to Luxembourg.

As regards news from Abyssinia direct, the matter is not such a simple one in view of the fact that facilities for broadcasts are of a more restricted character.

If the annexed list of stations is examined

it will be noticed that the Ethiopian Government so far only possesses four channels of which until recently but two, namely, 11,955 kcs. and 7,620 kcs. have been available for telephony.

Considerable publicity was given some little time ago to the fact that broadcasts had been made on these frequencies by the ruler of Abyssinia and his queen. Since that date, however, there is a possibility that E.T.A., Akaki, near Addis Ababa, on 16.42 m. (18,270 kcs.) has been converted for telephony, as tests have been picked up in the British Isles on this wavelength.

Regular Broadcasts From Akaki.

According to a recent report, a French journalist, M. Alex. Virot, on the staff of "Paris-Soir," left some weeks ago for Djibouti en route for the Abyssinian capital, for the purpose of giving a regular daily commentary on local happenings. The signals transmitted through E.T.A., Akaki, are to be picked up by the French listening post at Fort du Bicêtre, near Paris, and his talks will be broadcast over the French State network. Provisionally

the time has been fixed for G.M.T. 19.25, thus bringing it before the relayed commentary from Asmara.

In this connection it may be noted also that American, English and French Press agencies are said to have established bases at Djibouti, Massowah and Mogadiscio, and to have been equipped with mobile transmitters with the object of sending their reports in this manner, the messages to be relayed by more powerful stations. Whether or not their hopes will be realised remains to be seen. There is little doubt, however, that every attempt is to be made in the present conflict to keep the world informed by means of radio news bulletins.

The annexed list gives details of the principal transmitters already in operation in Abyssinia, Eritrea and Italian Somaliland; special attention is drawn to the

THE PRINCIPAL TRANSMITTERS

Metres	Kilocycles	Call	Kilowatts	Transmission
ABYSSINIA.				
ADDIS ABABA.				
		Call		
16-42	18,270	E T A	4	Tg. Tp.
25-09	11,955	"	3	Tg. Tp.
39-37	7,620	"	3-7	Tg. Tp.
51-02	5,880	"	3-7	Tg.
ERITREA.				
ASMARA.				
16-42	18,270	I T Q	4	Tg. Tp.
19-42	15,450	I T Z	5	Tg.
21-97	13,657	I T Y	3	Tg.
22-42	13,380	I D U	5	Tg. Tp.
28-01	10,710	I T X	5	Tg.
37-94	7,907	I T W	3	Tg.
38-02	7,890	I D X	2	Tg.
43-34	6,922	I T U	5	Tg.
50-44	5,948	I T S	5	Tg.
51-02	5,880	I T R	5	Tg.
ASSAB.				
25-09	11,955	I C Y	4	Tg.
39-37	7,620	"	4	Tg.
ITALIAN SOMALILAND.				
AFGOL.				
18-31	16,385	I T C	5	Tg. Tp.
28-63	10,480	I S L	5	Tg. Tp.
36-61	8,195	I S J	5	Tg. Tp.
39-87	7,525	I T B	5	Tg.
50-31	5,963	I T A	2	Tg.
CHISIMAILO.				
19-42	15,450	I Q J	10	Tg.
26-53	11,310	I Q K	10	Tg.
MOGADISCIO.				
18-31	16,385	I T K	5	Tg. Tp.
18-35	16,345	I T J	5	Tg.
20-82	14,410	I T H	3	Tg.
28-01	10,710	I T G	5	Tg.
28-63	10,480	I T F	5	Tg. Tp.
36-61	8,195	I T D	5	Tg. Tp.
39-87	7,525	I T M	5	Tg.
50-31	5,963	I T L	5	Tg.
ITALY.				
ROMA-SAN PAOLO (with Italian Colonies).				
20-89	14,630	I B R	5	Tg. Tp.
82-78	3,624	I B A	15	Tg. Tp.

NOTE: Tg.=Telegraphy only; Tp.=Radiotelephony.

(Continued on page 414.)

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TRIOTRON TYPES

-each a triumph of technical perfection

TRIOTRON VALVES are the first choice of many thousands of experienced Radio amateurs and technically minded listeners. TRIOTRON has been among the leaders in the industry from the earliest days of Radio. To-day there are more than 70 TRIOTRON types, each perfect for its purpose. TRIOTRON prices are considerably lower than those of any valves of comparable quality, ranging from 3/6 for General Purpose valves to 45/- for 50-watt Amplifiers for public address equipment.



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Heater voltage ...	4 volts	13 volts
Heater current ...	0.65 amp.	0.2 amp.
Max. anode voltage ...	250 volts	200 volts
Optimum screen voltage ...	70 volts	70 volts
Conversion conductance ...	0.6 mA/V	0.6 mA/V
Type of base ...	7-pin	7-pin or side contact
DOUBLE-DIODE TRICIDE ...	DT.436	DT.1336
Heater voltage ...	4 volts	13 volts
Heater current ...	0.65 amp.	0.2 amp.
Max. diode current ...	0.8 mA	0.8 mA
Max. triode anode voltage ...	250 volts	200 volts
Triode slope ...	3.6 mA/V	3.6 mA/V
Type of base ...	7-pin	7-pin or side contact
HIGH-SENSITIVITY PENTODE ...	P.495	P.2060
Heater voltage ...	4 volts	20 volts
Heater current ...	1.5 amp.	0.2 amp.
Max. anode voltage ...	250 volts	200 volts
Screen voltage ...	250 volts	100 volts
Max. slope ...	9.5 mA/V	8 mA/V
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Type of base ...	7-pin	7-pin or side contact

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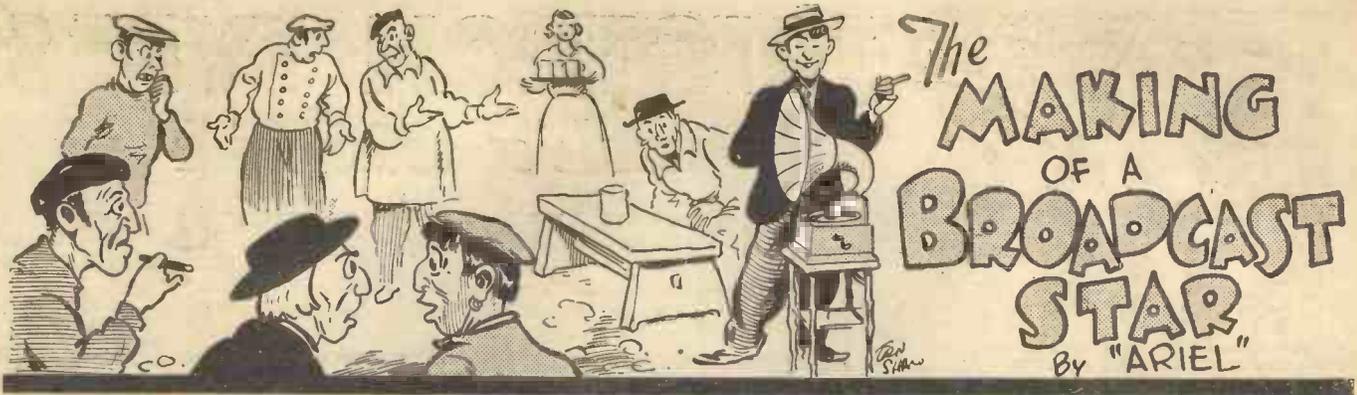
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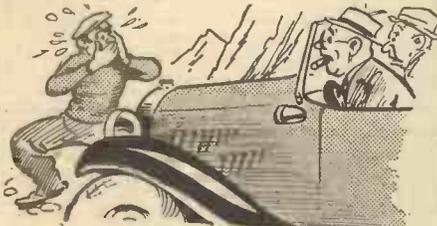


THE STORY OF DON RAMON AND HIS GUITAR

WHEN that dream-child of Mr. H. G. Wells, the submerged Mr. Tom Smallways, just so much as thought of flying-machines, he delivered the well-known dictum that this Progress "Goes on"—a more eloquent statement of the case than could have been achieved by his son, Bert, who usually said "Coo!"

Tom saw that discovery and invention "went on" throwing up bicycles, typewriters, phonographs, telephone and flying-machines. What he did not see, because he was blind, was that for every new marvel an old and possibly more gracious thing

KNOCKED HIS TOOTH OUT



"The handle of the crank was greasy and Ramon unskilful, so that the crank soared up and knocked a tooth from the very middle of his upper row."

died. Progress has eliminated much discomfort from our lives, but when we come to love comfort overmuch something fine in us withers.

Let it be granted that the soul is immortal. Not so the exquisite flowers which blossom therefrom. There was, for instance, Ramon, Don Ramon Fuentes, of La Playa, in the island of Majorca, sometime goat-herd to Tio Castaner of the hacienda Mil Flores. In him the musician was slain by Progress.

Not an Artistic Father.

Nothing about Papa Fuentes bespoke the artistic genius. A mere wineskin, with his feet rooted in his *pimienta* field and his head full of muddled notions about Saint This and That and the price of figs, delivered at Marseilles, packed, and warranted maggot-free. But in his heyday he had gone adventuring to Alicante in a fig-boat, and had returned with a bride, a daughter of Seville. This accounts fully for Ramon, who became a citizen of La Playa a year later. His mother went to the saints full early. "Pues! Such things happen," Papa Fuentes was wont to say when he was slightly drunk with anise.

Ramon was "musical," from his black, curly head to his shameful *alpargatas*, those hemp-soled boots in which he could spring

up his native volcanic rocks almost as limberly as one of his goats. He was not merely a player; he was the very larva of a *maestro*, fashioned by God for the plaudits of the musical intelligentsia. He dreamed of salons, footlights, triumphant tours of South America, bouquets, ribbons of Orders, a Manager, a country retreat, with possibly a few bulls, not too fierce, in the field for purposes of Press photography. "El gran *maestro* Fuentes disports himself. Left, the bull. Right, El Fuentes."

He begins with a flute, picked up from goodness knows where for three pesetas, and played by some technique evolved from his subconscious being plus a wandering puff of genius transmitted by his Moorish ancestors. Papa Fuentes thought that Tio Castaner might be gratified by this additional service rendered to the goats. Did not the beasts relish *la musica*? Truly, the ancient Greek goats had any amount of piping. And now look at the Greeks. What with cigarettes at Alexandria and postcards pictorial at Port Said. There is trade!

But Castaner inveighed against what he strangely described as Ramon's "accursed will to *gorgoritear*," which can mean trill or warble but really meant tootle.

Playing Astride the Cannon.

Ramon would stalk up to La Cabeza and there on the headland, where the ancient Moorish cannon still lay, half-buried, would stretch himself along the sun-warmed iron tube and flute to the greater glory of Catalina Poert, the Mayor's daughter, while to the wagging of beards and tails the goats ate what they might find. Nevertheless, he quite failed to charm the society of La Playa, which wagged its beards and waved its hands in eloquent pity for the "poor creature."

Then Progress struck its first blow at him: Tourists from Palma, two Americans, lifted the near front wheel of their automobile over the edge of a mountain path into empty space, from which neither their brute force nor their forceful oratory could withdraw it. Our Ramon, plodding upwards to La Cabeza, came upon the situation and lent his peasant strength to its elucidation with perfect success. He struck the ghost of an attitude and fingered the place where his moustache as yet lay like the corn in early spring, unseen yet somehow half suggested. He received two *reales*. This so melted him that he offered to start the car. But the handle of the crank was greasy and Ramon unskilful, so that the crank soared up and knocked a tooth from the very middle of his upper row. "Pah! These

machines," he spluttered, injecting half a litre of sulphuric acid into the words. He got five pesetas then, and the gift of a handkerchief.

That evening, after the excitement of his Great Tooth Story had simmered down—it had travelled three villages distant and had been the chief attraction at the pig-killing *fiesta* at Voldemar—Ramon lounged into the big living-room at Castaner's, where there was the Mallorquin equivalent of "a few friends taking pot luck," and drew out his flute. He dried its interior labyrinths. He polished its keys on his coat-sleeve. With his eyes directed to a string of garlies which hung from the rafters he essayed a few of his liquid notes.

An Appreciative Audience.

What a row! What *gorgoriteando*! The flute appeared to be uttering but the shadow of true flute noises; but through the gap in his dentition came simultaneously a whistle which would have charmed a member of the *guardia civil* from a pub. The company pricked up its ears, turned in their seats, stared for one century-long moment,

HE HAD HAD ENOUGH



"Seizing his guitar by the neck he raised it with a swish, intending to smash it to fragments against the door lintel."

and then exploded with hysterical laughter. For the first time in his musical life Ramon had an appreciative audience. And his soul was sickened. *Animals!*

Time healed the wound sufficiently to give Ramon strength to turn to the guitar as a means of self-expression. Immensely more satisfying than wood-wind! The passion of a Fuentes found its highest virgin consummation in the conflict between the strings and the soul at the finger-tips. Tio Castaner shrugged his shoulders and said that the poor one was without doubt beneath the protection of the Almighty, whilst the folks, generally, said it was a pity that that young fellow, Ramon, did not concern himself more with *pimientos*, pigs, figs, almonds and olives. As for the

(Continued on page 406.)

The S.T.700

THE S.T.700 in a nutshell: that is virtually my task this week. But let me at once make it clear that I do not seek to rival the Abbé de Triomonville or Brother John of the Circassian monastery who even in these days crash into the newspapers with almost astronomical regularity with their nutshell radio receivers.

If all the nutshell receivers ever made were put end to end—and left there—it would be a very good thing. The S.T.700 is certainly too proud to fight in that galère.

The Editor has flattered my new receiver to the extent of submitting it once more to the constructing public. Some were not aware that the S.T.700 was about to break upon them and so missed the issue in which the full details were published (the number dated Nov. 2nd, 1935).

Another reason for the republication in abridged form of the S.T.700 is that it affords us an opportunity for reviewing a receiver in the light of subsequent experiences of readers, and of any criticisms made. As regards the latter, these were dealt with a fortnight ago under the heading of "Cross-examining the S.T.700," and the accused was acquitted without a stain on its panel. I admitted that the extra knobs were an apparent complication but echoed my oft-repeated assertion that you cannot get something for nothing and that the extra performance is well worth the "extra" controls.

Certain Success.

The fallacy which the simplicity simpletons will never face with courage and honesty is the idea that you can get just as good results by simplification. The simpleton will rather build a very simple set with a glimmer of a hope of success than build a more complicated one with certainty of success.

The simpleton imagines that a designer whose set has additional controls, is actuated by some mania which pre-

For the benefit of those readers who missed the full details of the S.T.700 published in our November 2nd issue we here present an abbreviated description of the set, with the necessary diagrams and instructions for building it.

By JOHN SCOTT-TAGGART, M.I.E.E.,
F.Inst.P., Fel.I.R.E.

vents him doing what others do; that, in fact, he fits knobs for knobs' sake. When the S.T.400 was published a wireless dealer showed a certain reader another set; the reader was annoyed and insisted on the 400, whereupon the dealer himself became indignant and asked: "What's wrong with this set? It's got seven knobs."

As a fact, no one loathes complexity more than I do, but if you are to present new features not otherwise obtainable, you are almost bound to produce some small complexity. The audio-reaction of the S.T.700 is a case in point. This principle is never likely to appear in a commercial set because when used to best advantage

some means for altering the amount of the audio-reaction is desirable, and this is more than the layman, or especially the lay woman, will stomach.

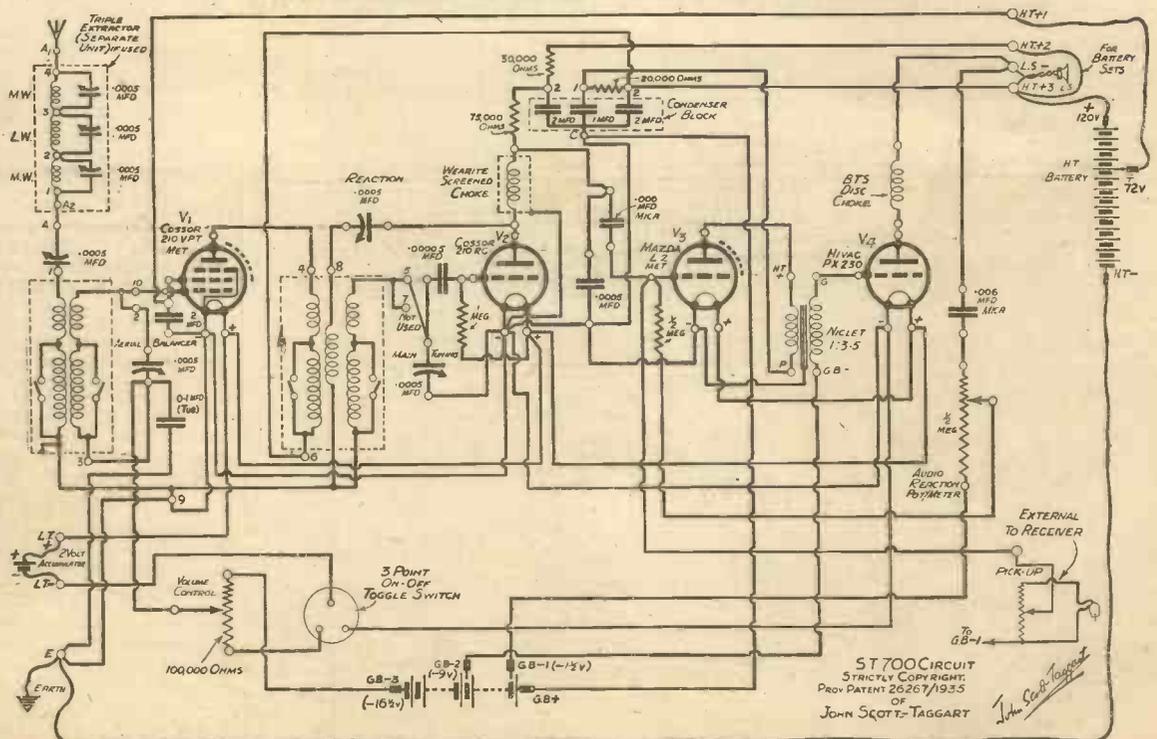
The man who builds his own set, however, has both a stronger stomach and a livelier brain. He realises, moreover, that the improving controls of one of my sets can be adjusted to their normal positions and left there. In such event, simplicity wins the day and experiments with the extra controls can therefore be left to a more enterprising occasion or to a more experimental member of the family.

Home-Construction Features.

After all, amateur radio has undergone considerable changes since the low prices of mains sets have competed with the Press design. From the first I have seen this and have not only planned accordingly but have done my best in print and by personal exhortation to urge other designers to seek out features which cannot be provided in commercial sets and to build up the home-constructor field on those lines rather than by sheepishly following in the wake of the large manufacturing firms.

(Continued on next page.)

THE SECRET OF A TREMENDOUS SUCCESS



The circuit of the famous S.T.700, showing how the Triple Extractor is connected, and the use of a pick-up for gramophone work.

THE S.T.700

(Continued from previous page.)

I have not the slightest animus towards the producers of the factory-built set and I do not suppose they have any towards me because I have always endeavoured to fill the gaps they have left unfilled. The made-to-measure suit is hardly competitive with the mass-production of "ready-mades." And so a set with out-of-the-ordinary features is for the connoisseurs of the radio public—to wit, the home constructors.

Two Special Advantages.

The S.T.700 is perhaps the best example of a set designed deliberately to appeal to the man who wants something absolutely unobtainable on commercial sets at any price. The two features which are special to this latest set are the dial and audio-reaction. I know of no dial which is so large and absolutely accurate and audio-reaction is a feature which not only increases signal strength but which builds up the bass response under conditions where it would be very deficient, namely when signals are weak or when a strong signal is deliberately turned down for comfort in listening or in order to avoid disturbing someone. Under these conditions the human ear and the loudspeaker both fall off rapidly in their sensitivity to the lower half of the musical register; by applying audio-reaction, however, the bass is greatly increased without the treble being affected and the quality of reproduction becomes almost unbelievably vivid and realistic.

The benefit of sensitivity is a practical advantage but comes into a different category, since I could not claim that every other receiver is

S.T.700

THE POWER SUPPLY

Batteries.—H.T. 120 v. Drydex, G.E.C., Aerilite, Milnes H.T. Unit, Lissen, Fuller.
 G.B. 16.5 v. Drydex, Lissen.
 L.T. 2 v. Exide, Lissen, Fuller.

Mains Units.—Ekeco, Atlas.

SUITABLE LOUDSPEAKERS

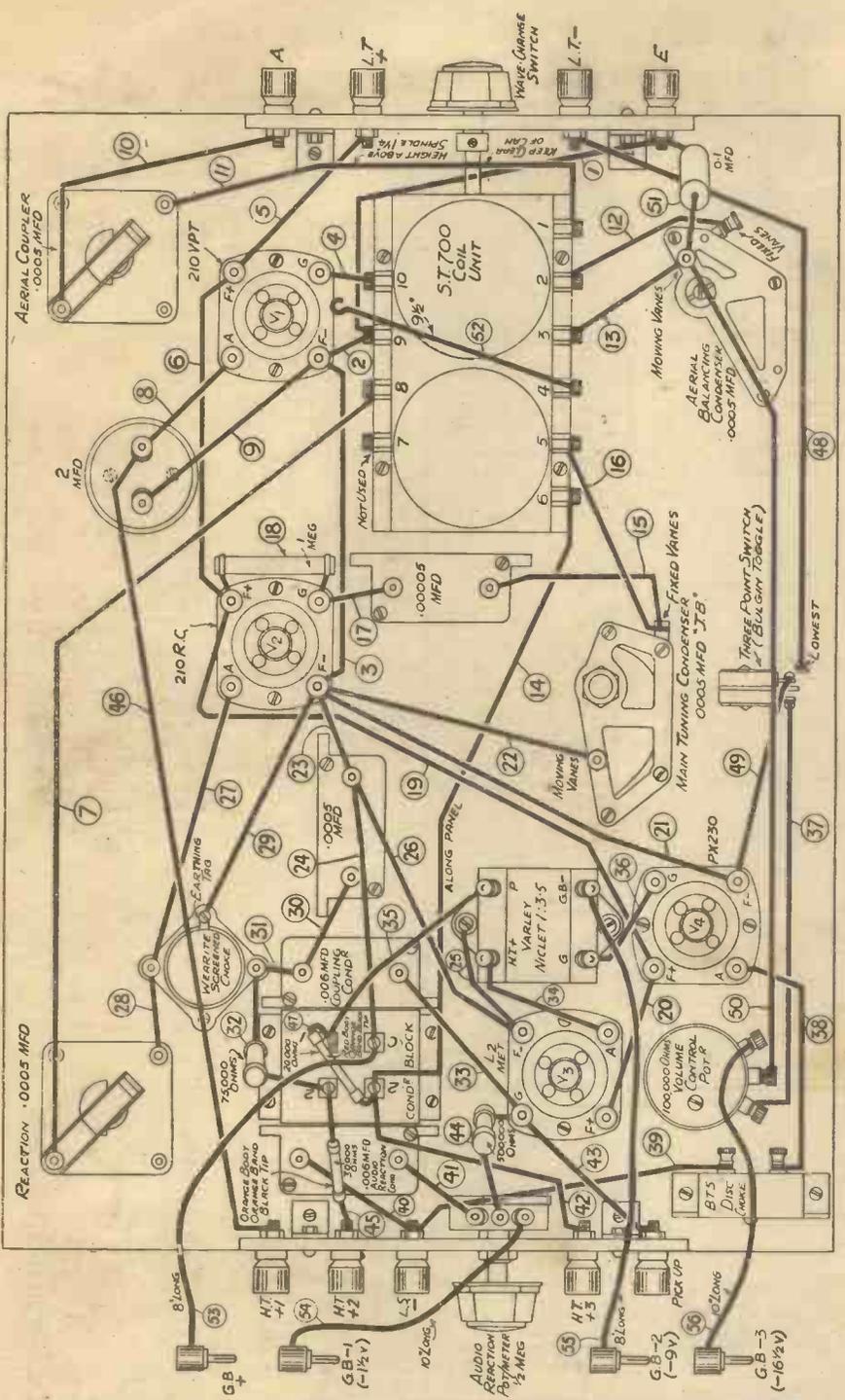
W.B., Rola, Blue Spot, Amplion, Wharfedale.
 (No significance attaches to the order of makes.)
 J. S.-T.

insensitive; but I could claim that the ability to tune at once with absolute accuracy to scores of stations by name and to apply audio-reaction with a view to improving the quality are features not obtainable at all with other sets. The S.T.700 is, therefore, in my view, a good example of a receiver which takes advantage of that extra percentage of intelligence which the amateur radio enthusiast possesses, and rewards him with results in certain directions which his friends cannot obtain at all.

The Triple Extractor is a third feature of immense value, since in the swamp zones it is possible to reduce as much as one wishes the strength of any two B.B.C. stations on the medium waves and one on the long waves, which, of course, will be Droitwich.

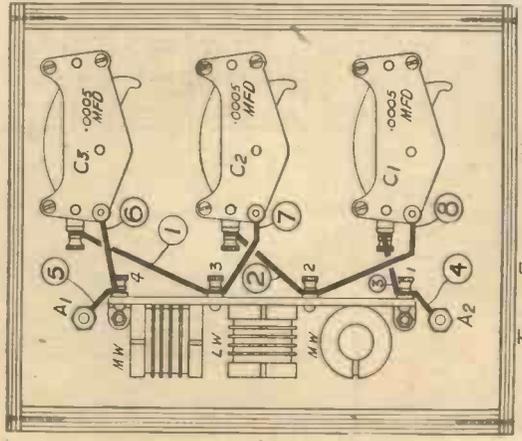
How successful these features have been may be estimated by the scores of readers' letters which have been published. Those letters from different centres form an unanswerable testimony to the merits of the S.T.700 and I cannot but urge you once again to obtain these self-same results in your own home by duplicating this receiver.

This is the Christmas Number of this journal and I doubt if any present either to yourself or the family would be more acceptable than an S.T.700 built at very small cost and within two or three hours with your own hands.



THE WIRING DIAGRAM

This diagram is a reproduction of the original blueprint of the S.T.700 given away with our November 2nd issue, and shows not only exactly how the components of S.T.700 are disposed and the connections to them, but also full details of the Triple Extractor unit. The numbering of the leads has been carried out in order, so that for easiest construction you should commence at No. 1, and proceed to No. 2, and so on to the end. The Uni-Plane construction (everything mounted on the panel) enables the set to be built in an exceedingly short time and makes the construction extremely simple and straightforward.



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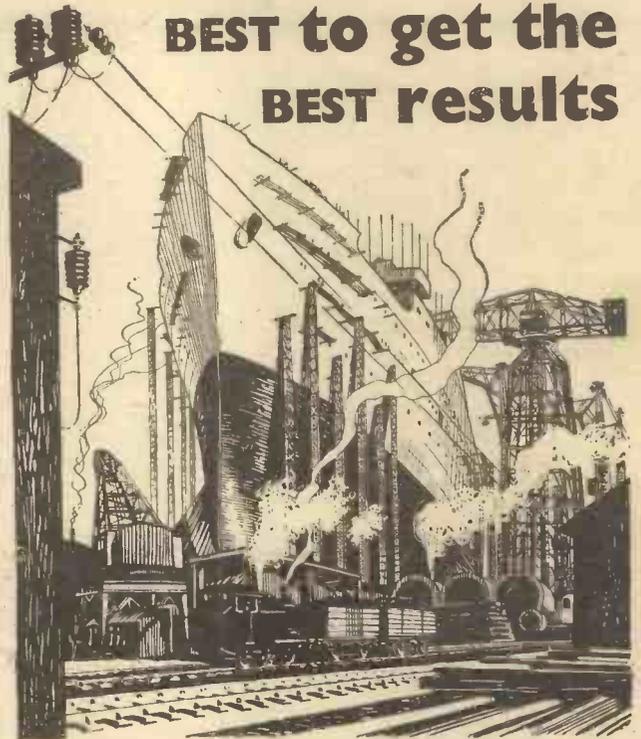
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Fig. 1. Here the right-hand side-piece of the cabinet and the top-piece are being fitted together.

THE S.T.700 RAPID CONSTRUCTION GUIDE

For the benefit of readers who did not have a copy of our issue for November 2nd, we are here repeating the vital instructions for building Mr. Scott-Taggart's latest masterpiece.



Fig. 2. The first stage in assembling the "Easy-Cabinet." Fixing the left-hand side-piece to the top.

THIS Guide is obviously most useful if you stick strictly to the original components used in my own set. If you use other components (but do not use ones outside my list of alternatives), simple modifications of the Guide will be necessary.

If you have bought a complete Author Kit, including my "Easy-Cabinet," or if you have bought a kit of the Easy-Cabinet, cross out sections C, D, F, J, K.

(A) Collect and examine required components. If an author's specification kit, check each item to see that it corresponds to my list of parts *actually used*. Handle J.B. tuning condenser with care, keeping moving vanes closed. Bending of vanes would affect calibration of station names.

(B) Tighten terminal securing nuts (not terminal heads) on components where necessary.

(C) Using Fig. 5, mark out on the front (not back) of panel, the positions of the holes. With a fine-pointed bradawl prick all the hole positions. Using a 1/8-in. twist-drill, start each 1/8-in. hole carefully, using light pressure and

drill cabinet top, drilling 1/8-in. holes as advised above, Fig. 9. Using Fig. 6 and Fig. 7, and keeping to the order of drawing the lines shown, mark out the cabinet side-pieces on the sides which will show. Do not cut out the shaded portions (the slots where the terminal strips will fit later), but cut along the general outlines of the side-pieces. Drill two 1/8-in. holes in each side-piece as shown in each figure.

From the edge, saw with a tenon saw down the lines marked DE and FG to the sides of these holes. Start sawing along the line marked HJ which forms the bottom of the slot, by placing the leading corner of the saw in the hole and using very short strokes of the saw. Continue sawing until other hole is reached. Repeat on other side-piece. Square up corners of slots with file or chisel.

(E) Take the left-hand (looking from front) side-piece and the top-piece and hold them together, and resting on a flat surface as shown in photograph (Fig. 2). Prick with a bradawl through the prepared holes in the top-piece into the top of the side-piece. Insert two 1/8-in. No. 4 round-head brass screws and screw top-piece to side-piece.

Now do the same with the other side-piece (see photograph, Fig. 1). The assembled top and sides are shown in photograph, Fig. 4.

Lay the assembled top and sides on the table with slots uppermost.

Lay the panel the right way round and veneer side uppermost, in its correct position on the framework assembly.

Fixing the Panel.

With a bradawl prick through the seven 1/8-in. fixing holes in panel and secure the panel in position with 1/8-in. No. 4 round-head brass screws.

(F) Mark out and drill the two terminal strips as Fig. 11 and Fig. 13. Prepare four mounting brackets as Fig. 12.

(G) Fit two mounting brackets to inside of each terminal strip, using 1/8-in. 6BA round-head brass screws and nuts, these screws going through the 1/8-in. holes in strip.

(H) Lay the completed Easy-Cabinet face down on a cloth-covered table. Place each terminal strip in its correct position on the back of the panel inside the slots, so that the outer surfaces of the terminal strips are flush with the side-pieces of the Easy-Cabinet (see Fig. 4). With bradawl prick fixing holes through the

four holes in the brackets, into the panel. Remove the terminal strips. Turn the Easy-Cabinet over and take out the seven panel fixing screws. Remove panel.

(J) If you wish to stain the side-pieces and top, do so now. (I used Jackson's, of Mitcham, Surrey, Oil Varnish Stain, colour walnut, size 6 tin.)

(K) Cut out, drill and stain the spar (see Fig. 10) which holds grid-bias battery in place.

Mounting the Components.

(L) Lay the panel face downwards on a cloth-covered table (to avoid scratching veneer). Mark out panel according to the diagram and place components in accordance with the wiring diagram marking with a bradawl the positions of their fixing holes. Screw down the following in order given: the two terminal strips (making sure the right ones are in the right place), using 1/8-in. No. 4 round-head brass screws to hold down the brackets; S.T.700 coil unit with extension piece in position and slipped through its allotted hole in terminal strip, 1/8-in. No. 4 round-head brass screws being used; slacken grub-screw on extension-piece and slip extension-piece into position shown in diagram. Tighten its grub-screw; four Vibrolders (get them right way round), using 1/8-in. No. 4 round-head brass screws; bend up the soldering tag which projects from terminal G on V2 valve holder; T.M.C.-Hydra condenser block (right way round), using 1/8-in. No. 4 round-head brass screws; four Lissen mica condensers, using 1/8-in. No. 4 round-head brass screws, taking extra care that the right capacities are put in the right place, as all these condensers look alike from the top; Niclet transformer (right way round), using 1/8-in. No. 4 round-head brass screws; Wearite screened choke (marked H.F.J., although catalogued HFPJ) with its earthing-

(Continued on page 402.)

TRIPLE EXTRACTOR DRILLING DETAILS

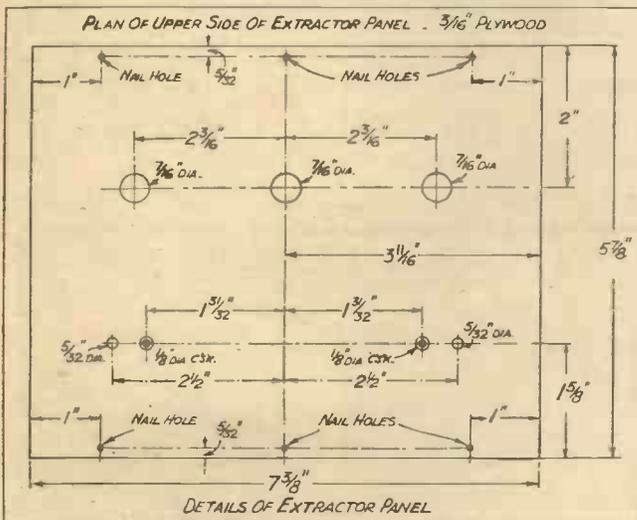


Fig. 3. The positions and sizes of all the holes in the Triple Extractor panel are given in this diagram.

turning the drill in a reverse direction at first; this is to avoid splitting the veneer. Continue drilling these 1/8-in. holes in ordinary way. Centre-bits are recommended for all the remaining larger holes in panel, but twist drills may be used. Drill these holes.

(D) If you are going to use my Easy-Cabinet system and have not bought the pieces ready prepared, carry out instructions in this section (D). If you have bought the pieces ready prepared, skip this section (D). Cut to size and

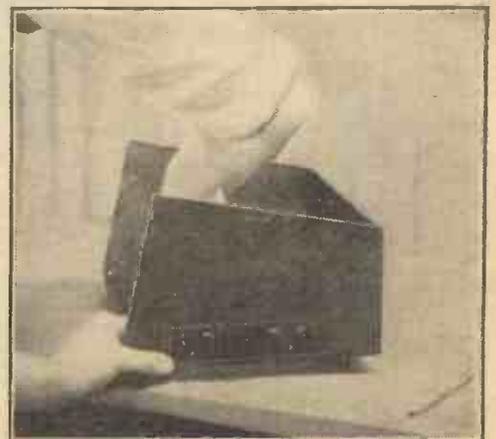


Fig. 4. Marking fixing holes for terminal strip brackets.

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The S.T.700 Rapid Construction Guide

(Continued from page 400.)

tag to correct side as shown in diagram, using 1/2-in. No. 4 round-head brass screws; 2 mfd. Dubilier cylindrical condenser (mounted by fixing the base cup which unscrews), using 1/2-in. No. 4 round-head brass screws. In screwing condenser into its socket see that its terminals are finally positioned as in diagram: B.T.S. disc-type choke, using 1/2-in. No. 4 round-head brass screws.

Fit terminals in their correct holes (check carefully). Fit audio-reaction half-megohm (500,000 ohms) potentiometer in terminal strip, checking to see you have used the right potentiometer. Fix knob to this potentiometer. Fit aerial coupler condenser without knob. Fit anode reaction condenser without knob. Fit aerial balancing condenser without knob. Discarding the on-off indicator plate, fit the on-off toggle switch. Fit the 100,000-ohm volume control without knob. Taking care that the whole panel will not rest on the spindle of the J.B. main tuning condenser (whose moving vanes should be closed), fit the J.B. condenser (without knob and pointer)

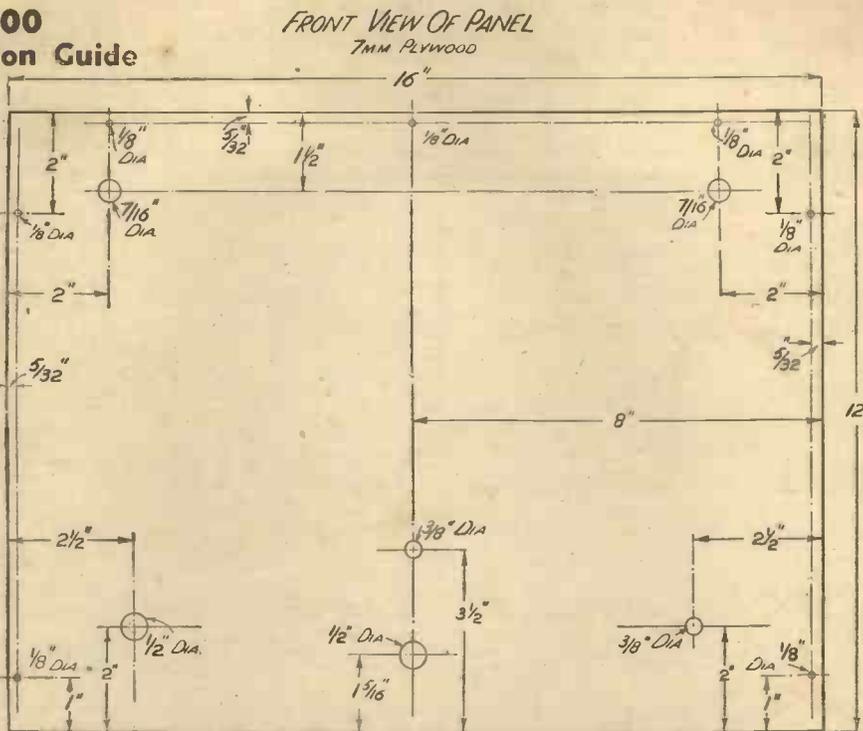


Fig. 5. Every hole, including the screw holes, is shown in this complete drilling diagram for the panel of the S.T.700.

to panel, putting its bush washer on the front side of panel under fixing nut, which should not be too tight.

THIS COMPLETES THE FIXING OF COMPONENTS.

Now you are going to wire the components.

only about 1/2 in. of the bared end, connect the wire, looping it (preferably clockwise) round under the terminal-head of the component to be wired up. Shape wire along route indicated in diagram.

(Continued on next page.)

Lay panel face downwards, resting it on two books or cloth-covered blocks of wood; this is to prevent scratching of veneer and to prevent pressure on control spindles.

The wires in the wiring diagram are numbered strictly in their order of connection, which has been carefully worked out for speed and simplicity of construction.

The recommended wire is of the kind that permits the insulating covering to be slipped back, revealing the bare end of the wire. "Maxamp" wire by Peto-Scott is about the best I have tried, and is also of suitable thickness. It is strongly recommended as being very much easier to use than bell-wire or similar stiffish wires. A 30-ft. coil is ample for the set. My advice is to use it as follows:

Cut off 6-ft. lengths at a time from the coil, as required. Push back insulation about 1 in. and, without increasing this inch, slide the bunched-up fullness of the insulating covering well back along the wire. Using

CABINET LEFT SIDE-PIECE

(FOR WAVE-CHANGE SWITCH SIDE)

5/16" PLYWOOD

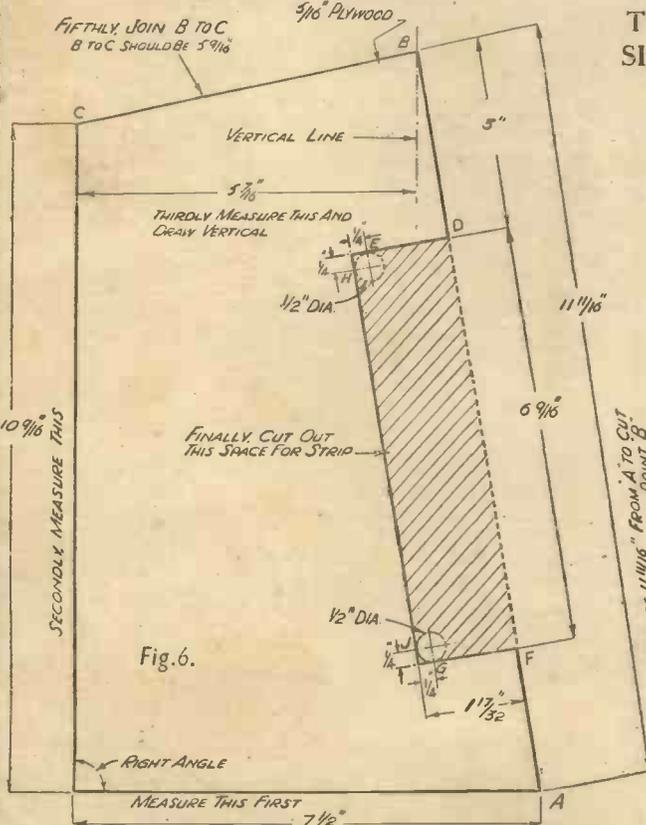


Fig. 6.

THE TWO SIDES

CABINET RIGHT SIDE-PIECE

(FOR AUDIO REACTION KNOBS SIDE)

5/16" PLYWOOD

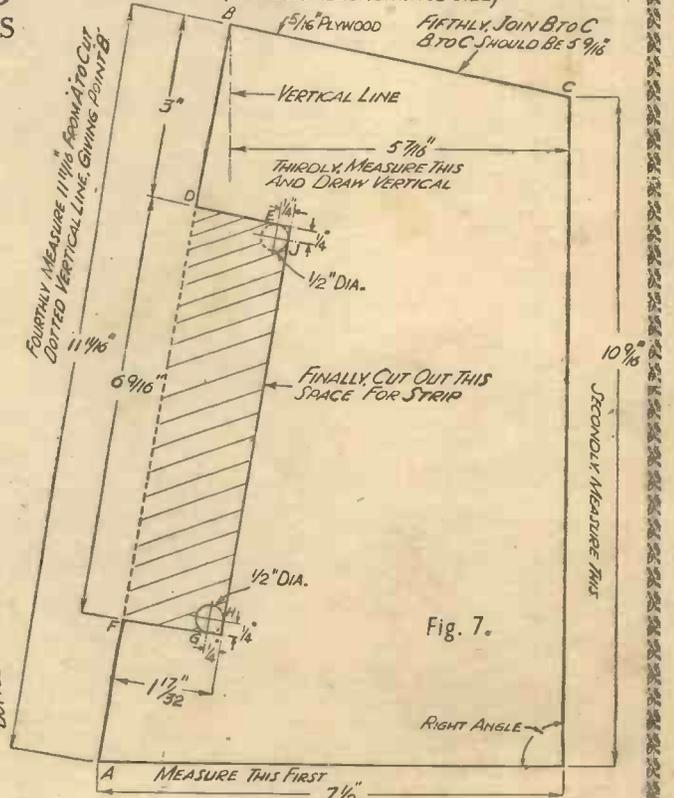


Fig. 7.

The sides of the cabinet should be cut out in the manner shown. The 1/2-in. diameter holes are to allow the saw to complete the cutting of the space for the terminal strips. If wood surfaces are polished lines marked "vertical line" should be drawn on paper affixed to the wood.

The S.T.700 Rapid Construction Guide

(Continued from previous page.)

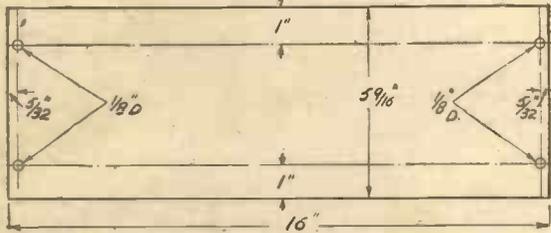
Allow an extra $\frac{1}{4}$ in. on the length of the wire for connection to the terminal it is going to. Cut through the insulated wire, slip insulation back $\frac{1}{4}$ in. and, without increasing this $\frac{1}{4}$ in., work the bunched-up fullness back along the wire, thus covering the bareness at the starting end. Now loop the finishing end (preferably clockwise) under its terminal-head. This detailed account is of a process which actually takes only a few seconds and will enable you to do the wiring more neatly and in double-quick time.

(M) USING WIRING DIAGRAM, WIRE UP THE SET.

In tightening the terminals on condenser block, avoid over-tightening, as this will cut wire; do not finally tighten these or any other terminals until all the wires are on.

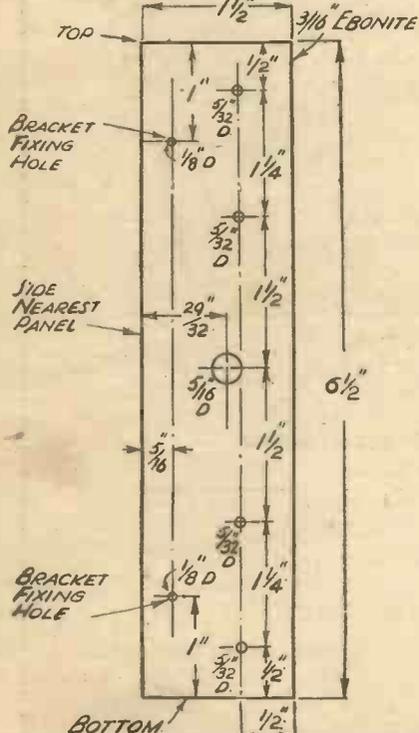
The grid-bias leads are prepared as follows: Take the proper length of "Maxamp" wire, as stated on diagram,

CABINET TOP (5/16" PLYWOOD)



and prepare it as usual to have $\frac{1}{4}$ in. of bare wire at each end. Bend one of the ends $\frac{1}{4}$ in. from the end back on itself and push the loop so formed into the hole in the side of the G.B. + Belling & Lee Midget wander-plug, having loosened the head of wander-plug. Tighten head of wander-plug. Fit other end of wire to correct component.

TERMINAL STRIP (VIEW FROM INSIDE) WHICH GOES ON LEFT-HAND SIDE OF SET (LOOKING FROM FRONT)



HOW THE WOOD IS CUT

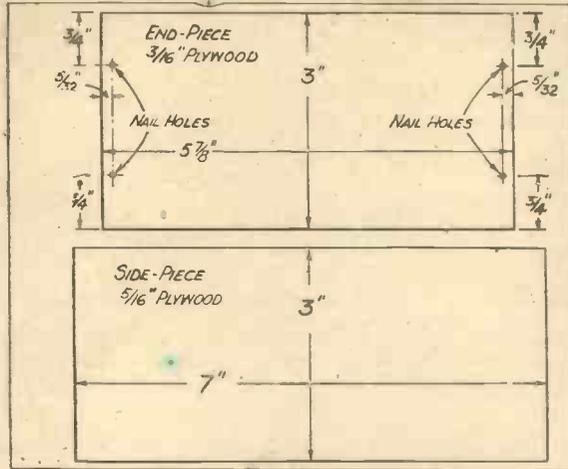


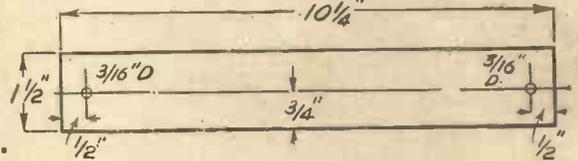
Fig. 8. Two pieces of wood of each of the above sizes are required to carry the Triple Extractor panel.

battery clamping spar and insert the point of the screw in the fixing hole just pricked. Give the screw one turn to prevent its falling out. Swing the spar round until it is parallel to the back edge of side-piece. Holding spar against side-piece, prick through the other hole (in spar) into cabinet's side-piece, with bradawl.

Insert a second $1\frac{1}{2}$ -in. No. 8 round-head brass screw through the upper hole in spar into pricked hole in side-piece. Give this screw one turn to prevent its falling out. Slip spar along the screws and insert the 16 $\frac{1}{2}$ -volt grid-bias battery between spar and side-piece of cabinet, with the battery sockets facing towards the back (away from panel) and the positive end of battery nearest top of cabinet.

Taking care that the voltage figures on side of battery remain in view, screw up spar fixing screws until battery is firmly clamped into position. (If you have used screws that are too long, you will need to put cardboard or a wad of paper between spar and battery, otherwise screws would go right through cabinet side-piece). FIT G.B. + plug in positive (+) socket, G.B. - 1 in. - $1\frac{1}{4}$ V.

G.B. BATTERY CLAMPING SPAR (5/16" PLYWOOD)



On the left (Fig. 9) are the dimensions of the wood for the top of the cabinet, while the right-hand diagram shows (Fig. 10) the G.B. battery clamping spar.

(N) Now check the wiring by getting someone to read out the connections on the wiring diagram while you give you full attention to the set itself. (This cuts out any risk of losing track of a wire through your having to turn aside to the diagram.)

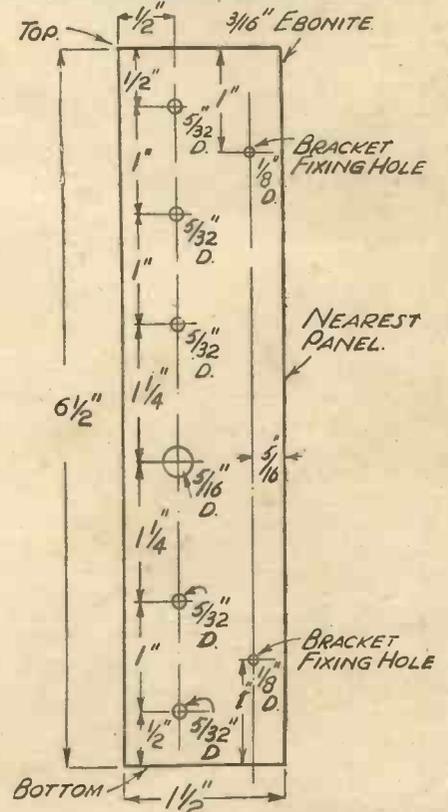
(O) If you have built the Easy-Cabinet frame (as I assume), fix the completed panel on the frame.

(P) Mark in following manner the fixing holes for grid-bias battery spar, which clamps the battery to the left side of the Easy-Cabinet looking from the back. Prick with bradawl the lower fixing hole, which is $\frac{3}{4}$ in. up from the bottom edge of the side-piece and 2 in. from the back edge (farthest from panel). Slip a $1\frac{1}{2}$ -in. No. 8 round-head brass screw through the hole in one end (either end will do) of the grid-bias

socket, G.B. - 2 in. - 9V. socket, G.B. - 3 in. - 16 $\frac{1}{2}$ V. socket.

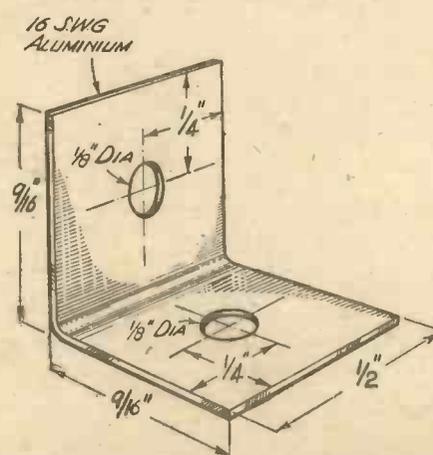
(Continued on next page.)

TERMINAL STRIP (VIEWED FROM INSIDE) WHICH GOES ON RIGHT HAND SIDE OF SET (LOOKING FROM FRONT)



VITAL PARTS OF THE CONSTRUCTION

BRACKET FOR TERMINAL STRIPS (TWO BRACKETS ARE USED ON EACH STRIP)



The two outside diagrams (Fig. 11, left, and Fig. 13, right) show how the terminal strips are drilled, while the centre sketch (Fig. 12) depicts one of the brackets used for mounting the terminal strips. There are four of these brackets used in the set, two for each strip.

The S.T.700 Rapid Construction Guide

(Continued from previous page.)

(Q) FITTING THE DIAL CARD. [This can be obtained from the Back Number Dept., Amalgamated Press, Ltd., Bear Alley, Farringdon Street, London, E.C.4., for 2d. post free. When writing ask specifically for the S.T.700 Auto-Dial Card.—Ed.]

Leaving the centring tab attached, cut out dial card along borders. Cut out (razor blade essential) the hole for slipping over bush, where

marked on the tab. Stand the set up in its normal position, front of panel facing you. The moving vanes of the main tuning condenser should be "closed." Put your left hand round the back of set and gently hold the rear end framework of main tuning condenser. Do not touch the vanes. Remove the fixing nut and washer from the main tuning condenser's spindle portion, which can be seen from the front of the panel.

Slip the hole in the centring tab over the spindle bush (the threaded brass collar), and hold centring tab against panel by fitting washer and then nut *loosely*. Lay set (in Easy-Cabinet) on its back, front of panel uppermost. Centre the dial card into its correct general

position; as a guide it may be noted that the top point should come opposite the middle fixing screw of panel (i.e. half-way along top edge).

Ensure dial is in correct position by measuring the distance from the lowest point on the left-hand end of dial to the bottom edge of panel; this distance should be the same as that from the right-hand end of dial to bottom edge of panel.

(R) Prepare 16 ordinary plated brass pins (if a pin is of a type that could be bent, it can be used) by cutting them diagonally with wire-cutters or pin-cors about 1/4 in. from their heads. You now have 16 very short and pointed pins.

(Continued on page 413.)

THE BATTERY MODEL S.T.700.—Keep Strictly Within this List

Components.	Make Used by Designer.	Suitable Alternative Makes.
MAIN SET.		
1 Coil unit for S.T.700	COLVERN	No alternative advised
1 .0005-mfd. air condenser	ORMOND R483 (with small knob) (Note.—To match other knobs you can buy a Graham Farish knob.)	J.B. "Popular Log," Formo direct drive
1 Main tuning condenser, with special pointer	J.B. (Specify for S.T.700)	No alternative advised
1 Aerial coupler, .0005-mfd.	GRAHAM FARISH Litlos log-mid-line	Polar, B.T.S., J.B.
1 Anode reaction condenser, .0005-mfd.	GRAHAM FARISH Litlos log-mid-line	Polar, B.T.S., J.B.
1 Volume control, 100,000 ohms potentiometer with terminals	GRAHAM FARISH	Inverse log-law models by following: Bulgin 100,000-ohms (requires coupling terminals), Colvern, 50,000-ohms
1 Potentiometer, 500,000 ohms	GRAHAM FARISH	Log-law models by following: Bulgin (requires coupling terminals), Dubilier metallised volume control log type without switch but with terminals
1 3-point toggle switch	BULGIN S87	Or separate condensers by Dubilier, T.C.C., T.M.C.-Hydra, Graham Farish, B.I.C., Amplion, Ferranti
1 Condenser block (2 mfd. + 2 mfd. + 1 mfd.)	T.M.C.-HYDRA B.1007	Dubilier, Polar-N.S.F., Ferranti, T.M.C.-Hydra, Graham Farish, B.T.S., Bulgin
1 0-1-mfd. tubular condenser	T.C.C.	Dubilier, T.C.C.
1 .00005-mfd. mica condenser	LISSEN	Dubilier, T.C.C., Graham Farish, Ferranti
1 .0005-mfd. mica condenser	LISSEN	Dubilier, T.C.C., Graham Farish
2 .006-mfd. mica condensers	LISSEN	T.C.C., Graham Farish, T.M.C.-Hydra, Ferranti
1 2-mfd. condenser	DUBILIER (8200)	Formowatt, Ferranti, Polar-N.S.F., Bulgin, Dubilier
1 1-megohm resistance (1 watt)	ERIE	Bulgin, Formowatt, Ferranti, Erie, Polar-N.S.F.
1 500,000 ohms	DUBILIER	Dubilier, Bulgin, Formowatt, Ferranti, Polar-N.S.F.
1 75,000	ERIE	Erie, Dubilier, Formowatt, Bulgin, Polar-N.S.F.
1 20,000	FERRANTI G.5 (half-watt)	Erie, Dubilier, Formowatt, Bulgin, Polar-N.S.F.
1 30,000	FERRANTI G.5 (half-watt)	Erie, Dubilier, Formowatt, Bulgin, Polar-N.S.F.
1 Screened reaction choke	WEARITE H.F.P.J. actual component is marked H.F.J.)	Graham Farish, type H.M.S. (not disc), Bulgin H.F.S
1 H.F. choke (as for S.T.600)	B.T.S. (disc type)	Wearite H.F.P.J., Bulgin H.F.S
1 L.F. transformer	VARLEY Niclet 1:3.5 standard	No alternative recommended
9 Terminals (black): H.T.+1, H.T.+2, H.T.+3, L.T., L.T.—, Pick Up, A, E, L.S.—	BELLING-LEE (type R)	Clix, Bulgin
8 Wander plugs: H.T.+1, H.T.+2, H.T.+3, H.T.—, Grid+, Grid-1, Grid-2, Grid-3	BELLING-LEE (Midset No. 1019)	Clix, Bulgin
4 4-pin Valve holders	BENJAMIN VIBOLDERS	No alternative recommended
2 Terminal strips	PETO-SCOTT (supplied drilled)	Or home made
4 Aluminium brackets	PETO-SCOTT (supplied with nuts and bolts)	Or locally made (thickness is important)
1 Panel	PETO-SCOTT (supplied drilled, french polished and with seven nickel-plated screws)	Or locally made
2 Cabinet side-pieces, cabinet top, and grid-bias battery spar	PETO-SCOTT (supplied drilled, french polished and with ten nickel-plated screws)	1 strongly recommend the "Maxamp" for easy construction
30 ft. wire for wiring	PETO-SCOTT "Maxamp" (easiest to use, as insulation can be pushed back, but any stiffish wire, e.g. bell wire, may be used)	

TRIPLE EXTRACTOR BOX		
1 Triple Extractor iron-core coil	WEARITE	
3 .0005-mfd. air variable condensers	POLAR No. 4 with knob (mention S.T.700)	J.B. "Popular Log" (without dial or slow motion, but with small knob), Ormond R483 (log condenser) with small knob
1 Wooden box—5 wood pieces	PETO-SCOTT	
2 Terminals, A1, A2	BELLING-LEE (type R)	Clix, Bulgin

Optional Aerial and Earth Equipment: Aerialite "Levenstrand," Electron "Superial," Graham Farish "Filt" Earthing-device.

VALVES	
Make Used by Designer.	Suitable Alternatives.
V1. Cossor 210 V.P.T. met., 4-pin base	Hivac V.P.215 met., 4-pin base.
V2. Cossor 210 R.C.	
V3. Mazda L.2 met.	
V4. Hivac P.X.230.	

SCREWS REQUIRED (Unless in Kit):

- For fixing panel, 7-1/4 in. No. 4 round-head brass (or plated).
- For fixing top to sides, 4-1/2 in. No. 4 round-head brass (or plated).
- For fixing components to panel, 10-1/2 in. No. 4 round-head brass (or plated).
- For fixing more components to panel, 10-1/4 in. No. 4 round-head brass.
- For fixing B.T.S. disc choke, 2-1/2 in. No. 4 round-head brass.
- For fixing terminal strip brackets, 4-1/4 in. No. 4 round-head brass.
- For fixing other components, 10-1/4 in. No. 4 round-head brass.
- For fixing grid-bias clamping spar, 2-1/2 in. No. 8 round-head brass.
- For mounting brackets to terminal strips, 4-3/4 in. 6 B.A. round-head brass screws with one nut for each screw.
- For fixing Triple Extractor coil assembly to Triple Extractor box panel, screws and nuts are supplied by Wearite with coil.
- NAILS** for Triple Extractor box, 14-1/4 in. nails.

NOTE.—This is my official and only list of components. The makes in black capitals are those actually used in my original set and referred to in my Rapid Guide. No apparatus outside the lists on this page has been recommended. Any departures are without my approval. Check all statements about apparatus against above official list.

(Signed) JOHN SCOTT-TAGGART.

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THE MAKING OF A BROADCAST STAR

(Continued from page 396.)

goats, they damned his art with faint praise; for although they admitted that it did not spoil the appetite, they considered it to be superfluous.

Then young Pablo Poert, the Major's son that was a waiter in Palma, came home with the first phonograph ever seen in La Playa. Progress had allowed him to win it in a raffle, for the further exorciation of Ramon. It had a long, blue, tin horn which waggled up and down with the exuberance of its own vibration, and its turntable appeared to rest on cams specially designed to make it wobble drunkenly. Nearly all the records which accompanied this devilish device were guitar pieces. Progress had looked after that!

Conceive the *première!* The infernal machine balanced precariously on a small bamboo table, with young Poert posturing by it, for all the world like a conjurer about to create rabbits. Castaner's *salon* packed to capacity, and lethal with garlic. The grating noise begins.

"Bah, these machines!" muttered Ramon.

"Silence, chico!" admonished Papa Fuentes, waving his cigarette. "This is in your line of business."

Mesmerised Silence.

As the piece proceeds the audience sits motionless, slumped into its seats, hands outstretched flat on thighs, staring, mesmerised, into the depths of the horn. The last *plunk, plunk* lets loose a tornado of superlatives.

Maravillosa!

Estupendissima!

Por Dios, how he touches!

Hast heard thou such expression?

After that evening Ramon felt that he stood, like Ruth, amidst the alien corn. He did not understand these people, his own people. Nevertheless, so far as Progress would permit, he was still a musician and he continued to practise his art. He made himself, undoubtedly, a second-rate *guitarrista*. Accordingly, a few years later, Progress staged the final scene in its slow murder of an artist.

Young Pablo Poert, that veritable Spanish edition of Bert Smallways, always trying the latest marvel, came home again with yet another treasure, a cheap radio receiver which an Americano had given to him in return for some utterly unsuccessful lessons in the Mallorquin tongue. Again this was the first of its breed to appear in the village, and again there was a *première*.

"Cut out the questions," said Pablo to the cackling relations and neighbours. "I tell you that you shall hear Don José himself touch the guitar. It is a thing sufficiently strange."

Now this José was to La Playa what

Shakespeare was to Stratford-on-Avon. He had deigned to be given to the light in that place. And now he was known all over Majorca and the lesser isles of the Baleares, and even esteemed in certain night resorts of Barcelona. *Caramba!*

Ramon Is Not Impressed.

After an exhibition of showmanship Pablo brought the receiver into action and Don José was duly announced. Ramon listened with the ear of a *guitarrista*, a Mallorquin-cum-Sevillano, a Republican and a sinner. He tried to be fair in his judgment, but he realised, almost unwillingly, that he had heard something which would have disgraced a gipsy at a camp-fire *cerousal*. Eighty per cent of the disgrace was due to Progress in the guise of bad modulation at the transmitter and the world's worst receiver at La Playa. But Ramon did not know that.

The audience was spellbound. They were inarticulate and paralysed with ecstasy. Only old Castaner, who would assuredly gossip with his Maker at the bar of Judgment, managed to croak out an "*Estupendissima!*" Aunt Castaner snuffled, and wiped her eyes on Mama Villaraja's apron. But *she* was nearly deaf.

RADIO AT THE CHRISTMAS PARTY



Don't forget to have a radio set ready for your Christmas Party. This merry group is listening to one of those attractive "Jubilee" Table Grands made by Marconiphone. This receiver gives a 2-watt output which is amply sufficient for dancing.

"Bah, these machines!" snarled Ramon, as the guests came at length from under the anaesthetic and hunted for superlatives. He darted from the house and ran home. He had had enough. Seizing his guitar by the neck he raised it with a swish, intending to smash it to fragments against the door lintel. Thus he stood for a few terrible seconds. Somewhere near by a bird

whistled, and a pig squealed in his father's backyard. Ramon shuddered as the Great Idea rushed upon him.

Back to Castaner's, where he confronted the huddle of slobbering soup-swillers.

"Pardon! Look at this tooth so spurious!" (It replaced the one which he had sacrificed to the American automobile.)

"I pluck it forth. So! I destroy it in the fire. Adios, fifteen pesetas. But now observe the guitar. I play it thus—like a *maestro*. Now I play it like Don José, who doubtless has a palsy. You heard him. And now behold a baboon of Gibraltar who has stolen José's guitar."

The Inspired Fool.

Thereupon he acted like an inspired fool. He played his flute like a bird-man. He played the guitar with his nose, he made it represent the cry of a strayed kid and the braying of an ass. He parodied every style of playing affected by exponents of the instrument, not forgetting Don Alonzo, who accompanied Medina Sidonia with the Great Armada.

La Playa stood up and acclaimed her great son, Ramon Fuentes, and it did not fully recover from its hysterics until fig-packing started. But long before then our

Ramon had padded down the mountain and taken ship to Barcelona. He knew what to do.

Ramon Fuentes is now known and revered all over Spain and the Latin-American world as the Comic Flute and Guitar Player. He is swamped with offers of contracts to appear on the stage and his broadcast "fan" mail demands the labours of three secretaries. It has become a national joke to say that he has insured the gap in his teeth for fifty thousand *duros*.

ALL IN TEN DEGREES

FEELING rather bored with the fare offered by the ordinary broadcast waveband I decided to explore the short waves. This is not a very difficult matter on my set, as I merely have to flick over a couple of switches and the short-wave coils are in circuit.

After a few minutes' preliminary searching round the dial I heard the Isle of Wight clear and strong calling other parts of the British Isles. This was interesting, as I had spent a few days on the island only last summer, so I lingered a little longer with this station, visualising the scenes I had visited and wondering how they all looked under winter conditions. It was such a chance to receive signals from this tiny island after listening to the giants of Europe night after night.

A slight movement on the dial, so small that it was scarcely noticeable, brought in Coventry calling Liverpool. Coventry was surprised that his signals should be received in Liverpool, a mere hundred odd miles away from his transmitter! Such are the properties of these short waves that they have an extraordinary habit of skipping the first hundred miles or so. This also may serve as an illustration of the modern short-wave experimenter's attitude towards distances. Truly distance is no object to him.

But to return to the various places I heard: London was inviting all and sundry to give him a call: next Bristol, and Dundee, Southampton, and the Isle of Man, King's Lynn, Wakefield and Cheltenham, Cambridge, Mansfield and Portsmouth.

All these stations were received within ten degrees on the dial. Ten degrees of concentrated amusement, not organised amusement as provided on the longer waves, but fragments of gossip technical and otherwise between a band of enthusiastic experimenters in short-wave transmissions.

T.E.P.

RADIO ILLUSION

WHY is it that most of us fail to gain as much pleasure or amusement from a broadcast gramophone record as we do from hearing the direct microphone performance of a similar item?

Actually, we should, from one point of view, value the record the more because the performance in wax has been perfected by rehearsal until it is "just so," and we know that nothing can go wrong. The orchestra (if any) cannot drop a wrong note, and the artist cannot dry up through sudden "stage fright," or by intent or accident slip in a *risqué* joke in the manner of certain broadcasters in the past.

But perhaps it is this very fact that we know that nothing untoward can happen in the substance of a gramophone record, simply because it has been "ironed out" to the umpteenth degree, that tends to bias us against it.

Elimination of Human Failure.

The element of the uncertain is extremely small in a "natural" broadcast, but it is there all the time, and maybe it is this which makes its vitality real to us. Certainly the complete elimination of human failure of any kind (in which can be included sneezes, coughs and other irrelevant noises) tends to destroy "naturalness."

I have nothing against gramophone records as such. As polished examples of the performances of various artists, as bottled versions of items which would otherwise not be available, the record has its very important place. But I find myself feeling most resentful when a record is put over without explanation.

This often happens on the Continental advertising stations. And simply because the playing of the record is subject to technical error, even if its contents may not be, the cat slips out of the bag on occasion. There was that historic and certainly amusing instance of Christopher Stone, and on later occasions we most of us have heard the effects of the needle jumping back on to a previous track.

The other Sunday tens of thousands must have heard a lady artist end her performance with "Well, good-bye, good-bye, good-bye, good-bye, etc.," which continued until the needle was hastily lifted.

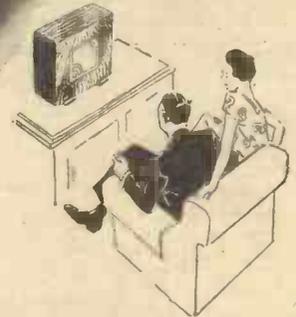
A Peculiar Instance.

But I must say that I did think that the broadcasts of Debroy Somers were original, that he and his "boys" were really "over there" broadcasting to us from the Continent on Sunday afternoons. You could hear him announcing his own items through a whole half-hour. Maybe others have spotted that his is, on these occasions anyway, a recorded performance.

I hadn't until I casually switched over from Radio Normandie, who was broadcasting him, only to hear the same things four or five minutes behind from Luxembourg. And now I have the impression, rightly or wrongly, that everything those stations broadcast in English is made in England and re-imported. Which is all right as far as it goes!

G. V. D.

True 'studio' reproduction from



your radio this Christmas . . .

To the True Radio 'Fan,' the broadcast performance itself is often of secondary importance to the manner in which it is reproduced. Thus, a radio talk which appears insufferably tedious to every other member of the family may hold the enthusiast enthralled by the manner in which sibilants come through, the excellent 'colour' of the voice, and other subtleties which collectively make up what is generally known as 'realism.'

If you are a person who understands and enjoys the finer points of radio in this way, then you probably already use a 'W.B. 1936 Stentorian.' If not, you should certainly buy yourself one for Christmas, for there is no doubt you have been missing a very real pleasure.

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1936 STENTORIAN

Whiteley Electrical Radio Co., Ltd. (Information Dept.), Radio Works, Mansfield, Notts



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

LOCATING INTERFERENCE.

P. D. B. (Belfast).—"I have been interested in reports of other readers' experiences with interfering crackles, but so far I have not come across a case like my own. Perhaps you can help me to trace the cause of it?"

"The symptoms are that after a period in which the set works perfectly it suddenly gives an abominably loud crackle, or series of crackles. Sometimes this occurs when somebody is walking near it, but at other times there is no apparent reason.

"Knowing it might be a bad joint, I have disconnected the set and looked over it very carefully without finding anything amiss. And I have compared notes with others living in my own district. Some get no interference worth mentioning, but others say that there is interference from some electrical source in this neighbourhood.

"How can I tell whether the noise I get is a fault in my own set or is caused by something external?"

Usually the type of interference which is due to electrical machinery gives a clue to its cause by occurring at certain regular hours, for certain periods, often followed by silence while the machinery is not working.

For example, electrical shop-signs are switched on only at certain hours, and interference which occurs only during those hours is obviously likely to be connected with the signs.

Moreover, it is not usual for the interference made by electrical machinery to be short-lived; it is

usually maddeningly otherwise. Few machines are run only for a minute or two, so machinery-made noises are rarely single crackles, or bursts of crackles, like those of which you complain.

On the other hand, the crackles due to a poor joint or broken connection are nearly always of the intermittent type, as experienced by you; so there is one reason for suspecting that the trouble lies in the set itself or in its associated wiring.

Another reason is that your neighbours are not unanimous about similar interference occurring; machinery-made interference is nearly always recognised by several listeners in the same area, and it is unmistakably the same disturbance though heard on different sets.

So we think the cause is a faulty contact some where in your own installation. And it should not be beyond your power to find it.

The likeliest cause is a dry joint or unsatisfactory connection inside the receiver. Do not disconnect, as before, but get a long wooden skewer and gently probe the set's wiring, etc., while it is working, to see if you can cause it to crackle as before.

You may find that pushing at a certain screen, or bearing down on one component, or prising against the panel, will cause the trouble; and further experiments with the skewer will enable you to gain further information about it. Once you have localised it in this way you can more closely examine the suspected section, re-wire or replace whatever is necessary, and so get rid of the fault.

If, however, there is no luck with the inside of the set, suspect battery leads, aerial and earth wiring, loudspeaker leads, etc.

You can test them by closer examination, by replacement, or by shaking and moving them when the set is switched on, the object being, as before, to bring on the crackling. When you have found out how you can start it, there should be no difficulty in deciding how best to stop it.

TESTING FOR LOOSE CORE LAMINATIONS.

W. S. (Frinton-on-Sea).—"In the form which you sent me from the Query Department it says: 'What is the effect of disconnecting: (1) Aerial? (2) Earth? (3) Loudspeaker?' (This last named is a test for loose core laminations, etc.)

"I understand (1) and (2) all right, but I do not see what is meant by (3), disconnecting the loudspeaker as a test for loose core

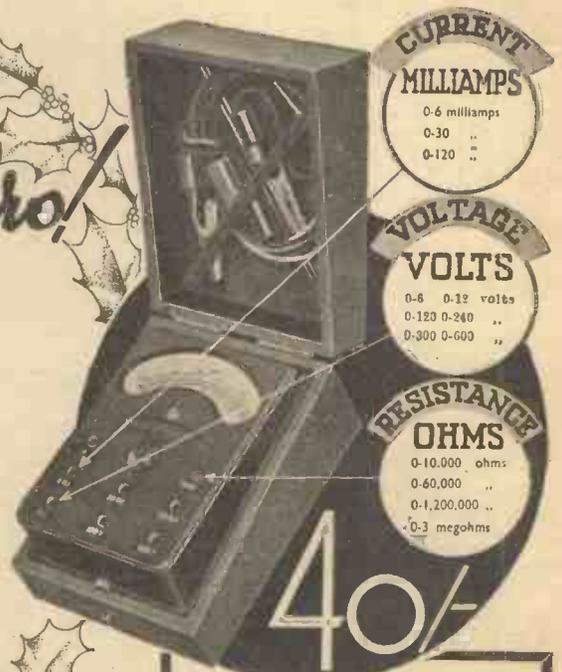
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RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

laminations. Please explain what this part means."

The question comes in the section devoted to all-mains designs, and arises from the preceding question: "Does the receiver hum?"

There are various causes for hum, and some of them affect the set in different ways. To enable us to decide which is causing the trouble complained of, we ask you to disconnect (1) the aerial; (2) the earth; and (3) the loudspeaker.

Humming interference which is coming down the aerial lead will obviously be shown up if this lead is disconnected. And similarly the removal of the earth lead will also be indicative of other causes of hum. Neither of these, however, will greatly affect hum which is due to loose laminations in, for example, the iron core of a transformer.

So we ask you to note the effect of disconnecting the loudspeaker, when the set should, of course, be silent. If it is not silent, but instead there is a distinct humming noise coming from one of the components, you have located a fault which would not have shown up under normal conditions, because the sounds from the loudspeaker would have concealed it. The remedy for loose laminations is to tighten their fixing nuts sufficiently to prevent the movement of the laminations.

CONDENSERS IN THE LEADS TO THE PICK-UP.

B. H. O. (Watford).—"As the reproduction on records is unusually good, I asked the manufacturers to give me a diagram of the pick-up circuit, which I could not follow from looking inside the set, and which did not appear to be as simple as the circuits I have seen in "P.W." for pick-up work.

"They very kindly sent me a complete theoretical diagram, which shows that each pick-up terminal is connected only to a condenser (different condenser in each lead), and apart from this pair of condensers the pick-up circuit is very much on the lines of the one I built for use on the battery set.

"What is the purpose of putting the condensers next to the pick-up terminals, and why are they not always used if they improve reproduction?"

We do not think that the condensers are affecting the reproduction as much as you imagine.

Probably they have been placed in series with the pick-up leads merely to insulate these, at the point where they leave the set, from any voltage which might be applied from the mains.

Although the main purpose of the condensers is probably to prevent accidental shock on touching the leads or handling the pick-up, the value of the condensers used has doubtless been chosen to suit the particular pick-up recommended for use with the set, or supplied with it. There would be no harm in using similar condensers in a battery set's pick-up circuit; but generally they are quite unnecessary, and that is why they are not shown in the circuits.

LOUDSPEAKER CONNECTIONS FOR FILTERED OUTPUT.

N. R. (Horsham, Sussex).—"The trouble was, as you suggested, a broken-down condenser in the output filter circuit. But when fitting the new condenser I had a surprise.

"Normally the plate terminal of the output valve holder is connected to one end of the output choke and to one side of the 2-mfd. condenser, the other side of the choke going to H.T.+. And one loudspeaker terminal is joined to the other side of the condenser.

"All this I left unaltered, but there is one other lead—the one from the remaining loudspeaker terminal to H.T.—. Instead of re-connecting in this way I took the last lead from the loudspeaker to H.T.+, and worked it like that for over a week without noticing any difference!

"Have I done any harm to the condenser, and why is it that it worked as well this way as when the lead is taken as before to H.T.—?"

You have not done the condenser or other component any harm. But you probably did right to change over when you discovered the alteration, because the normal connection, to H.T.—, gives a decoupling effect which is not obtainable when the loudspeaker lead is taken instead to H.T.+

(Continued on next page.)



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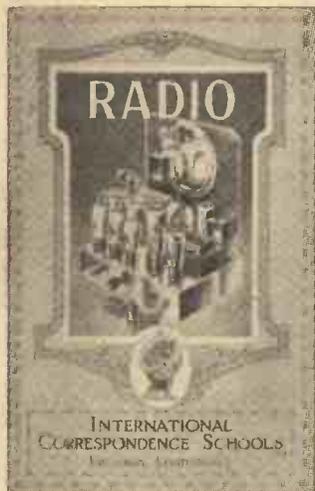
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RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

This has made no difference to reproduction during the time you had it in operation, but there might have been a very different story when the H.T. supply had deteriorated a little, and good decoupling had therefore become essential to good quality.

In brief, the difference between the two methods is this:

Normal method (second L.S. terminal to H.T.—); decoupling provided but condenser has maximum H.T. voltage across it as well as "speech" voltages.

Second method (with second L.S. terminal joined to H.T.+): H.T. pressure removed from condenser, but no decoupling of output circuit.

AN UNEXPECTED SOURCE OF INTERFERENCE.

S. H. (Tufnell Park, N.).—"To satisfy a disbelieving neighbour and to confirm my own belief, can you assure me positively that a crystal set cannot possibly interfere with the reception on my neighbour's set?"

"We are good friends, but he keeps on telling me that he gets funny little clicks and disturbances since I have used a crystal set which I rigged up. He even claims that on one occasion he heard voices in an interval in the programme, and he believes they were from my set because they sounded like my sons' voices.

"He will not take my word that it is impossible for a crystal set to cause any sound, as it has no batteries to give out power. So I hope you can assure him positively on the point."

Sorry, S.H., but we cannot take the line you want us to; for we have proved time and time again that the operation of a crystal set can affect the set next door, under certain conditions.

Although, as you say, the crystal set's aerial has no batteries attached to radiate power, it is nevertheless energised to some extent on the wavelength in question; either by a neighbouring set, or possibly even by the local station, since if it is receiving strongly it is presumably re-radiating to some extent.

Whatever the cause, it is a well-known effect that crackles, etc., should be heard on a neighbouring set when the catwhisker adjustment is attended to.

Moreover, there have been plenty of authenticated instances of conversations in a house where there is only a crystal set being picked up by that set, and radiated from the aerial, with sufficient clearness for words and voices to be recognised on a valve set next door.

BETTER RESULTS WITH TWO GRID LEAKS.

W. J. (Cranwell).—"Can you explain why my set seems to work better with two grid leaks than with one?"

"It is one of the most straightforward arrangements possible to get, being merely an S.G., detector and pentode. The detector is a rather old valve, but it seems to be in first-class condition, and very sensitive.

"I have tried a newer valve, but this old HL2 cannot be beaten in my opinion. It gives such good long-distance reception that I have rather concentrated on this, and so tried to get perfectly smooth transition into and out of oscillation, as the set's only drawback was a tendency to uncertain reaction when the detector H.T. was well over the 100 volts mark.

"I had been told that a high resistance sometimes helped smooth reaction control, so I was experimenting with a 2-meg. leak when I found the set was simply perfect if I left the original grid leak in (it is a 2-meg. also, connected from grid condenser to L.T.+) and used the second leak as well.

"I have got this second leak connected between the grid condenser (same terminal as the other one is connected to) and L.T.—. I have tried it also to L.T.+ (that is, in parallel with the other leak), but the results are then definitely only about half as good. Also, if I remove the first one the results are hopeless. But with them both the set is a revelation. Why?"

What you appear to have done is to hit exactly

upon the right spot on the grid's curve, thus working the detector at its best possible operating point.

Although one comparatively seldom sees grid circuit curves, it is possible to draw them up on a voltage-applied current-flow basis, exactly like the more familiar anode current curves. And the shape of the grid-current curve, being similar, lends itself to the selection of an initial operating point such as is chosen for "bottom-bend" detection.

Usually there is no advantage in selecting the operating point very carefully, because it is not very well-defined, and variations on either side of it have no appreciable effect on results.

In your set, however, circumstances appear to have combined to make the selection of the right "bias" on the detector grid an important factor; and the extra grid leak, by providing a potentiometer effect, gives you just the right initial setting for good results.

So we should keep the arrangement exactly as it stands. But remember that if your valve gives out, your unconventional grid leak arrangement may have to be scrapped, or its value altered, to suit another valve.

SHOCK FROM THE CONDENSER.

A. P. S. (Seven Kings).—"The set was made up from a 1933 blue-print, and the components are all seeing service for the second time. But it goes excellently except for one small difficulty, in connection with tuning.

"We find that when altering from National to Regional—the two programmes from which we always select our entertainment—the person touching the tuning knob sometimes gets a tingling sensation where the fingers touch the edge of the knob. And this, it is found, is caused by touching the small screw which holds the knob in place.

"Mentioning it to a friend, I was told that this is because it is a 'D.C.' set. Is there anything that can be done about it, as he seemed to think there was nothing to worry over, but I thought I had better write and make sure."

We are glad you wrote because there is an easy cure for the trouble that will only take a couple of moments to put into effect.

All you have to do is to cover that little screw-head with insulation, so that it is not able to come into contact with the bare fingers when tuning. (There is nothing wrong in its being "alive," since it often happens that when D.C. sets are in use all the metallic parts of the set which are earthed are capable of giving a shock, and should, therefore, not be touched.)

The insulation may take the form of a blob of sealing wax, and if this is of the same colour as the tuning knob the set's appearance will be unaffected, or even improved.

See that the screw is well tightened, and then heat the wax and drop it on to cover the screw-head. A very thin covering is quite sufficient, since all it has to do is to cover the metal so that it cannot be touched.

THE COIL UNIT PRECEDING THE DETECTOR.

C. W. (Borden, Hants.).—"Where an ordinary coil unit of the two-windings type is used to couple the H.F. valve to the detector there is some stunt for improving reception by altering the coil terminal to which the H.F. valve's plate circuit lead is connected.

"Please give me some information about this, as I do not want to go to the expense of a big alteration."

You do not give us much information, C.W., do you? "Improving reception" covers a multitude of stunts.

In the absence of further particulars we must assume that you want to do one of two things, commonly rendered necessary by wrong adjustment of the coil unit in question—(a) increase selectivity; or (b) increase strength, because an indifferent aerial is used.

To increase selectivity (a), the tapping from the preceding valve can often with advantage be moved from its terminal to one of the other terminals on the coil unit—it is safe to try them in turn if a coupling condenser is connected in the lead from the preceding valve, since no H.T. current can pass through such a component.

The object of this change is, of course, to select a looser coupling, such as is often obtainable on a tapped coil.

To increase strength (b), where the aerial is poorer than average, the reverse process is adopted.

The lead from the coupling condenser is moved from the "A" (or similar) terminal on the coil unit, and is taken instead to the "G" terminal, where a much tighter coupling is usually obtainable.

We would emphasise, however, the need for caution, since sets vary so widely that damage may easily be done unless the set-owner can be sure that he is not letting the H.T. get out of hand.

RADIO MAGIC

(Continued from page 386.)

to the cell. The indication of the meter and the aid of the detectaphone tell the operator in the "mike-room" when the questioner is in position.

He hears the question via the detectaphone, waits for the needle to kick up, showing the questioner is bowing down, and immediately intones a suitable answer. Choose a friend for this job who has not put in an appearance. This will be easily arranged if the stunt is worked early in the evening. Half an hour or so afterwards your friend can knock at the street door and be let in by one of the guests.

And a Few "Ghosts."

Let the guests examine the god immediately after the stunt. They will find no wires—just two torches inside.

And then what about a ghost in one of the bedrooms. It's simple with a hidden speaker, the mike, and a few good groans when the house is quiet. And think of the thought-reading games you can play with the aid of the detectaphone.

But I am sure that by now you will already have some other and, quite possibly, better schemes in your mind. So I will close with a simple request: Spare the nervous ones, please!

RADIO DRAMA

(Continued from page 391.)

listeners by a delicate, if dictatorial, turn of a dial.

They have placed the principals in one studio, the supporting cast in another, the "crowd" in a third, the orchestra in a fourth, the gramophones in another, and the "effects" in the sixth. The producer then sits at the Panel, one hand hovering over a row of bell-pushes, the other twirling the dial.

He presses a button and the "crowd" in Studio Three see the red light flick twice, the signal for them to shout "Welcome to our Prince!" The red light goes out leaving them in the silence of death while the producer red-winks Studio One into activity, whereupon Molly Muddlewump whispers "Kiss me darling," into the microphone and the nation's loudspeakers.

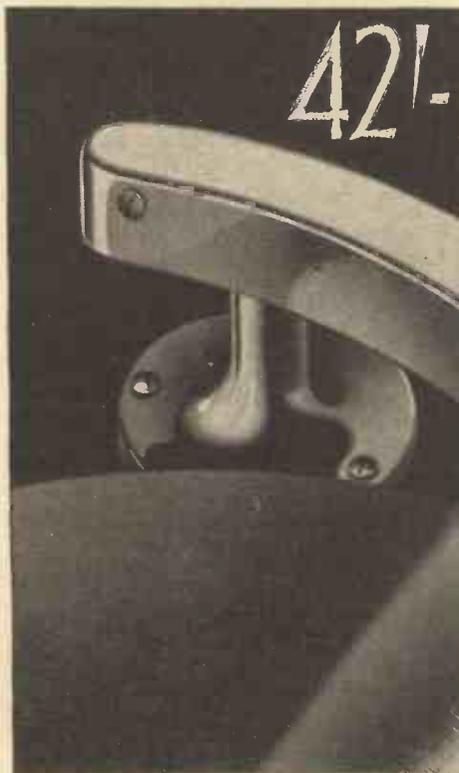
The Obvious Weakness.

The obvious weakness of this method is that convincing artistry is rendered defunct. This particular Prince Charming might have put some genuine throb into his voice had he heard his devoted subjects (isolated in Studio Three) shout their welcome to their prince; and Molly's osculatory invitation might have sounded more naturally luscious if she could have heard the orchestra (at the other end of the building) playing "Liebestraum."

The truth is that some B.B.C. producers have become so fascinated with the machine that they forget its products. They see the chromium-plated mechanism, the marble-panels, the glistening switches, the ebony dials, the flickering metres. To handle them is power. Enthroned in the Control Room they forget that artistry and mechanism are to-the-death enemies; that histrionics and humanity are inseparable; that what it produces, not what it is, is the sole virtue of machinery.

For the man who seeks perfect record reproduction

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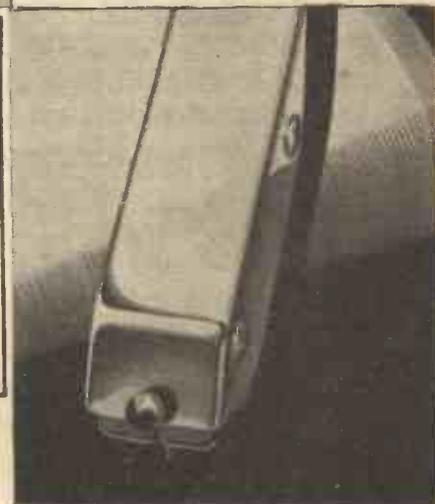
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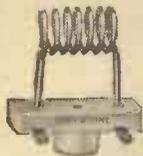


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EDDYSTONE

SHORT WAVE COMPONENTS

BARRY KENT CALLING

News and Views from the "Big House."

Play Background.

THE musical background to plays is causing a lot of discussion at Broadcasting House these days. The play producers naturally concentrate on the dramatic effect, regarding music as part of the contributory means for putting across their effort. The music department equally naturally resents the mutilation of what it regards as "good music."

Another problem is that the dramatic people would like to have complete orchestras and other combinations "standing-by" rather than gramophone records, and so on. The issue came to a head over the "Scott Programme" on Armistice Day, when the only thing criticisable was the musical background. My money is on the producers. I believe that the purist musicians will have to give way!

Birth Control and the B.B.C.

For years enterprising talks officials have been trying to get the B.B.C. to deal with birth control. Behind the scenes there has been developing almost a feud about this problem. Colonel Dawnay, as Programme Controller, was rather against; Mr. Gladstone Murray, who acted as Programme Controller during a critical stage of the struggle last year, was definitely adverse; so it was left for Mr. Graves, the new Programme Controller, to review the matter afresh. This he did, and with the result that an ingenious and satisfactory formula has been evolved.

It is that while the B.B.C. will not go out of its way to argue the problem of birth control, it will allow it to be mentioned in appropriate context provided it is made clear at the time that the subject is controversial.

Hughie Green Off the Air.

I understand the B.B.C. has decided to drop Hughie Green and His Gang for a time. This is in accordance with the policy of giving opportunity to as wide as possible a range of artists from the limited time available on the B.B.C. network. It is not a reflection on Hughie and his clever act.

"In the Modern Manner."

The B.B.C. has definitely captured a popular entertainment from the purveyors of sponsored programmes in English from the Continent. I mean Van Phillips, who begins a new series entitled "In the Modern Manner," in the National programme on January 6th.

This will be dance music presented in the Paul Whiteman way. The second of the series will be given also in the National on January 13th, and then, in the same week, that is, on January 17th, Van Phillips will give a really "Special Dance Programme." Eric Maschwitz pins a lot on Van Phillips, who will not broadcast except from the B.B.C. while this engagement runs.

Presents for B.B.C. Staff.

Grateful listeners who would like to show their feelings by making gifts to B.B.C. officials should think twice before acting. There is going on now a general "tightening up" of the rules about presents. The management of the B.B.C. will probably "collar" any money that is sent in to individuals, and it is ruled that any present, no matter what it is, which might be regarded as a bribe must be returned to the sender. There was a time when grateful listeners sent cases of champagne, and enormous boxes of flowers, to announcers and staff artists. Alas! these good old days are gone.

Bad Language on the Air.

The much discussed invective adjective made famous and nearly respectable by Mr. George Bernard Shaw in "Pygmalion," before the War, has been the centre of acute controversy in the B.B.C. lately. There was a broadcast play not so long ago in which the word was used. The play was to be repeated, and there was a request that the word should come out in the second performance. After much discussion the B.B.C. decided to leave in the word; and quite right too. Another victory for common sense and progress.

Naturally, no one wants to have "strong language" out of place, especially in a medium that is so intimate as radio. On the other hand, we are not a nation of "ninnies," anxious to see our art emasculated when it is broadcast. So what I say is "another one up" for Mr. Cecil Graves, the new Programme Controller of the B.B.C., in doing the right and unexpected.

B.B.C. Choral Society Help Charity.

The B.B.C. Choral Society, which is an amateur body associated with the B.B.C., has decided to give a special concert at the Queen's Hall, the proceeds of which are to go to the Musicians' Benevolent Fund.

The Ullswater Report.

It is a deserved tribute to the unassailable position of the B.B.C. that there was no objection in Parliamentary circles to the rumour that Sir John Reith had been given an advance draft of the report of Lord Ullswater's Committee on Broadcasting. I myself think it was extremely unlikely that the draft was passed in this way.

On the other hand, I would not be surprised if the Postmaster-General had asked Sir John Reith for his observations on the early copies "from the Press" of the Committee's Report. This would be a natural precaution to protect the Postmaster and Lord Ullswater against inaccuracies of fact.

Amateur Music Banned.

Round at the "Big House" the other day I was told that there has been another unsuccessful eruption of the forces that aim at establishing a permanent place for the amateur musician in the programmes. The latest effort is built on an argument that experiments in America have proved the programme value of amateur talent, on the "Major Bowes" basis.

Well, the fight is over so far as Britain is concerned. There is to be no "amateur hour" — or "moment" for that matter. We stick by our professionals, and observe our contracts with their societies.

S.T.700 RAPID CONSTRUCTION GUIDE

(Continued from page 494.)

Any other type of very short miniature nails may be used.

There are 16 small circles with white centres along the border of dial. Keeping dial card flat on panel, start with the top circle and prick through centre of circle with some thin-pointed instrument (I used a drawing-pin) for about 1/16 in. Insert a prepared pin into this hole and push home with any hard flattish-ended instrument (I used the handle of a screw-driver). Carry out the rest of the fastening-down of dial in following order: Circle between pin just inserted and condenser spindle; the two circles (on outer border) on each side of top circle; the two circles (on inner border) between last-inserted two pins and spindle. Carry on in this way, working towards the ends, keeping dial card flat.

(S) CUT CENTRING TAB OFF WITH SAFETY RAZOR BLADE by cutting along inner border where indicated (where tab is joined on). Tear away the tab from the condenser bush; there is really no need to remove the fixing nut to do this. Tighten up the fixing nut on bush of main tuning condenser.

(A) Collect and examine (handling carefully) the three specified .0005-mfd. air variable condensers and the Wearite Triple Extractor coil assembly which I designed for this set.

(B) Using Fig. 3 and Fig. 8, mark out and prepare the wooden top and sides of box, unless bought prepared.

(C) You are now going to build the box. Lay one end-piece of box, face upwards, on a table. Knock in about 1/4-in. deep four 1/2-in. ordinary nails at the points indicated in Fig. 8. Hold one sidepiece vertical on end. Driving in two of the nails in the prepared end-piece, nail end-piece to side-piece. Drive the other two nails through into the end of the other side-piece which is held vertical on end.

Drive four ordinary 1/2-in. nails 1/2 in. into other end-piece in the same way and complete frame of box. Now lay drilled wooden panel right way up on the table and knock in about 1/2 in. deep six 1/2-in. ordinary nails in position marked on Fig. 3. Lay panel on box frame and hammer in the nails. Sandpaper any rough edges and, if desired, stain. (I used Jackson's—of Mitcham, Surrey—oil varnish stain, walnut

shade, a size 6 tin being more than enough for both set and Triple Extractor.)

(D) Using two 3/4-in. No. 6BA countersunk head brass screws and nuts, fix the Triple Extractor coil assembly inside the box the right way round. Fit terminals A1 and A2. Fit the three Polar .0005-mfd. condensers. Write with a pencil the markings C1, C2 and C3 on the ends (not vanes) of condensers in order shown on diagram. This will enable you to identify each condenser.

(E) Preferably using "Maxamp" wire in the manner described in S.T.700 Rapid Construction Guide, wire-up as in wiring diagram. (Do not confuse coil numbers with wire numbers; wire numbers are in circles.) Tick off wire numbers on diagram as connections are completed.

(F) Check wiring by asking a friend to read out the wiring from the diagram while you look at Triple Extractor. In case of error, correct at once.

(G) Fit knobs of condensers.
THIS COMPLETES TRIPLE EXTRACTOR.
J. S.-T.

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Economy with Efficiency is a rare occurrence in radio practice, but there is always an exception to prove the rule. **Mr. John Scott-Taggart, in designing his "S.T.700,"** specified two Hivac types with splendid efficiency records, coupled with marked economy in current consumption.

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"S.T.700—MARVELLOUS!"

Dear Sir,—I feel I must write you concerning your latest production, the S.T.700, which set I have just built. It is marvellous, and the results are excellent. I have built it to your instructions (no alterations).

Your faithfully,
Thomas More,
c/o Duncan,
1064, Argyle St., Glasgow, C.3.

Note: This reader is prepared to give demonstrations.

STAND SET IN ITS NORMAL POSITION WITH DIAL FACING YOU.

(T) Turn projecting spindle of main tuning condenser fully anti-clockwise (fully left). Slip the large J.B. knob and long pointer on to end of spindle with the pointer pointing exactly horizontally to the left. Tighten grub-screw, which is the little screw which fits into edge of knob and is on opposite side to pointer. (Do not touch screw which secures the pointer.)

(U) Turn spindles of aerial coupler, anode reaction condenser and aerial balancing condenser fully anti-clockwise (fully to left). Fit their knobs with their white spots or pointers pointing exactly in a horizontal direction to the left. Tighten up their grub-screws.

Turn volume-control spindle (on panel) fully clockwise (to right) and fit knob with its spot pointing towards the bottom right-hand panel fixing screw. Tighten its grub-screw.

(V) Fit knob on wavechange switch spindle (no special direction).

YOUR SET IS NOW COMPLETE.

TRIPLE EXTRACTOR

IF you use .0005-mfd. air condensers of other makes, you will most probably need a larger box. You must not fit your condensers closer together than described, and the coil assembly should not be nearer to the side of box or nearer to condensers. If you use the S.T.600 Extractor coil, together with a single Colvern medium-wave Extractor (which costs 5s.), the same precautions should be taken.

N.B.—The Extractor condenser used in S.T.600 should not be used; but the better Ormond condensers (e.g. as used in S.T.300, S.T.400, and S.T.500) are all right. The efficiency of the condensers is of extreme importance; for that reason I have given as alternatives to Polar only condensers proved on measurement to be satisfactory.

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Note this special bargain! For charging or lighting. 140 watt Enclosed Dynamo. 12/16-v. 12 amps. Ball Bearings, Vee Pulley, Type O, 25/-. Marine Type Switchboard with Ammeter, maximum and minimum Auto Cutout main Switch and Fuses. Field Regulator, 25/-. or 47/6 the pair.

ELECTRIC TOOLS. A.C. induction motor, flex and plug, 1/25 h.p., 2,800 revs. 18/-. 1/10 h.p. ditto with pulley, fan cooled, 1,500 revs., 35/-. Motor-grinders ditto, double ends, fitted two emery wheels, 21/-. Light A.C. Drill, 4lbs. to tin hole, 40/-. All with flex and plug. Electric Pumps, 120 galls., 67/6.

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MILLIAMMETERS. A special bargain while they last. Moving coil, flush fitting, nickel finish, 25-0.25 m/A., 7/6. **DIX-SPANIA TEST POCKET TESTER.** A wonderfully versatile moving-iron multi-range meter for service on A.C. or D.C. jobs. No projecting terminals. THREE ranges of volts: 0.7.5, 0.150, 0.300. Used for MILLIAMPS, reads: 0.125 m/A and 0.75 m/A. In black bakelite case. Measures only 2 1/2 in. by 2 1/2 in., with pair of test leads and plugs. Leaflet "N" gives full information. 19/6.

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ON THE AIR

Candid Comments by Our Broadcasting Critic on recent programmes

LESLIE BAILY and Charles Brewer are men of imagination. I would like to think that their latest Scrapbook was something new in broadcasting, for that would silence those who complain that the sources of inspiration at Broadcasting House are momentarily dried up. But the Scrapbook series isn't new. Nor is it so old that we are beginning to tire of it.

Like the crossword puzzle it is as popular as ever, and it should continue to live by virtue of its own excellence. "Scrapbook for 1911," like its predecessors, was a very live thing. It produced no strain on listeners. As we listened to it we became oblivious of our actual surroundings, and of the year 1935. It was 1911 all over again for us, with old hopes and aspirations revived. Everyone taking part in the broadcast recaptured most perfectly the spirit, the atmosphere and the temperature of those twelve months, twenty-four years ago.

The two most outstanding episodes presented, I thought, were the Siege of Sidney Street, and the Investiture at Caernarvon. Ex-Detective Sergeant Leeson told his story well, and in typically policeman fashion. Hugh Martin supplemented the story in a very novel and dramatic way. I would have nothing but praise for this journalist's unconventional manner, had he not too frequently dropped his voice almost to inaudibility. (I feared once or twice he was being faded out, though I couldn't make out why.)

A Very Live Picture.

Walter Pitchford (I recognised his voice immediately) described the Investiture scenes in a way that made them alive. One couldn't but feel that he was doing an Outside Broadcast of a ceremony then and there in progress. He got all the original colour and splendour into his picture. He used his musical voice to good purpose. The records used in these scenes, too, were unfamiliar and full of appeal.

The joy of these Scrapbooks is the perfect blending of music and narrative. The proportions are ideal. Nothing is superfluous. It is always interesting to hear once again the voices of one-time favourites and notabilities. Florence Smithson still sings well, by the way. Vive les Scrapbooks!

The Monthly Galas are maintaining a high standard and the stars their reputations. In the November gala Elizabeth Welch was her usual polished self, but she sang less interesting songs than usual for her, and to my ear her solos seemed to run counter to the orchestral accompaniment.

Elsie and Doris Waters went all Christmas in song and their patter was as delicious as ever.

The Italian baritone, Riccio, was power and passion personified in his big number, "That's why Darkies were born," and, I thought, a bit sharp on some of his notes.

Ivy St. Helier was the pick of the bill with her very clever impersonations. I like good impersonators. Hence the pat on the back for Ivy.

Tessa Deane encouraged the vogue to make anthems out of a popular song. She sang an elaborate version of "Love Me For Ever," assisted by a B.B.C. Choir.

The two newcomers from Vienna—Rawicz and Landauer—gave some delightful pianoforte numbers on two pianos. I would like to hear them again.

And lastly, Claude Hulbert and Bobby Comber fooled with gusto on a yacht. Their script was written for them by Mr. Du Garde Pech.

The Stag Parties.

The Stanelli Stag Parties are playful affairs, with plenty of talk and a modicum of artistry. The host is a veritable gas-bag, whose standards of humour and conversation aren't very exacting for his guests. The humour, in particular, is simple. Trying to recall some of the things said at the recent party, I can't remember anything funnier than this rhyming couplet, "Brains wouldn't be any use to me, For I've got a job at the B.B.C."

But there were some popular artists at the party who got down to business whenever the talk subsided.

The Band-Box gave a foretaste of what may result from the B.B.C.'s furious quest for new dance bands. There were bands of all shapes and sizes, some like many we already know, and others different. Dance bands should, in my opinion, begin to explore fresh avenues, the more divergent the better. Too long have they trod the same path.

The season's talks do need a little brightening-up on the whole. We have had better series in the past, series that are still remembered. The new series, inaugurated by Julian Huxley—Plans for To-morrow—may help to achieve this. His was a very practical talk on the experiment going on in Tennessee Valley.

It was obviously a talk for the Government. It offered much food for thought.

What a marvelous array of speakers are undertaking the "I Knew a Man" talks! I have referred to this series before, and I would have avoided any further mention of it but Lt.-General Sir William Furse's talk on Lord Roberts makes this quite impossible. This talk ranks, I should say, as one of the best that has ever been given on the air. In print the talk would certainly rank as literature. The electric recording of it ought to be kept as a perfect specimen of good talking. These talks, or the best of them, must be published in book form. I already own a number of similar publications, and I am glad to have them.

The story of "The Boomerang Bet," for all its impossibility, was quite interesting, and the broadcast was satisfactory.

Nothing will convince me that an item like "Meet Mickey Mouse" is adult entertainment. To put it on the National wave, too, at 9 p.m. really takes the biscuit. For children it is ideal, of course. Actually, I think the B.B.C. err in having anything to do with Mickey Mouse at all. This little creature is a creation of the screen. He has to be seen. If you eliminate the visual part of him the residue is just make-weight. And no one can make anything substantial out of make-weight!

WAR NEWS ON SHORT WAVES

(Continued from page 394.)

stations equipped for telephony, but although the information is the latest officially published it is possible that more transmitters have been adapted for this purpose.

Since last January Italy has been feverishly extending her colonial radio network, and listeners on short waves may hear transmitters testing at almost any hour of the day or night. In particular, Roma-San Paolo on the frequencies given, and I A C, Coltano (near Pisa) working with ships on 16.95 m. (17,699 kcs.), 23.32 m. (12,865 kcs.), 35.23 m. (8,315 kcs.) and 47.20 m. (6,355 kcs.), will be found particularly active.

In a recent article published in "Wireless World," dealing with the development, amongst others, of Italian short-wave broadcasts, a list was given of the frequencies allotted to the Rome stations reserved for this service.

To this information may be added the fact that the third transmitter installed at Prato Smeralda, and which was originally destined for broadcasts to West and South Africa, has now been equipped with directional aerials for East Africa. It is to be brought into operation without delay for a series of daily news bulletins and musical entertainments of interest to the Italian troops now encamped in Eritrea.

It will be seen that a working knowledge of the Italian language provides many items of interest, and the number of radio telephony transmissions associated with the Italo-Abyssinian conflict is likely to be greatly increased in the near future both on short waves and channels in the broadcast band.

"NOW IS THE TIME FOR DANCING"

(Continued from page 393.)

And talking about signature numbers, why not hold a few competitions while you have your dancing? For instance, choose eight records for an hour's dancing and use a different band for each record. Then ask your guests to jot down on pieces of paper between the items the name of
(Continued on next page.)

"NOW IS THE TIME FOR DANCING"

(Continued from previous page.)

each band and the signature tune used. You could give a couple of simple prizes for the person who got the most right in each section of the contest. The signature problems are not difficult in themselves, but the deciding of the name of the dance band often is. And until the persons have decided on the band they cannot decide on the signature tune. Added to this you could ask them where the band plays.

Here are a few details to assist you: Ambrose and his band, signature, "When Day is Done"; Embassy Club. Henry Hall, "Here's to the next time"; B.B.C. Harry Roy, "Bugle Call Rag"; May Fair Hotel. Maurice Winnick, "Sweetest Music. This Side of Heaven"; unattached. Roy Fox, "Whispering"; unattached. Caroll Gibbons, "On the Air"; Savoy Hotel. Jack Payne, "Say it With Music"; unattached. Charlie Kunz, "Here Comes Charlie"; Casani Club (easy one this).

Group your records carefully and you will be able to make a very difficult competition if you wish. For instance, carefully selected records of Maurice Winnick and the Canadian Guy Lombardo will sound very much alike. So do some of the Jack Hylton and Billy Cotton discs.

Roy Fox is usually fairly easy to recognise, and so is Lew Stone. Harry Roy is almost a dead cert. But if you are careful, especially where the vocalists are concerned, you can pick a programme of good dance numbers which will be by no means easy as a competition. **K. D. R.**

PLAYERS ALWAYS PLEASE!

THE quality of Player's "Navy Cut" Cigarettes has made them world-famous, and the dainty way in which they are packed makes them very acceptable as Christmas presents. For example, the "Medium Navy Cut" Cigarettes are supplied in charming Christmas packings of 50's, 100's, and 150's, the prices being 50 for 2/6, 100 for 4/10, and 150 for 7/3. These cartons are ready to post, having greetings and address space on the reverse side. For the smoker who prefers the ordinary twenty packet, a very attractive gift is the Christmas postal carton containing five packets of 20 for 4/9½.

Player's Cork-tipped "Bachelor" Cigarettes are in great demand among ladies, and these may be had in flat tins of 50 for 2/6. For those who prefer a generous-size cigarette of superfine quality, Player's "No. 3 Virginia" in flat pocket tins of 50 at 3/4 make a strong appeal.

Player's "Whiffs" in cartons of 5 for 10d. have the true Havana flavour, while to those who like a Cigar, Player's "La Doncella" will make a strong appeal—in packets of 5 for 2/6 and in boxes of 25 and 50.

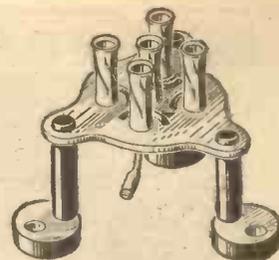
For pipe smokers Player's provide a variety of excellent brands, the chief among which are the old-established Player's "Medium Navy Cut" Tobacco ¼-lb. tins 4/4, "Airman" mixture ¼-lb. tins 3/4, "No Name" ¼-lb. tins 5/-, and the "Digger" range of all Empire Tobaccos at 2/8 per ¼-lb. tin.

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The popularity of "Clix" products has been built up on their splendid reputation for perfect contact. Year after year as each new component was produced samples were sent to the Technical Editors of all British Radio journals. During the many years that "Clix" have contributed to Radio progress, no product bearing that name has ever failed to satisfy the exacting tests placed on them by those whose duty it is to report on the efficiency of Radio apparatus submitted for "test."

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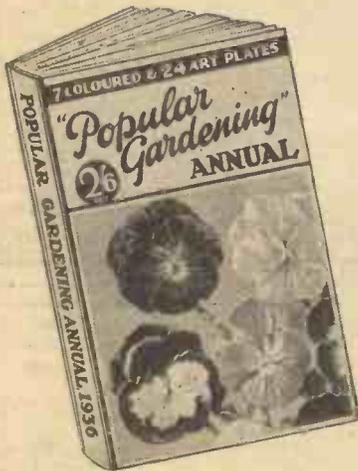
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MORE READERS PRAISE THE S.T.700

A further selection of opinions from those who attended the demonstrations.

SIMPLICITY ITSELF.

Dear Sir,—I wish to thank you for the opportunity you gave me of witnessing a demonstration of the S.T.700, and a memorable evening's entertainment it was.

I had looked forward to the advent of this set and I must say it exceeds all my expectations. But it would be difficult to say what strikes one most about it.

At first glance one is undoubtedly attracted by the calibration chart on the panel. It is the largest, but at the same time most simple one would wish for. It makes tuning easy, as I found on actual test.

The layout, too, is simplicity itself. From an economy and adaptability point of view it would be hard to beat.

As to the operation of the set itself, out of its many novel features I think the Extractor unit calls for a special measure of praise. It was astonishing how soon one could get hold of the principle as to how it was used, and the ease with which one just wiped out the local stations. As a test I tried Strasbourg, and with all truth I can say London was "wiped out," for there was not a vestige of background to this station. The "locals" for tuning-in have become like "foreigners."

Also the startlingly novel feature of audio-reaction calls for special mention. As was ably demonstrated the increase of volume, together with a roundness of tone it builds up, on stations at first only just audible, can be likened to switching in an extra stage of L.F.

Needless to say its station-getting power is up to the usual S.T. standard. It is so selective, I venture to think that after a few minutes' trial to get the "hang" of the controls one could go round the dial and find they have a set of far more worth than the much boosted superhet.

I was more than impressed with the enthusiasm of those present at the test, and I feel sure everyone who builds the set will also be the same. It deserves, and I trust it will be, a record set in every way.

W. N. CLARK, 92, Arodene Road, Brixton Hill, S.W.2.

VOLUME REALLY ASTOUNDING

Dear Sir,—Here is a summary of the main features of the demonstration.

Stations received: sixty-four stations were received at loudspeaker strength, fifty-six medium-wave and eight long-wave stations. We both agree this was good, as conditions were considerably below par.

The logging of the stations presented no difficulties, being simplified by the Auto-Dial. The advantage of this new Auto-Dial is that, whereas on the S.T.600 (for instance) the pointer used with the station name dial covers three or four stations at one position, the Auto-Dial is never over more than one station. The benefit of this great improvement becomes at once apparent.

Triple Extractor: This device was set to Droitwich, London National, and London Regional, these stations being the "locals"; this reduced them to the strength of ordinary foreign stations. When a station close to one of the "locals" was received and the particular extractor was taken off, the "local" swamped that part of the dial. We noticed that the Triple Extractor, once adjusted to the stations mentioned, was completely forgotten.

Quality of reproduction was very good.

Audio-Reaction: This feature was demonstrated on a meter connected across the speaker speech coil and proved that it was able to increase signal strength twenty-five times, at the same time improving to a marked degree the quality.

Volume of output: This was really astounding in view of the fact that the set is battery operated.

Sensitivity. Although the set was not so

powerful without aerial or earth the more powerful Europeans could be received at loudspeaker strength, proving beyond doubt the wonderful sensitivity and stability of the S.T.700.

The cost of this set is almost too good to be true, as this set in our opinion is equal to any receiver manufactured to-day costing £15 to £20. The set should prove easy to build, due to novel design, which also gives it an attractive appearance.

A. E. HANLEY, F. J. HANLEY, 15, Pembroke House, Stanmore Street, Caledonian Road, London, N.1.

A STARTLING DEVELOPMENT.

Dear Sir,—"Come down to Tallis House and see the 'BHOYS' putting the S.T.700 through its paces," wrote the Editor.

Well, fellow-constructors, I duly arrived, and my impressions were something as follows:

No ganging troubles to contend with this time, for the new circuit employs separate variable tuning condensers, and the valves, they are cheap enough, for they appear to consist of a H.F. pentode in the first stage, followed by an ordinary triode detector, thence a 2 L.F. stage.

When teamed together in the circuit they spell SENSITIVITY and SELECTIVITY, combined with that of a beautiful undistorted output.

Now for the Triple Extractor which, when brought into play, simply blotted out the two London stations, also Droitwich, to my complete amazement, which leaves you an open field to tune in the numerous foreigners with the utmost ease.

Another startling development was reaction to the L.F. stage, a feature which will no doubt cause great controversy.

Just one more point. I thought that S.T.'s new dial was better looking than ever. No reflection, of course, upon Mr. Scott-Taggart's latest armchair photograph.

H. WILLS, 6, Lennox Gardens, Neasden, N.W.10.

THE EXTRACTOR—"UNCANNY."

Dear Sir,—In company with some other "fans," I have just had the privilege of a "pre-view" of S.T.'s latest product.

It is something quite unusual in design, all components being mounted on the back of the panel itself. The advantages of this will be obvious, in that all the wiring is short and direct, and in consequence can be measured easily from the blue print.

The most striking thing about the appearance of the set is the dial, which is the largest and clearest I have seen.

It is, in principle, a much improved form of the S.T.600's "Spot-on."

I had the opportunity of testing the set, and while in the time available it wasn't possible to get all the stations shown on the dial I have no doubt it is possible. The set is extremely sensitive and very easy to tune, and experience of S.T. sets has proved the probability of getting more rather than less stations than claimed by the designer.

A big improvement is the substitution of "audio" for ordinary reaction, as this not only considerably increases strength, but very noticeably improves quality on distant stations.

Another improvement is having the "Extractor" circuits in a separate case (though of course it could be included in the cabinet), which can be placed under the window ledge by the "lead-in" and, once set, forgotten. The way this Extractor cuts out the "twins" is uncanny. The quality of reproduction is tip-top, and the sensitivity such that a large number of

(Continued on next page.)

MORE READERS PRAISE THE S.T.700

(Continued from previous page.)

stations were coming in at "local" strength less than an hour after dusk. A final point that will commend the S.T.700 to earlier S.T. owners is that it will be much less expensive to convert their sets to the S.T.700.

CLAUDE R. S. ELFORD, 70, Lakeside Road, Palmers Green, N.13.

A WONDERFUL SET.

Dear Sir,—When you invited me to a demonstration of the S.T.700, I could not see it beating the S.T.600, but I was astounded at results. The three things that impressed me most were the Audio-Reaction, Triple Extractors and Auto-Dial. With the Triple Extractor it is possible to cut out the two Nationals and the Regionals, without interfering with other stations; it is a great improvement on the 600 Extractors. With regard to the Audio-Reaction, it is possible to bring out the speech 25 times greater. The Auto-Dial is a wonderful improvement on the S.T.600 dials—if you want a station you just swing the pointer round to it; a child could do it, as it is so simple; as for stations, we got dozens at full loudspeaker strength; on a 10-foot aerial indoors we got two dozen at full strength. To sum it up, I think it is a wonderful set. I for one shall make it, and shall advise my friends to do the same.

L. TUGWELL, 11, Princes Road, Holland Park, W.11.

STATION AFTER STATION

Dear Sir,—It was a great pleasure to be at your demonstration of the S.T.700 on Saturday evening, the 12th of October, 1935. The first thing that I noticed was the fine tuning chart on the front panel, which, when demonstrated, was the best, easiest, and simplest to use I have ever seen; it should be a boon to every wireless constructor. Next was the variable volume control from full volume down to a whisper without detuning, another great needed want.

When you started to tune I was amazed at the ease the London Regional and the National were faded right out, also Droitwich, with the aid of the Triple Extractor; once this was set, there was no need to touch it again.

As we went, tuning-in station after station at full loudspeaker strength while both National and Regional were working. This was at Central London, on about 45 feet of aerial; we received about 45 to 50 stations with ease, loud, clear, just like the local. We next tried a 10-ft. indoor aerial; all the principals were tuned-in at the same strength, all clear and loud, so it will work well on an indoor aerial as well.

But the biggest surprise of the evening was when you demonstrated the Audio-Reaction; this is to boost up the lower frequencies; it brings the music and speech right out clear; I think it is the finest form of tone control that has ever been invented, and every constructor will agree with me when he hears it.

I must congratulate Mr. Scott-Taggart on this wonderful set; it is one of the finest sets I have ever had the pleasure to listen to (and this includes mains sets). The tone, quality, and selectivity, are all that could be desired.

H. REDFERN, 3, Vespan Road, Shepherd's Bush, W.12.

QUALITY EXCELLENT.

Dear Sir,—The Auto-Dial is a great improvement on current practice, enabling the operator to tune the set with much greater accuracy

and ease than ever before. Also the set brings in so many stations that the Auto-Dial is essential for ease of tuning.

The quality of reproduction is excellent. I have heard sets costing 20 guineas which in this respect have been nowhere near as good as the "700."

The selectivity is more than adequate to meet any demands made on the S.T.700. Station after station came in without once overlapping.

The S.T.700 can give more volume of output than is comfortable in the average room, without in any way being distorted.

Seventy-five stations were tuned in on the "700" in sixty-five minutes. I can vouch for this because I wrote down all the stations obtained and made a special note of the time.

Now for the Triple Extractor. With this control both Droitwich and Midland were completely cut out, so that reaction had to be used to obtain them again. These stations then had to be treated like good foreigners. No one would have known that the "700" was working in a "swamp area."

Then came a demonstration of Audio-Reaction, with its wonderful effect on signal strength and quality. Believe me, it was rather startling.

For the first time it has been made possible, in the S.T.700, actually to build up the low notes without cutting out the top notes, an achievement that gives a new and startling effect to the tone, "building it up and giving a solidifying effect" to the quality of tone.

Again, Audio-Reaction actually increases signal strength 25 times, which was proved conclusively by testing meters.

The sensitivity of the "700" was conclusively demonstrated on an aerial of approximately 10 feet in length laid on the floor of the room. With this small aerial several stations were obtained at full loudspeaker strength.

The performance of this set is extremely high (to put it mildly), the cost very low. What more can any constructor ask for?

GEOFFREY W. REYNOLDS, 19, Wigorn Road, Warley Woods, Smethwick.

THE BEST FOUR-VALVER.

Dear Sir,—At your kind invitation I attended a demonstration of the S.T.700. As an amateur I have dabbled in wireless since the commencement of broadcasting, constructing many sets, but I can honestly say this is the best four-valver I have ever handled, and the tuning is simplicity itself.

M. SMITH, 38, Woodberry Way, Chingford, E.4.

CLEAR-CUT PROCESSION OF FOREIGN STATIONS.

Dear Sir,—My congratulations to Mr. J. S.-T. The clear-cut "proceSSION" of foreign stations at full strength is amazing—especially as your aerial is in busy London.

The simple tuning control—the set as a whole—should cause many owners of "supers" to think again.

A. W. SMITH, "Helios," Fox Lane, Palmers Green, N.13.

IT IS JUST WONDERFUL.

Dear Sir,—It was with interest I attended your demonstrations at 4 Kennoway Drive, on October 19th, and I must say that the S.T.700 has many surprising features which always hold the interest of the wireless enthusiast. I think that it is just wonderful, the Triple Extractor is the best method I have ever seen for cutting out the home stations and the selectivity excels, as has been the case in every one of the S.T. sets.

Wm. McMILLAN, 9, Kennoway Drive, Glasgow, W.1.

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They now so greatly improve the set as to make it comparable with up-to-date models. O.G. H.V. Valves give your set more sensitivity than any other. We have constructed all the previous S.T. Models with these valves and have hundreds of unsolicited testimonials proving the superiority of O.G. Valves—for their longer life, greater efficiency and cheaper consumption place these valves in an unrivalled position. NO Barretters, NO cut down Resistances, and NO Main Transformers required. There is a valve for every purpose and a guarantee for 6 months.

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TECHNICAL JOTTINGS

Items of Interest to Every Enthusiast.

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

An Interesting Microphone.

ALTHOUGH the microphone enters into the technical equipment of only a percentage of radio experimenters, it is nowadays used in large numbers of public-address systems and such-like apparatus. There is, of course, a microphone in every ordinary post-office telephone, but this is designed more for simplicity and robustness than for a very high performance response curve.

The carbon microphone is still the most widely used type for public address and kindred purposes, and in conditions where linear bass output and absolutely noiseless background are not essential it can be relied upon to prove perfectly satisfactory.

The usual type of carbon microphone consists of a solid block into which two electrodes are recessed, thin layers of carbon granules covering the electrodes and forming a conductive path between them, the granules being retained by a mica diaphragm. The electrodes are commonly made of carbon, and this is often very susceptible to the effect of grease or moisture.

When the Mike "Packs."

The carbon granules are hydrogen-activated, and if left open to the air they soon absorb moisture and the whole microphone tends to "pack," and so becomes practically inoperative.

I have just received particulars of the Reslo transverse-current microphone, which claims to have overcome all these difficulties. The carbon electrodes in this microphone have highly polished faces and are attached to brass backs. The layer of granules has a total area larger than usual, but so arranged that the maximum width does not exceed three-quarters of an inch; this enables the use of a 0.001-inch diaphragm without any tendency to bulge. In this way the joint is airtight and the microphone can be filled with granules in full view. The electrode, retaining collars and filling screw are sealed in position, and the instrument is then absolutely airtight.

The Hiss Level is Reduced.

With this microphone it is claimed that the hiss level is very low indeed, owing to the use of polished electrodes and the even pressure on the granules. The microphone is suitable for use in a humid atmosphere which would render ordinary types of carbon microphone inoperative.

The upper frequency response is claimed to be equal to the best condenser types up to 10,000 cycles per second, and there are no resonances. The impedance is roughly 500 ohms, and a matching transformer has to be used of a ratio of 15 to 1. The polarising current is 30 milliamperes.

Those of you who require a reliable microphone of this kind will be interested to know that the price is £2 2s., and the instrument can be obtained from Reslo Sound Equipment, 97, Hampstead Road, N.W.1.

Zworykin's New Amplifier.

Dr. Zworykin, of the R.C.A. Victor Company's Television Research Laboratory, has recently been demonstrating a new kind of radio valve. He calls this an "electronic amplifier." It is claimed to give an enormous stage-gain as compared with existing valves.

Inside the amplifier is a double row of electrodes, those in one row being connected with a preparation of calcium and acting as targets for the bounding electrons. Opposite each target is an electrode which supplies the electrostatic field, whilst around the outside of the bulb are permanent magnets which combine with the electrodes inside to control the electron flow.

From a cathode at one end of the bulb electrons are driven against the first target. As they hit the target the impact sets free other electrons, called secondary electrons. These new electrons tend to shoot off in every direction, but are herded back into the desired path by the combination of electrostatic and electromagnetic fields.

An Enormous Stage-Gain Obtained.

By properly spacing the successive electrodes, the augmented electron stream, gathering momentum at each impact, hops and skips from one target to the other in progressive steps. Starting with only a few electrons at the cathode, the stream becomes a sizeable current by the time it reaches the positive plate at the other end of the tube, and gains of several millions have been obtained from a tube with ten such stages.

This tube has already been used as an amplifier for photo-cells, and in one form it includes a photo-cell, thus combining in one unit the cell and the necessary high-gain amplifier.

Used With the Iconoscope.

The tremendous amplification of the tube, with its low noise level, makes it particularly suitable for use with the television camera or Iconoscope (with which Dr. Zworykin's name is particularly associated), where the minute impulses generated upon the mosaic of the sensitised surface must be built up many millions of times before they are sufficiently powerful to modulate a transmitter. In a demonstration of the tube, where the volume from the loud-speaker was sufficient to fill a large hall, it was shown that the gain was about five millions.

Have You Got It ?

I expect you have seen references in "P.W." and elsewhere during the past few weeks to the "Book of Practical Television." This has been prepared under the editorship of Mr. G. V. Dowding, Technical Editor of "P.W.," and he has had the services of a group of well-known specialists in the various branches of the television art to help him. As a result the book

(Continued on page 420.)

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WOBURN RADIO OFFER FOLLOWING GOODS :
W.R.C. Short-Wave condensers, with slow and fast drive, 0001, 00015, 00016, 0002, 00025, 0003, 0005, 2/-; Ormond two-piece dial for same, 1/-.
W.R.C. Short-Wave Plug-in Coils, 13-26, 29-44, and 40-90 metres, 4-pin, 2/6d., 6-pin, 2/9d. S.W. Chokes 10-100 m., 10d. Pye 4-pin S.W. valve holders, 6d. Eerie resistances all values to 2 meg., 6d.

WESTINGHOUSE H.T. 8 and 9 Rectifiers, 8/11d. Condensers : 01, 1 and 02, 6d.; 25, 9d.; 0001 to 0005, 5d. L.F. Transformers, 5/4 and 3/1, 2/6d. Mike transformers ratio 100/1, 2/6d. Popular iron-cored canned coils with circuits, 2/6d.

ELECTRIC Soldering irons, copper bit, complete with flex and adaptor, 1/11d., post 6d.—guaranteed. Electric Hair Dryers, 200/250v. fully guaranteed, 5 colours, 27/6d. Xmas Decoration Sets, 16 lamps and one spare, 2/9d., post 4d. Larger set with automatic flicking device, and two spares, 4/11d., postage 6d.

ROLA P.M. Speakers, 7 in. cone, power and pentode transformer, 16/6d., post 1/-.

W.R.C. ELIMINATORS. Owing to huge demand we cannot accept orders for delivery under 14 days. All guaranteed 12 months. 150 v. at 30 m.a. Three positive H.T. Tappings (60 v., 80 v., 150 v.). A.C. Model 21/-. A.C. Model with 2 v., 1 amp. Trickle charger, 32/6d., postage 1/- extra.

AERODYNE A.C./D.C. 4-v. sets, Curlew model, current model listed 12 gns., few only in cartons at 56 15s. 0d., carriage forward. A.C. 4-v. model 56 10s. 0d., carriage forward.

TRADE enquiries invited. Enclose trade heading and stamp.

WOBURN RADIO CO., 9, Sandland Street, Holborn, W.C.1 (Letters only), callers at shop, 2a, Hand Court, Holborn, W.C.1.

VAUXHALL.—Magnavox mains energised, 2,500, or 6,500 field coil, 10 in. cone, 17/6; 7 in. cone, 12/6.
VAUXHALL.—Magnavox permanent magnets, universal, suitable for Class "B," power or pentode, 10 in. cone, 23/-.

VAUXHALL.—Polar Midget 3-gang condensers, straight or superhet, 8/9; Polar full visions, horizontal or Arcuate dial and drives, 4/6.

VAUXHALL.—Polar drives horizontal station named scales, specially made for above, 1/9.

VAUXHALL.—Dubbler condensers, 4 or 8 mfd., dry electrolytic, 500v. working, 2/6; 50 mfd., 50v. working, 1/6; 50 mfd., 15v., 1/3; tubular non-inductive, 0.1, 6d.; 0.05, 6d., 0.002, 0.0002, 0.001, 0.0001, 4d. each.

VAUXHALL UTILITIES, 163a, Strand, W.C.2; over Denny's, Booksellers, Temple Bar 9338, or 56, Ludgate Hill, E.C.4. City 2553. Lists of 5,000 bargains quite free.

OUR CATALOGUE SAVES POUNDS BUT COSTS ONLY STAMPS THE SQUARE DEALERS, RADIO-MART, 19, JOHN BRIGHT ST., BIRMINGHAM.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, Second-Hand, &c.

(Continued)

SOUTHERN RADIOS WIRELESS BARGAINS. ALL GOODS GUARANTEED NEW AND SENT POST PAID.

FOX INDUSTRIAL 4-Valve Amplifiers. A.C. Mains 3½ watts Output with two tuning coils. For Television, Radio, Gramophone and Microphone. Chassis Complete less valves, 30/-. With four specified Ring Valves, £3/12/6. Specified Speaker for same, 15/-. **SPEAKERS.**—Blue Spot 1935 Series, with Universal Transformers to match any circuit. 99 P.M., 24/6; 45 P.M., 20/-; 32 P.M. In exquisite Cabinet, 42/6; (List 97/6); 22 P.M. in attractive Cabinet, 28/6; Mains Energised 2,500 and 6,500 ohms, 14/6; Celestion Soundex Permanent Magnet, 11/-; Telsen Permanent Magnet Speakers, 16/-; Telsen Speakers Units, 2/9. **LISSEN KITS ALL NEW IN SEALED CARTONS AND COMPLETE.** With Specified Valves: Lissen Skyscraper 3-valve Battery Kits, 42/- each (List 77/6). Lissen BAND PASS 3-valve Battery Kits, 62/6 (List 99/6). Lissen ALL-WAVE Four Valve Battery Kits, 65/- (List £5/12/6).

DEEMARK SHORT-WAVE ADAPTER KIT. Complete with all accessories for adapting set for 14-150 Metres, 20/-. Super-Het Short-Wave Converter Kit, 20/-.

MULLARD M.B.3 THREE-VALVE BATTERY SETS (Decoupled). Complete with 3 Mullard Pentode Valves. Permanent Magnet Speaker Batteries and Accumulator. Contained in handsome Walnut Cabinet £5/7/6 (List, 8 guineas). In original sealed cartons.

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ELIMINATORS.—Regentone 1935 Series. A.C. Mains, 200/250 volts, Type W5A, complete with trickle charger, 39/6; W1a (less trickle charger—carries 30 milliamps), 33/-; W1c (less trickle charger), 30/-. All in sealed cartons.

CONDENSERS.—Lotus 0-0005. Fully screened, with trimmers, escutcheons, dials and knob. 3-gang, 11/-; 2-gang, 7/3. Dyblock Single 0-0005, complete with all accessories, 4/-. Telsen Single Variable Condensers 0-0005, 2/3; Plessey 4-gang Super-het, fully screened with trimmers, 7/3. Igranite, 1-mfd., 1/3, 2-mfd., 1/9.

COILS.—Igranite Super-het. Coil, set of four (1 Osc., 2 I.F. with Pigtales, 1 L.F. plain), 9/- per set (List, 50/-). Varley Square Peak Coils, B.P.5, complete 2/3. Telsen Iron-core Coils, W.349 midget size, 4/6 each.

The following Telsen Components in original sealed cartons at sacrifice prices:

ACE L.F. TRANSFORMERS.—5/1, 2/9; Binocular H.F. Chokes, 2/-; Standard Screened H.F. Chokes, 2/-; Ace Microphones (P.O.) with transformers, 5/- each. This Microphone can be used with any radio set and is a very efficient article.

AMERICAN VALVES.—A full range of valves for all American sets at 7/- per valve.

SOUTHERN RADIO BARGAIN PARCELS.—We are offering the following parcels of mixed components at a fraction of their value. The items comprise up-to-date Radio parts, new and perfect, which are too varied to be advertised individually.

5/- PARCEL.—Contains modern components valued at 20/-. including Resistances, Condensers, Coils, Wire, etc. Circuits of modern Receivers included with each parcel.

20/- PARCELS.—This is known as the "small trader's" parcel, and contains a wonderful selection of components valued at 85/-. We have supplied this parcel to hundreds of Traders for re-sale at a profit.

SOUTHERN RADIO Branches at 274-275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2. All Mail Orders to 323, Euston Road, London, N.W.1. SOUTHERN RADIO, 323, Euston Road, London, N.W.1 (near Warren Street Tube). Phone: Museum 6324.

The following unused Set Manufacturers' Surplus. All goods guaranteed perfect; immediate delivery. ERIE resistors, 1-watt type, 7d.; 2-watt type, 1/2; Marconi 25 pick-ups, 22/6.

WESTINGHOUSE rectifiers, HTS, 9/6; HT9, HT10, LT4, LT5, 11/-.

MAINS transformers, 350-0-350v., 60 m.a., 4v.-4a., 4v.-2a., 12/6. Eliminators, outputs, 150v., 25 m.a., S.G. and detector. A.C. type with Westinghouse rectifiers, 25/-; D.C. type, 12/6. Collaro gramophone motors, 100-250 v. A.C., 34/-.

CONVERSION Units for converting D.C. Receivers to A.C. Mains operation up to 80 watts, £2 each.

ROTORHOM volume controls with switch, 2/6.

MAGNAVOX speakers, complete with hum-bucking coils, output transformers, etc., 152 (9-in. cone), 22/6; 154 (7-in. cone), 15/9. All with 2,500 or 6,500-ohm fields. Magnavox PM254, 18/-. Carriage paid, cash with order or C.O.D.

We can supply complete Kits of specified components for the A.C. S.T.600 at a competitive price.

WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

PLEASE BE SURE to mention "Popular Wireless" when communicating with Advertisers. Thanks!

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, Second-Hand, &c.

(Continued)

BANKRUPT BARGAINS.—All goods new. List free. Mullard's MU35 6v. superhets and battery MB3. Highest possible part-exchange allowances against these receivers. Just in, Ferguson 8v. superhets with 7 watts push-pull/output, 12-2,000 metres, every possible refinement, 11 gns., A.C. only. Zenth A.C. 7v. superhets, £7/4/0. Amplion 5v. superhets, 8 gns. Unitone D.C. 3 pentode receivers, 95/-. Ultra model, 55 universal, £5/5/-. Very large stock all radio goods. American valves, coils, transformers, motors, pick-ups, speakers. Write for quotations.—Butlin, 143B, Preston Road, Brighton.

BOYES BARGAINS.

TELSEN matched screened coil, 1/11; W. 68, L.F. choke, 40 hy., 1/6; 3-1 and 5-1 Ace transformers, 1/11; 40 hy. heavy-duty L.F. choke, 1/6; W. 74, binocular H.F. choke, 1/6; W. 340, all-wave scd. H.F. choke, 2/3; W. 132, .0005 air-dielectric var. tuning cond., 1/6; W. 63, multi-ratio O.P. transformers, 1/6 G.S. 4, L.F. transformer, super model, 3/11. Send 6d. for postage. Everything brand new in makers' boxes. Limited number.

BOYES BARGAIN PARCELS, containing 1 Igranite iron-core oscillator coil, 1 Igranite S.W. choke, 3 rolls wire, 1 grid leak and holder, 1 mains fuse and holder, 1 lightning switch, 2 small knobs, 1 battery cable, 6 Formo tag condensers, 6 Telsen tag condensers, 1 set engraved wander plugs, 1 double-range voltmeter, 20/- value for 3/6. Limited number. Send 6d. towards postage.

BOYES RADIO, LTD., Mail Order Dept., 49a, Shudehill, Manchester. 4.

HEADPHONES.—G.E.C., B.T.H., Sterling, Brown, Telefunken, Ericsson, Nesper, etc. 2,000 ohms, 2/6. 4,000 ohms, 5/-. Also above maker/brand-new, 5/-, 4,000 ohms, 7/6. Postage 6d. Every pair guaranteed. Trade supplied. Kodesh, 56, Barnsbury Street, London, N.1.

S.T.700.—Complete Kits, exact to specification, £3 4s. Od. A.C. version, £7 8s. Od. Radio Goods, lowest prices. Part exchanges.—Servwell Wireless Supplies, 64, Prestbury Road, London, E.7.

A THOUSAND BARGAINS. MAINS TRANSFORMERS, M.G. SPEAKERS, MAINS VALVES, SHORT-WAVE GEAR, CABINETS, ETC.

PREMIER SUPPLY STORES
20-22, HIGH STREET, CLAPHAM, S.W.4.
SEND 1½d. STAMP FOR CATALOGUE.

MISCELLANEOUS

CLEARANCE of second-hand guaranteed Sets and Components, including S.T.400, S.T.500, S.T.600, etc. Write for lists. Below—

S.T.700. We will take your old Set or Components in part exchange for a Peto-Scott S.T.700 first specified sealed kit. Cash balance only. Below—

CASH FOR YOUR OLD SET if you require a new 1936 Receiver on Easy Terms. Highest allowances; prompt attention.—R. Wigfield, Wireless Agent, Furlong Road, Goldthorpe, Yorks.

ROTARY CONVERTER, 220-v., DC/AC, for sale. Cost £15. Unused since overhaul by makers. What offers.—P.S.I., R.A.F., Biggin Hill, Kent.

LOUDSPEAKERS REPAIRED, 4/-. Blue Spot a Speciality. Transformers and Headphones, 4/-. Eliminators, Mains Transformers and Moving Coils quoted for. 24-Hour Services. Trade Discount. Clerkenwell 9069.—E. Mason, 44, East Road, London, N.1.

WANTED, good modern second-hand Sets, Parts, etc. Spot cash paid. Highest part-exchange allowance in the trade. Bring or send. University Radio, Ltd., 142, Drummond Street, London, N.W.1. Nr. Euston Station (L.M.S.).

SOEWS FOR S.T.700.—Complete set as specified. Brass, 1/3; nickel plated, 1/9. Specified S.T.700 kits, £3; 9; 6, any component supplied separately, at advertised prices. Immediate delivery, post free. B. Sullivan, 44, Park Lane, Croydon, Surrey.

REPAIRS.—Loudspeakers, transformers, headphones, all makes, 3/6. M/c speech coils, 4/6. Field coils, 5/6. Guaranteed twelve months.—Breeze, 82, Western Avenue, Ashford, Kent.

500 GLADIOLI, 3½-4-in. circ., in 10 best named vars. 50 Single Anemones, 50 Double Anemones, and 12 Lilium, for only 8/-. Carriage and duty paid to destination. (C.O.D. 6d. extra.)

P. WALRAVEN, Stationsweg, Hillegom, Holland.

500 GLADIOLI, first size 4-5-inch circ., in 10 named vars., 100 Anemones, 100 Ranunculus and 5 Lilium Regale for only 10/-. Double lot 19/- carriage and duty paid to destination (C.O.D. 6d. extra).

THE FIRST HILLEGOM BULB NURSERIES, Hillegom, Holland.

NEW RECEIVERS, COMPONENTS, ACCESSORIES, &c.

CLARION VALVES.—All brand-new; battery valves 2-volt, H.2, H.L.2, L.P.2, 1/9; super-power P.2, 2/6; screens and pentodes, 3/9; A.C. Mains: 4-volt 1 amp, general purpose, 3/9; power, 4/-; screens and pentodes, 4/6; full-wave rectifier, 3/6. Postage paid, cash with order, or C.O.D. over 10/-. Clarion Valves, Dept. 5, 885, Tyburn Road, Erdington, Birmingham.

"NORTHUMBRIA" All-wave A.C. Four, £7/17/6. Three, £5/15/6. Table Radiogram, £9/9/0. Catalogue from Novo Radio (4), Union Works, St. John Street, Newcastle-on-Tyne, 1.

SITUATIONS VACANT

G.P.O. ENGINEERING DEPT. No experience required. Commencing over £4 per week. Age 17-23. Excellent prospects. Free details of Entrance Exam. from

B.I.E.T. (Dept. 568), 17-19, Stratford Place, London, W.1.

PLEASE be sure to mention "POPULAR WIRELESS" when communicating with Advertisers. THANKS!

ADVERTISEMENTS

As far as possible all advertisements appearing in "Popular Wireless" are subject to careful scrutiny before publication, but should any reader experience delay or difficulty in getting orders fulfilled, or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

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TECHNICAL JOTTINGS

(Continued from page 418.)

comprises a complete survey of television theory and practice, and is not only right up to date and completely authoritative, but also is written in simple and lucid style. This latter condition, in fact, was one which was particularly laid down by the Editor, as he very wisely wished to get away from the complications with which television has hitherto been surrounded in the public mind, and to give a simple, clear and readable account which all could understand. I have had a very enjoyable busman's holiday reading through the entire book, and I can thoroughly recommend it to all those who are going to be interested in television when it comes along—and that means *all* of you!

Long-Distance Transmission.

When wireless waves travel over any considerable distance they usually make their way by reflection between the earth and one or other of the electrical layers in the upper atmosphere. It is obviously important for commercial purposes that we should have as clear and reliable a knowledge of these effects as possible, and for this reason a good deal of work has been going on to study the conditions which affect the long-distance radio transmissions and particularly the effect of the sun's rays.

Some Curious Electrical Effects.

The name of Heaviside has been associated for many years with this kind of work, and we have all heard of the Heaviside layer, which was the first and for a long time the only electrified layer in the upper atmosphere of which we had any knowledge. Since then Professor Appleton, of London University, has been very active in this field, and has discovered not only a second layer, which goes now by the name of the Appleton layer, but also other electrified regions still farther apart.

He has shown that the magnetic storms which continually take place in the Polar regions have a great influence on the transmission of radio waves, especially when, as frequently happens, such waves have to travel more or less in the vicinity of the Polar regions. In particular he has found that what we may call the normal action of the electrified layers in reflecting radio beams is liable to be completely upset by these magnetic storms, with the result that the layers, so far from helping in the propagation of the radio waves, actually absorb them.

The Sun's Rays.

It has been known for many years, of course, that the sun's rays, more particularly in the ultra-violet region, produce electrification in the atmosphere, and it seems that this effect influences long-distance radio transmission very considerably. Professor Appleton and his team of collaborators are doing yeoman service in unravelling these extremely complicated phenomena, and their work has a very direct bearing on radio communication throughout the world.

Loudspeaker Response Curves.

We talk a lot about the "response curve" of a loudspeaker, but I do not know whether we realise sufficiently that when the loudspeaker has done its best, or worst, it is the ear which really makes up for the defects in the reproduction, from whatever cause, and covers, so to speak, a multitude of sins. The ear is a most accommodating organ—just like the eye—and can adapt itself not only to enormous variations in loudness but also to flagrant imperfections in quality.

It is a well-known fact that if a person has some peculiarity of speech which makes it difficult to understand readily what he says, you can very soon get used to his speech and understand it perfectly. This simply means that your ear is quickly learning to accommodate itself to the peculiarities of the sounds and the ear, or the brain, if you like, translates these into terms of the proper thing.

Compensating for Amplitude Variations.

In the same way, if you hear a tremendously loud noise—traffic in the street or in the Underground—it does not cause you any serious inconvenience, although the

GETTING THE BEST FROM YOUR S.T.700

Special articles next week include :

YOUR AERIAL AND EARTH
FITTING EXTENSION SPEAKERS
INSTALLING A PICK-UP
H.T. FROM THE MAINS
etc., etc.

These articles, though specially written for the benefit of builders of the S.T.700, will be of great value to every set owner.

SO DON'T MISS NEXT WEEK'S "P.W."

USUAL PRICE 3d.

ON SALE DEC. 11th.

intensity—that is, the amplitude of the vibrations—may be millions of times greater than that of some of the smallest sounds which you can readily hear.

If the ear acted just like an ordinary acoustic apparatus it would be put completely out of action by vibrations of an amplitude so enormously greater than the minimum amplitude which it was designed to pick up.

Supplying the Missing Links.

One of the difficulties of judging of the quality of reproduction from the loudspeaker is due to the very fact that the ear is so kind, as it were, to sound imperfections. It supplies the missing parts, just as in a rough artist's sketch the eye, as is well-known, will supply or imagine unconsciously the parts which have been left out.

It is a well-known fact that with the ordinary telephone many parts of the speech sounds are missing—partly due to the imperfections of the instrument, but mainly due to the careless enunciation of the speaker—and yet we are, as a rule, able to hear and understand perfectly well because the ear fills in the gaps for itself.

permit of sound as well as vision transmission from the studio.

A Remarkable Studio.

The studio itself is one of the most remarkable of its kind. In no other part of the world has anybody ever realised the type of apparatus now used at Paris. Over 40 kw. are consumed by the lamps placed in the studio. To enable artists to work, in spite of the heat created by these, a special cooling plant has been provided.

Television takes place on a wavelength between 7 and 8 metres.

As suitable television receivers which are already being manufactured are still rather expensive, Monsieur Mandel, the French Minister of Posts, intends opening a number of public televiewing rooms in Paris before the end of the year.

The present transmitting outfit produces 1.5 kw. in the aerial at the top of the Eiffel Tower. A large new transmitter is already under construction which, it is hoped, will be completed next spring (1936). This transmitter will enable the aerial at the top of the Eiffel Tower to radiate with a power of over 10 kw. on ultra-short waves.

TELEVISION
BOOK

6

Printed in Great Britain and published every Wednesday by the Proprietors, THE AMALGAMATED PRESS, LTD., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices: John Carpenter House, John Carpenter Street, London, E.C.4. Registered for transmission by Canadian Magazine Post. Subscription Rates: Inland and Canada, 17/4 per annum. Abroad (except Canada), 19/6 per annum. Sole Agents for Australia and New Zealand: Messrs. Gordon & Gotch, Ltd.; and for South Africa: Central News Agency, Ltd.—Saturday, December 7th, 1935. S.S.

THE APPROACH OF TELEVISION

Popular Wireless & TELEVISION TIMES

Garry Allighan on
THE SPOKEN WORD

Alan Hunter asks
IS THE B.B.C. "TIME-CONSCIOUS"?

EVERY
WEDNESDAY
PRICE

3^D

No. 706.
Vol. XXVIII,
Dec. 14th, 1935.

INSTALLING YOUR NEW SET

*A Valuable Feature for All Listeners, Especially Those With
an S.T.700, which Includes the Following Articles:*

**YOUR AERIAL AND EARTH
VALVES AND VOLTAGES
FITTING EXTENSION SPEAKERS
USING A PICK-UP
H.T. FROM THE MAINS**

Also This Week :—

**HOW
MICROPHONES
WORK**

★ ★ ★

**AUTOMATIC
SELECTIVITY
CONTROL**



COSSOR *Quality*

SUPERHET RADIO

for

Battery & A.C. Mains Users

INCORPORATING the most up-to-date in Superhet practice these receivers employ a Pentagrid Frequency Changer in conjunction with specially designed coils, which ensure an exceptionally high degree of selectivity. A wealth of experience is behind these Superhets, and backed by the largest self-contained Radio factory in the Empire, they are above all RELIABLE.



Models 366A and 364

BATTERY MODEL 366A

With Pentagrid Frequency Changer, H.F. Screened Pentode I.F. Amplifier, Double Diode Detector and Economy Pentode Output. 8" Moving Coil Speaker. Cabinet with accommodation for suitable Accumulator and Battery. Price **9 GNS**

(Exclusive of Batteries)

H.P. Terms: 17/6 deposit and 11 monthly payments of 17/6.

A.C. MAINS MODEL 364

With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Detector, High Slope Pentode Output, Full Wave Rect., Thermometer Twin illuminated and detachable Scales. Combined On/Off, Wavechange and pick-up Switch, Volume Control. 8" Mains Energised M.C. Speaker. Complete with plug and sockets for extension Speaker and for pick-up. A.C. Mains only 200/250 v. (adjust.) 40/100 cycles. Price **11 GNS**

H.P. Terms: 20/- deposit and 12 monthly payments of 20/-.

A NEW MODEL

SEVEN STAGE

BATTERY MODEL 376B

Seven stages, Anti-fading circuit with Pentagrid Frequency Changer, Variable- μ H.F. Pen. I.F. Amplifier, Double Diode Det. High Slope Driver and Class 'B' Output. Single Knob tuning, sloping detachable scale. Four way combined On/Off, Wavechange and pick-up Switch: 8" Moving Coil Speaker. Cabinet with accommodation for suitable Accumulator and Battery. Price **£9.19**

(Exclusive of Batteries)

H.P. Terms: 17/- deposit and 12 monthly payments of 17/- or 40/- deposit and 12 monthly payments of 15/-.



The NEW Seven Stage Class 'B' Battery Model 376B.

To A. C. COSSOR LTD., Melody Dept.,
Highbury Grove, London, N.5.

Please send me free of charge, literature giving full particulars of the new Cossor Superhet Receiver *Model No.
* Please state Model required.

Name.....

Address.....

P.W., 14/12/35.....

THIS COUPON BRINGS FULL DETAILS



MANAGING EDITOR: N. F. EDWARDS.

TECHNICAL EDITOR: G. V. DOWDING, Associate I.E.E.

TOO MUCH JAM
CALLING U.S.A.
BURGHEAD

RADIO NOTES & NEWS

TAKE THAT!
RADIO LOVE
A HOT SET

Radio Inferno.

WRITING from Shanghai, N. B. S. says: "There is only one way to describe from the wireless point of view, and that is to call it Radio Hades." He says the stations—of which there are far too many—work with a fine disregard of one another's hours. Moreover, they pinch one another's wavelengths if so disposed, on the principle "I likee, I catchee."

Furthermore, three new stations are being installed, on medium waves alone, the respective call signs being X G O S (333 m.), X G O G (375 m.), and X G O H (536 m.).

In the postscript, N. B. S. assumes that I have never been to Shanghai, but there he is wrong; I bubbling well have—and all who know the city will take my meaning!

Society News.

HARK to the alluring cry of the Secretary Bird. The Radio, Physical and Television Society meets on the first, second, and fourth Fridays of the month at 8 p.m. Headquarters: 12a, North End Road, W. Kensington. Cordial welcome to all "P.W.-ites." Visits to various radio concerns are being arranged, and a trip to the B.B.C. is in contemplation. Moreover, it is hoped to build a Society transmitter, so short-wavers are received with open arms. And what is more, my hearties, this noble company of amateur enthusiasts serves coffee at all meetings. (No grounds for complaint.)

Full details can be obtained from the Hon. Sec., M. E. Arnold, 12, Nassau Road, Barnes, S.W.13.

Tests With the U.S.A.

ALL and sundry who can tune down to five metres should watch out for the interesting tests to be conducted with the U.S.A. from the Portsmouth Municipal College, station G 6 P U.

Telephony and Morse code will both be used, calling "TEST USA de G 6 P U." The experiments begin on Friday, December 13th, at 10 p.m., and continue till 1 a.m., ten minutes sending and five minutes listening alternately. The next day, Saturday, December 14th, there will be two test periods—10 a.m. to 11 a.m., and 10 p.m. to 1 a.m.

Mr. Albert Parsons, who is conducting the experiments, will welcome reports. The wavelength will be 5.18 metres, and it is expected that some interesting "echo" effects may be observed.

Here and There.

THE Japanese are planning to start television broadcasts, and it is hoped that a Tokio station will commence tests in the spring of next year.

* * *

The B.B.C. is to be represented at the forthcoming Paris meeting of the International Broadcasting Union, when a plan for the distribution of the short wavelengths among the nations will be under consideration.

* * *

Among the veteran cars that took part in the recent "Old Crocks" run from London to Brighton was a De Dion Bouton of 1904 vintage, on which car radio was installed. The owner-driver of this remarkable mechanism is Mr. E. A. Marshall, of Edgware, Middlesex.

Birmingham's Reserve.

THE Secretary of the Admiralty has been looking into his books, and now announces that a score of vacancies

A KEEN LISTENER



Captain Sir Ian Fraser, C.B.E., Member of Parliament for North St. Pancras, is a keen and critical listener. Here he is seen tuning in a programme on his set.

exist for the Royal Naval Wireless Auxiliary Reserve, in Birmingham.

Applicants must be between the ages of 18 and 35, and sons of British-born parents. There is a training centre at 5, Edgbaston Street, Birmingham, and applicants should look in there any Tuesday evening, after 8 p.m. Ask for the District Commander, R.N.W.A.R., No. 3 Division.

Welcome, Little Stranger.

DID ye no' hear the bonnie bairn o' Burghead? Unknown to listeners in the North of Scotland and the Isles, the B.B.C. suddenly decided to try out their new station at the end of November, shortly after the erection of the 500-ft. aerial at Burghead.

There was no introductory announcement, so when the newcomer started to fill the glens with music of unprecedented strength many an auld wife called the guid man in, to hear. Later, when the programme reverted to normal strength, the hope was widely expressed that the station's necessary overhauls would be short, and the full-strength programme would soon be inaugurated. So let us pray that come it may, as come it will, for a' that. . . .

Adolescence.

THIRTEEN is an awkward age, isn't it? So we must forgive the B.B.C. for being so *gauche* as to keep its recent birthday to itself; and reflect, instead, upon what a nice boy it has grown into since it first began as baby 2 L O, on November 14th, 1922.

It has been putting on weight nicely, ever since, as the following figures (representing listeners, in millions) will show. End of 1924, 1.1; end of 1926 (when the Company merged into the Corporation), 2.1; 1928, 2.6; 1930, 3.3; 1932, 5.2; 1934, 6.7. Who can guess the exact number of licences that will be in force at the end of this year?

Something to Yodel About.

THE opinion that Johann Sebastian Bach could shake a very pretty ivory or two is widely held to-day. The firmest adherents to that opinion appear to live in Switzerland, where Radio Geneva has announced its intention of embarking upon a complete presentation of Johann's organ compositions.

(Continued on next page.)

COMBINED RADIO SET AND ELECTRIC COOKER

A start has already been made and a total of forty concerts has been arranged, lasting till next July.

Well, the Swiss have always boasted of their eternal snows, but maybe this *magnum opus* will make them revise their ideas of eternity!

Take That!

A PROPOS my recent comment on the Wild West cowboy who pulled out a gun and shot up any loudspeaker that annoyed him, E. S. G., of Darlington, tells me that he has heard almost the same kind of thing.



He sends me a newspaper cutting describing a meeting of the Urban Council, to discuss an application for permission to institute a wireless relay service. According

to this report, a member said: "During the 1931 election I had a receiving set. When listening to the wireless results I became so disgusted that I put my fist through it!"

Some people might think this was unduly hasty, but in radio trade circles they look on it as delightful impulsiveness.

For Ever (Calling) England.

THE distinction of being the first ultra-short-wave transmitting station to be controlled and owned by a troop of Boy Scouts is claimed for Z L 3 H Z. It is situated in New Zealand, at North Beach, and is worked by Rovers who have determined to get radio communication with Imperial Scout Headquarters in London or bust in the attempt.

They have been trying ever since last May, but although they have contacted all sorts of places, including many American stations, they have so far failed to get the coveted connection. Stick it, Rovers!

FROM PETERBOROUGH CATHEDRAL

(Midland, December 21st.)

Once again for the first carol concert Midland programme-makers go to Peterborough Cathedral. Dr. Henry Coleman, Organist and Choir Master there, always produces an interesting programme. The carols chosen for the Cathedral choir include the old Basque carol, "Gabriel's Message," the old German carol, "O little One Sweet," arranged by Martin Shaw, and a number of English carols. In the last section is the "Carol of the Three Humble Creatures," composed by Dr. Coleman. He is to play Bach's Pastoral Symphony and two other organ solos.

Uncle Sam's Example.

THE Lighthouse Department of the U.S. Department of Commerce announces that ten new radio beacons are soon to be erected, to safeguard shipping in American waters. Three of them will be on lighthouses, and the other seven in lightships.

At present this go-ahead lightship service has no fewer than 108 wireless beacons in operation, a total which no other country can beat. Moreover, when the ten new beacons are added, every lightship under

U.S. jurisdiction will have its radio beacon. All honour to Uncle Sam for his hundred-per-cent navigational enterprise.

The French Programmes.

A FRIEND of mine, who has been wireless-operating for the past eighteen months in South America, tells me that what surprises him most, on coming back to European programmes, is the advance made by France. He recalls how it was possible to tune all over the medium waves and hear only two or three Frenchmen in 1934; but now they seem to be going Nap on all parts of the tuning scale.

He also told me that he had received Marseilles "coming in like a ton of coal" on 400.5 metres, immediately below Munich, at 11.45 p.m. Presumably the "coaling effect" is due to the new transmitter which Marseilles is due to be trying out now.

It Had to Come.

SOME of America's Middle West stations are now broadcasting love. Just love.

Daily at ten a.m., or thereabouts, a chap with one of those "dark-brown velvet" voices takes the air, whispering romantically



"Are you there, darling? We three are together again—just the radio and you, and your wireless lover: Put your ear close to

the loudspeaker, and let me whisper my love to you."

Ardently and gallantly he tells the lonely ladies just what they want to hear—how he adores their eyes, their dainty hands, and the way they do their hair. And do they lap it up? Oh, boy! The starved cat and the saucer of cream are outclassed from the get-away, and many of the dear things have a good cry every morning when the radio lover whispers good-bye.

Meanwhile, poor old Pop is on his way to the city, to earn some more money. And if ever Pop meets that radio lover the chances are that he will wring his gol-darned neck for him! The lounge lizard!

Good Work.

SIR BOYD MERRIMAN, President of the Admiralty Court, recently awarded £2,000 for "a very skilful and praiseworthy rescue from the pack-ice of the North Atlantic icefield in April last."

"This is a remarkable case," he said, "of a vessel which was salvaged without ever seeing the ship which salvaged her."

The London steamer *Tower Bridge*, holed and fighting incoming water with her pumps, sent an SOS from the icefield. It was picked up by (among other vessels) the *Newfoundland*. The latter vessel learning that the *Tower Bridge* was steering south, warned her that sixty miles of ice lay in that direction, but by steering east clear water would be reached in twelve miles.

The *Newfoundland* herself suffered damage to hull and propeller while shepherding

the stricken ship from a distance, but both vessels carried on, and now the owners of the *Newfoundland* have been able to carry off £1,500, her captain £200, and the crew a nice little £300. Yo ho, my boys, yo ho!

"ROUND THE NORTHERN PANTOS"

(Northern, December 20th.)

No less than five Northern theatres are to co-operate in the "Round the Northern Pantos" feature, to be broadcast on December 20th. From a central control point at Manchester, Victor Smythe, the Northern Outside Broadcast chief, will co-ordinate the output of some thirty microphones, with the result that Northern listeners will be able to hear pantomime rehearsals in progress all over the region.

Nothing But the Truth.

SURELY one of the queerest ways in which science has been applied is the one being tried in America, where they have developed an amplifier for detecting lies.

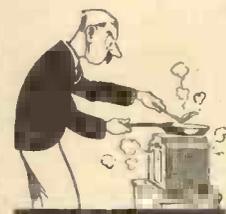
The idea behind this Ananias-indicator is that when anybody replies untruthfully to one of a series of questions fired at him, the mental and oral stress necessary to tell a whopper results in certain physiological reactions. The brain has to work with extra speed, the pulse quickens almost imperceptibly, and the simulated candour calls for a certain extra expenditure of energy on the part of the liar.

Powerful amplifiers have been designed to show up these reactions, and hard-case third-degree experts can now watch the needle to see how their shots are getting underneath the skin of the cross-examinee. Verily, the way of transgressors is un-cushioned nowadays.

A Hot Design.

I SEE that a man who was sued for the price of a radio set told the magistrate that it got so hot when switched on that he could cook eggs and bacon on it.

What the magistrate thought of that I don't know, but it seems to me that a set like that would be well worth paying for. Gentle heat and gentle music—what more does a fellow want this weather?



Television in Russia.

RUSSIA can probably claim to have the farthest north televisionaries, since a television outfit has been installed at Archangel. With this it is possible to hear and to see the Moscow television programmes.

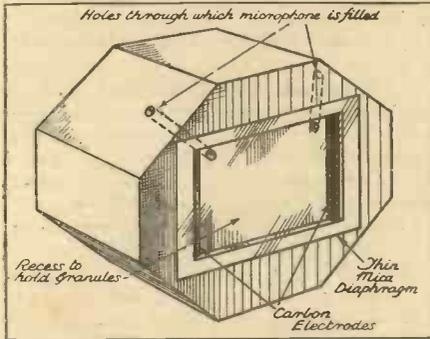
Moscow has been working on a high-definition system for some time, and now transmits sound from station V Z S P S and vision from R Z S. Another television installation for Moscow is now being prepared in the Leningrad factories.

ARIEL

How Microphones Work

AMONG the host of interesting things which must strike the visitor to Broadcasting House is the large number of different types of microphone in use there. And if the observer is fortunate enough to visit the headquarters of broadcasting on more than one occasion he will note that a continual change is taking place in the microphone equipment of the studios.

USED FOR TALKS



The Marconi-Reisz type uses very fine carbon granules.

No such thing as perfect reproduction can ever be attained, since the sound put into the microphone cannot be reproduced in surroundings which are so different from the original as the average listener's sitting-room is from the broadcasting studios. But the studios are so arranged that the transmission is one which suits most listeners' requirements.

Constant Research in Progress.

Echo is damped down by suitable wall materials in the studio and special furnishing; the microphones are carefully arranged to get the best possible pick-up. There is constant research in progress to make the transmissions as near perfect as possible, and the development of the microphone is one of the principal steps in this direction.

The ideal microphone would transform the sound vibrations in the air into electrical vibrations of the same form. But this is not possible because microphones are directional, because they are not equally sensitive to all the frequencies encountered, and because it is not possible to transmit electrically all the regions of sound intensity which occur in acoustical vibrations. But in recently developed microphones these effects have been reduced to a very low level.

Four principles are used for the transformation of sound into electrical vibrations. First, the resistance of a layer of carbon powder may be caused to change

By G. L. GRISDALE, B.Sc.

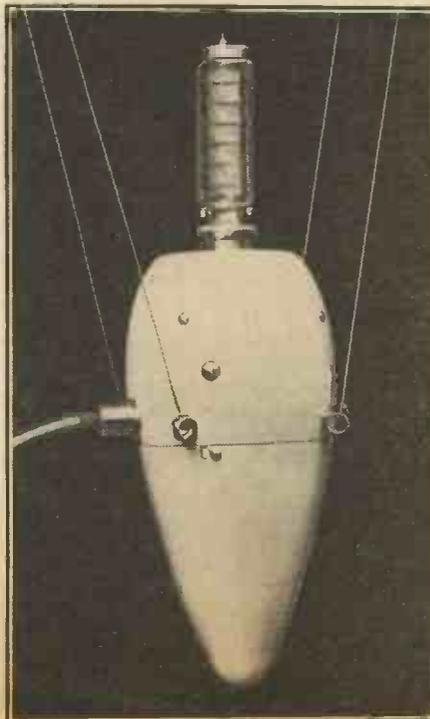
The microphone is the key to broadcasting. It can make or mar the whole process. So it is little wonder that this small instrument has come in for a great deal of attention at the hands of radio engineers.

with the sound pressure upon it. Secondly, a capacity may be altered by making one plate of a condenser vibrate. Thirdly, a wire, or a coil of wire, may vibrate in a magnetic field, and so set up a voltage in the wires.

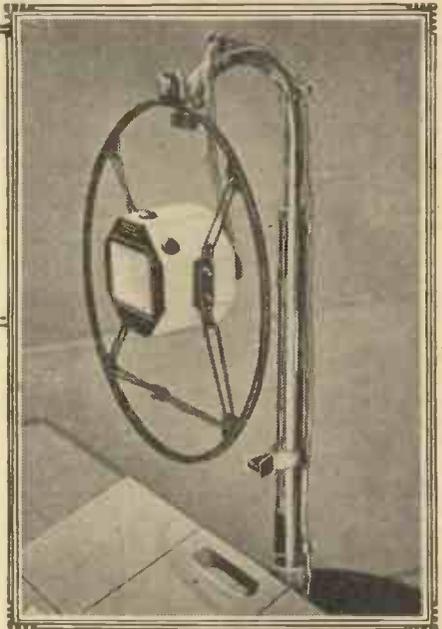
Three Types in this Country.

Lastly, a piezo-electric crystal, such as quartz or Rochelle salt, may be made to change shape with the incident sound waves, and a voltage will appear at its surface, which may be collected by means of electrodes. In this country the first three of these principles are used for broadcast microphones.

THE CONDENSER TYPE



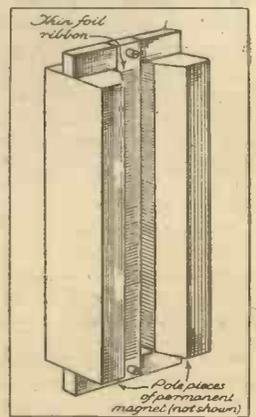
An Edison-Bell microphone with the special B.E.C. streamlined amplifier.



The carbon microphone is the oldest type still in use. It takes the form nowadays of the Marconi-Reisz instrument, which is a form of transverse current microphone. A rectangular recess about 1-16th inch deep is made in a block of marble and a carbon electrode is sunk in the block at each end of the recess, which is next covered by a mica diaphragm.

The recess is filled through a hole in the marble block with very fine carbon granules, and these are compressed and released between the diaphragm and the block by the sound pressure on the front of the diaphragm. This compression alters the resistance of the carbon layer between the electrodes, and this resistance change is transformed into a voltage change.

WIDE RESPONSE



This is a drawing of the latest ribbon microphone which introduces very little frequency distortion.

The current passes from side to side through the layer of granules, and for this reason this type of microphone is known as "transverse current." The microphone works off a 10-volt battery and a 30/1 step-up transformer is usually used with it.

Sensitivity and Hiss.

It is often found that microphones of good quality are very insensitive. The common telephone transmitter, which was the first type of microphone to be used for broadcasting, is very sensitive indeed, but the quality of the transmitted sound is very bad.

Judged by modern standards the Reisz microphone is fairly good as far as quality

(Continued on next page.)

PREVENTING EARTH PIN CORROSION

IN some soils, particularly those of a damp and mineral-containing type, the earth rod or wire of a receiving installation is peculiarly apt to corrode just at its point of entry into the ground.

This effect is, of course, due to electrolytic action at the point of contact of the metal and the ground. Chemical influences also come into play, the metalwork being chemically corroded owing to the action of air, moisture and the various salts in the soil.

Above the soil level and also below it the metal rod or wire will be found to be unattacked, the corrosion, as previously

stated, only being present at the point of entry of the metal rod into the soil.



Rubber tubing bound round the earth tube, and well covering the point of entry to the ground, will prevent corrosion.

Corrosion influences such as the above cannot be eradicated. Nevertheless, they may be rendered completely

powerless by the simple process of wrapping round the earth rod or wire at its place of entry into the ground a strip of rubber (one cut from an old bicycle or car inner-tube will serve excellently) or a length of wax-impregnated cloth or sacking, both of which protective coverings may afterwards be further protected by a layer of pitch applied by means of an old brush.

When applying the treatment, however, be sure always that the protective covering of the earth rod or wire actually penetrates the soil and is buried beneath it to a depth of three or four inches.

J. F. S.

AN ALL-WAVE MAINS SUPER

MANY of the superheterodyne receivers which are on the market this season are rather incomplete. They are fine little pieces of apparatus which stop short three-quarters of the way along the road towards what can be done when there is no building down to a price.

I have just had the happy experience of testing, under domestic conditions, a set, which has very obviously not been produced under such restricting influences, and one

which also has been designed and built by one of the world's largest concerns.

I refer to the "Philips" All-Wave six-valve superhet mains receiver Model 575A for A.C. only. Now this fine instrument costs £19 8s. 6d. but—and this is the point—it is completely satisfying. Maybe the price is above that which some can afford, but it offers convincing proof of the fact that it pays to buy the better model when you can do so.

In the case of the Philips 575A, for instance, there is that extra valve in a "pre H.F." stage denied to cheaper sets, and so the listener is given the station-getting advantages of super-sensitivity without throwing open a "front door" for mush of all kinds, as so often happens.

A Wonderful Receiver.

As a plain matter of fact, this Philips set is quite a wonderful piece of apparatus from this as well as many other points of view. It has the hum-free, mush-dodging quietness of a battery set of medium sensitivity, and yet above its beautifully quiet background you can tune-in on the one tuning control almost anything which is on the air in the way of broadcast programme.

And if you cannot find something which holds your attention in Europe on the medium or long waves you can flick over a switch, and on the same tuning dial with the same one tuning knob search the short waves for programmes from across the Atlantic and elsewhere.

There is variable selectivity, tone control and automatic volume control all serving all waves and rendering reception just as good as the finest radio engineering skill can make it. There is a three-watt output, and the quality is above criticism.

On some later occasion I hope to be able to tell you more about this most interesting and satisfying set.

G. V. D.

HOW MICROPHONES WORK

(Continued from previous page.)

is concerned, and the sensitivity is quite good. In practice about 50 millivolts, or about 1/20 of the average pick-up output, may be obtained on speech with a Reisz microphone. This is the voltage available after transformation for application to the amplifier.

The chief disadvantage of all carbon microphones is the large amount of background hiss. They are therefore of greater use for speech than musical broadcasts.

The condenser microphone has perhaps the simplest construction of all. A condenser is formed by placing a thin metal diaphragm in front of a solid electrode in the form of a metal plate. When the diaphragm vibrates with the sound pressure the capacity of the condenser changes, and these changes can be transformed into electric vibrations.

The thin electrode is usually stretched duralumin, the tension being such that the resonance of the diaphragm is above the highest frequency to be transmitted. Due to the fact that the diaphragm is stretched so tightly it cannot vibrate with a very great amplitude, and the sensitivity of the micro-

phone is not great. For this reason the microphone is very prone to exterior interference, and an amplifier must be used at the microphone itself.

Long leads to the microphone are out of the question unless this is done. The amplifier is enclosed in a cylindrical metal shield in many cases, but in the case of the B.B.C. instruments the microphone is built with the amplifier into an egg-shaped container.

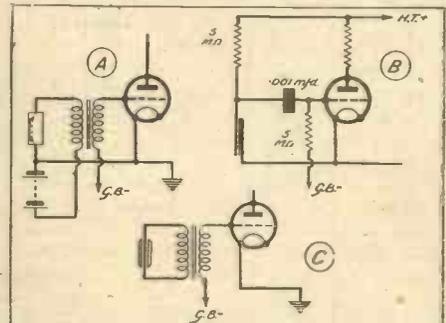
The Latest Designs.

The most modern development in microphone technique is the use of the moving-coil or moving-wire principle. In chronological order the moving coil comes first. The E.M.I. moving-coil microphone is really like a small permanent magnet moving-coil loudspeaker used backwards.

In appearance it looks like a small black cylinder, some 6 in. long and 2 in. in diameter. There is a grille at one end through which the sound passes on to the diaphragm, the leads being taken out at the other end of the casing.

No pre-amplifier is needed close to the microphone as with the condenser microphone, as the moving-coil system is more sensitive, but at the same time the response is not uniform at all frequencies, and the irregularities are smoothed out by a correc-

CONNECTING THEM UP



Three methods of coupling microphones. A is the carbon type, B the condenser, and C the moving-coil variety.

tion circuit in the amplifier. With this system a really high degree of fidelity may be obtained.

The most up-to-date thing in microphones is the new B.B.C. ribbon microphone, which was seen at the Olympia variety shows and at the recent Prom. season. In external appearance this microphone is quite large, looking like a flat box. The principle is similar to that of the moving-coil microphone; a flat ribbon is hung between the pole pieces of a permanent magnet, so that when the ribbon vibrates a voltage is set up between its ends. The ribbon is a very light strip of aluminium alloy.

Useful Directional Characteristics.

The resistance of the microphone is naturally very low, and so a high ratio step-up transformer must be used.

The main feature of the ribbon system is the lack of frequency distortion and the useful directional characteristics. No sound is picked up from the side of the microphone, maximum response being from the front and back. Both sides of the microphone may be used. The frequency range of the microphone is from just over 20 cycles per second to about 10,000 cycles per second.

INSTALLING YOUR NEW SET

Your Aerial and Earth

In this and following special pages we provide valuable information regarding the installation of battery receivers, with particular reference to the S.T.700, although the articles are, of course, widely applicable to all other types.

Conducted by A. JOHNSON-RANDALL

THE popularity of the S.T.700 is spreading throughout the length and breadth of the country like a prairie fire, and thousands upon thousands of enthusiastic constructors are loud in their praises of Mr. Scott-Taggart's latest masterpiece. And little wonder, for never before in the history of radio has the home-constructing fraternity been afforded such a unique and golden opportunity of building a set that has no equal the world over—a design that is indeed *the Set of the Century*.

The Question of Accessories.

The imminence of the seasonal festivities and the desirability over that period of radio at its very best have resulted in a most marked increase in the average weekly number of recruits to the "better radio brigade"—that vast multitude of listeners who already own S.T.700s; and with a view to assisting all those who are working to get their sets finished in time for Christmas, it is proposed on this and following pages to deal with the question of accessories.

We should perhaps make it quite clear that the whole of this survey is based upon Mr. Scott-Taggart's original list, from which no variations can in any circumstances be recommended. In fact, in venturing upon this all-important question of accessories it is not our intention to attempt the impossible by amplifying what the designer himself has already written. It is our object merely to give guidance upon the broad question of accessories in general and upon one or two extensions and adaptations in particular.

And while our remarks—which will inevitably be to some extent an amplification of what has already been covered—are primarily intended for the latecomers, it is no doubt a fact that many readers who are at present enjoying the manifold advantages of S.T.700 radio will welcome the opportunity of learning how best to fit an extension speaker, the procedure necessary for the fitting of a gramophone pick-up, and so on.

But first, to start at the logical beginning, for some details concerning aerial and earth equipment.

It may perhaps seem a little strange in these advanced days even to mention the question of aerial and earth equipment, for it may be argued that there must surely be few readers who do not already possess an aerial and earth of some sort. But is it not equally true that because they are so often taken for granted and do not, in consequence, come into the picture, they are apt to be the most sadly neglected part of all the radio equipment?

When did you last overhaul *your* aerial and earth? If you are anything like most of us, it was probably so long ago that you will not be able to remember! And does not such a magnificent set as the S.T.700 deserve your attention to the aerial and earth?

One is rather apt to trade upon the fact that the S.T.700 is so amazingly efficient and to assume that that efficiency will make up for the deficiency of a neglected aerial and earth. Well, it will! It is so extraordinarily sensitive that it will work with pretty nearly anything. But is that

quite fair either to the set or to the designer?

If your aerial and earth have been subjected to the ravages of time it will pay you hand over fist to give them an overhaul before you try out your new set. No great elaborations are called for in a straightforward overhaul, and are, in fact, quite unnecessary if your present arrangements conform more or less to average conditions.

The Graham Farish "Filt" earthing device ensures a good damp earth contact even in the driest of weather.



What is really wanted is a good old clean up of insulators, the removal of cobwebs and similar "current thieves," and the renewal, where necessary, of frayed or corroded wire.

So much has been written concerning the correct procedure when erecting an aerial that it seems hardly necessary to go over the ground again. But here is just one hint in season. Our climate at this time of year is decidedly unfriendly to exposed wire, and if you must have a join between the aerial and the down-lead, do take steps to ensure that it is a joint that will stay put, in the electrical sense, either by soldering or by tight binding. Best of all, make your aerial and down-lead all one piece, and then the question does not arise.

Suitable Types of Wire.

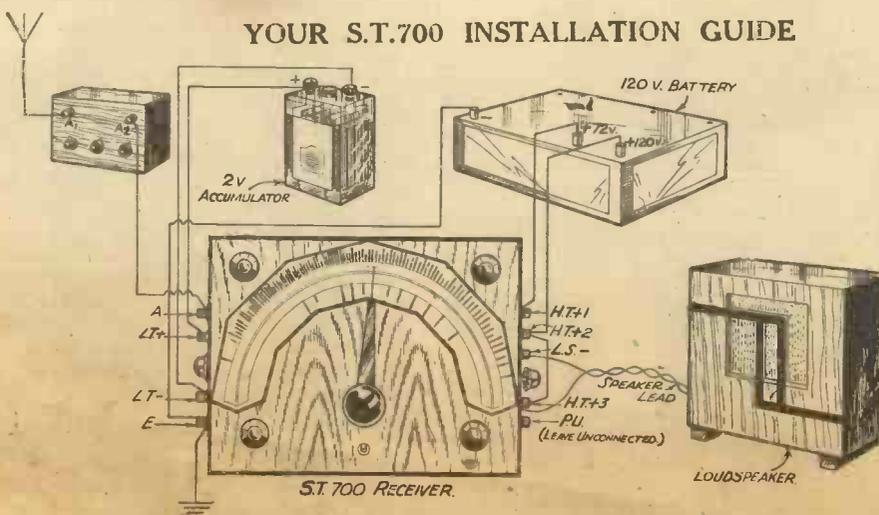
If you are in doubt as to the type of wire to use, assuming that your existing wire is due upon examination for the dump heap, you would be well advised to use either Aerialite "Levenstrand" or Electron "Superial," both of which were given in Mr. Scott-Taggart's list of optional aerial and earth equipment.

As a matter of fact, these two types of wire are also eminently suitable for use as indoor aerials where the erection of an outdoor one is not possible or desirable.

Electron "Superial," which is sold in boxed lengths, is available in 25, 50, 75 and 100-ft. coils, and the prices are 1s., 1s. 9d., 2s. 6d., and 3s. 6d. respectively.

(Continued on page 428.)

YOUR S.T.700 INSTALLATION GUIDE



This sketch shows how the various accessories are connected to the S.T.700.

VALVES AND VOLTAGES

Constructors of the S.T.700 will find the following results and advice on the battery power supply and the valves of particular interest and assistance.

JUST as the strength of a chain is only that of its weakest link, so the efficiency of a radio receiver is limited by the power supply. No matter how good a circuit, nor how well chosen and arranged the components forming a radio receiver, the whole operation of the outfit can be made or marred by the power supply. Given plenty of good clean L.T. and H.T., to say nothing about grid bias, the set will provide its maximum efficiency. Stations will roll in and the entertainment provided by the set will be plentiful.

But give that same set a halting H.T. battery and a lame L.T. supply and the

IDEAL FOR YOUR SET



An Exide indicating battery which shows at a glance the state of the charge.

result is a very different story. Gone will be the long range reception, and what stations are tuned in will have their programmes marred by distortion and, in all probability, crackles. The set is a mere travesty of its former self.

Not a Critical Design.

And so will it be with your S.T.700 if you do not do it justice in the way of battery power supply. The S.T.700 is not a critical set where battery voltages are concerned, and will work quite well with its H.T. below the maximum figure of 120 volts. But to get the best out of the set you should start with 120 volts from a new battery, choosing one that will not run down too quickly and so will give long life and efficient operation of the set for a considerable time.

It is false economy to buy unknown H.T. batteries just because they are cheap in price. They do not usually last even a reasonable length of time commensurate with their low cost. The result is that you pay more for your power in the long run and you do not get the full efficiency out of your set. A good make of battery, however, will give clean power and hold up to its voltage for a long time, resulting in efficient operation of the set and trouble-free reception.

I have said that the S.T.700 is not critical in its H.T. voltage. That is, it will continue to work well even when, due to long use, the H.T. has begun to drop below its maximum 120 volts. But the set will not remain free from crackles and noisy reception after the voltage has begun to drop unless you have bought a good reliable make of H.T. battery.

Batteries To Choose From.

And 120 volts of good reliable power can be obtained from a number of makers. There is, for instance, the Ever Ready "Super" battery with its low cost of 10s. 6d., or the Lissen "Super" at 12s. 3d. If you want even longer life from your H.T. you can use a Super power type Lissen battery, which costs 16s., and it is well worth it.

These two do not exhaust the choice, of course, there are Drydex "Super Life" batteries at half-a-guinea, or, better still, the Orange Triangle type for 16s. G.E.C. have a fine Triple Capacity 120-volt battery for 16s., and this will do excellently for the S.T.700. The unique accumulator-charged Milnes

Wet H.T. is also worth considering. Where L.T. is concerned it is best to get a battery that is able to stand up to the discharge for a fairly long period without requiring recharging. The valves in the S.T.700 like a total L.T. current of about 6 amp. So if you get a battery of 20 actual ampere hours you should get about 30 hours working from it for each charge. That is a reasonable size of battery to buy, for it will not require charging too frequently and is a convenient size to carry. You can get a bigger one if you wish, of course.

Working It Out Yourself.

It is a good plan to work out for yourself your requirements in L.T. Assuming 6 amp. is the set consumption, you divide this into the actual ampere-hour capacity of the battery. This gives the absolute maximum you could theoretically get out of the battery in hours per charge. In reality you get a little less.

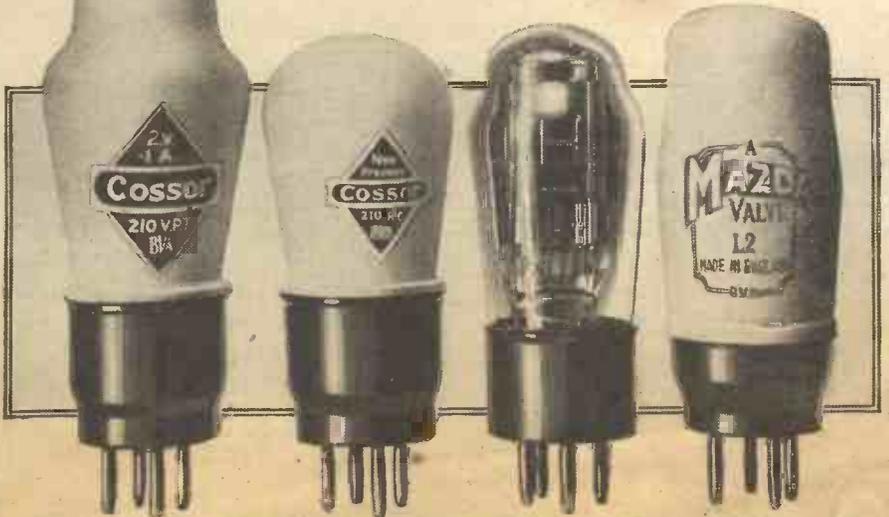
And as for batteries—well, there are scores of good 2-volters to choose from. Exide—I particularly like the indicating type which shows at a glance the state of charge—Fuller, Lissen, and plenty of others. I should get two smallish ones rather than one big one, so that while one is being charged the other can be in use.

As regards grid bias there is little to be said except that the make should be a good one and, though you may not think it, a grid-bias battery does gradually run down, so keep it tested for voltage and change it when it is down more than a couple of volts. If you have to change your H.T. battery and the grid-bias battery is down, change that, too; it's not good for the valves to run at less grid bias than that specified for the given H.T.

And mentioning valves reminds me that these are just as important as the batteries. Keep to the list given last week if you want to be sure of things. If you consider using other makes, be certain that they are suitable for the set, for you want the full efficiency of which that set is capable. Therefore, go warily if you do not keep to the official list—and don't blame the designer if your results are not what you expected.

K. D. R.

THESE ARE THE CORRECT VALVES



The team of valves recommended by the designer for the S.T.700. The third valve is the Hivac output valve, the PK230.

JUST because you happen to be the lucky (or wise if you prefer it) possessor of an S.T.700, there is no need for you to be selfish over it. Let other members of your household share the pleasures that the set will give, not only when the said members happen to be in the same room as the receiver, but when they are in other parts of the house. In other words, fit one or more efficient extension speakers to your S.T.700 and flood the house with the entertainment it will enable you to receive.

The extension speaker is being used more and more widely in this country, and rightly so. It is the most convenient method of obtaining radio in as many rooms as you desire, but with less expense and greater convenience than would be entailed by the installation of further receivers.

Easy To Fit.

With the set installed in one room it is easy to run leads from it to other rooms in the house so that speakers may be fitted as required. There is no need for the volume from the set to be cut down if one or two extension speakers are used, provided that they are properly matched with the speaker used on the set. And the following remarks

FITTING EXTENSION SPEAKERS

Why not extend the enjoyment of your S.T.700 by fitting extension speakers so that you can listen in any room in the house? Here are some details on the subject which you will find extremely useful.

matched sufficiently closely to go with any other type or make of moving-coil speaker you may be using.

The latter way is the simplest, and in many respects the better of the two, for it allows you to change your mind about the method of connection of the extension speaker to the output of the receiver, and should you change your speaker on the set, the extension speaker will still be suitable.

In the case of the S.T.700 there are two ways of connecting the extension speaker: across the primary of the main speaker—i.e. to the H.T. + 3 and the L.S. terminals of the set, or across the secondary of the loud-speaker transformer, that is, the speech coil.

Of the two, probably the second is the better, for it allows the H.T. path to be limited to the immediate vicinity of the set without having to arrange for any blocking condensers. If you decide to connect your extension speaker across the primary of the "main" speaker, then do it as shown in the sketch, with a couple of 2-mfd. condensers (250 v. working) to isolate the H.T. from the extension speaker leads.

Obviating H.T. Leakage.

This is far better than allowing the D.C. anode current to flow all over the place through the extension speakers, and obviate any risk of H.T. leakage due to faulty or badly laid extension leads.

If you use a W.B. extension speaker you will find it can be connected in either of the two ways just mentioned, and by means of the plugs or switches on the back can be matched up with the other speaker in a jiffy.

Blue Spot provide a system of terminals or plugs and sockets according to whether you use the Popular or Senior models, enabling the speakers to be matched up closely. Amplion also provide easy matching devices on all their speakers.

The famous Wharfedale extension speakers can be obtained in several types, Type 32 being most universally adaptable and being suitable for the set in question if you decide to connect it across the primary of the main speaker—i.e. to the H.T.+3 and the L.S.— terminals on the set. If you decide to connect to the speech coil or secondary of the set speaker you will need the low-resistance type of speaker. It is advisable to get in touch with the speaker makers before you make a final choice.

If you favour Rola you should write to the makers and tell them exactly what you wish to do, when they will supply you with a speaker correctly matched for the task.

As regards the extension leads themselves, these should be of good quality and well insulated, for any form of leakage must be avoided, even though H.T.

is not exactly "flowing" through the leads. Many special types of wire are made for extension speaker purposes, some of them remarkably flat so that they may conveniently be run along the skirting boards of the rooms or even under the carpet.

Bulgin turn out a very useful complete extension speaker kit, including neat wall plugs and sockets, a good length of well-insulated twin wire, and even the rubber insulated staples for fixing the wire firmly in position.

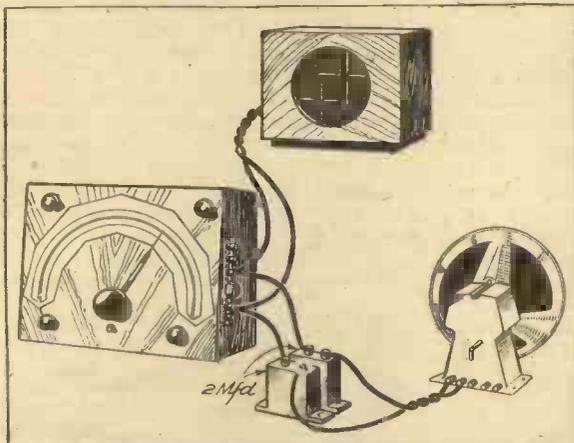
Adjusting The Volume.

The connecting of extension speakers is the easiest thing in the world, and there should be no snags whatever provided you make sure—by writing to us or to the speaker makers when in doubt—that you match your extension speaker or speakers closely with that used close to the set. If you go on adding extension speakers all over the house, you must expect to have to put the volume control up a little more than usual in order to retain the same volume that you have when only one speaker is used; but, as I said before, just one, or perhaps two extension speakers properly matched will make no audible difference to the power from your set.

But do not forget this. The matching is important, and so is the laying of the extension wire. Keep this well out of the way of damp places, never run it out-of-doors, unless special wire is used, and run it so that people will not walk on it, let alone trip over it.

K. D. R.

HOW TO WIRE IT



When an extension speaker is directly connected to the output terminals of the S.T.700 two condensers should be interposed to prevent H.T. being fed through the extension wires.

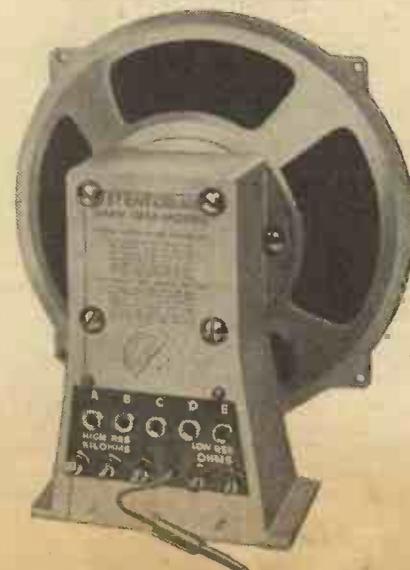
apply equally well for the most part to sets other than the S.T.700.

The choice of the particular loudspeaker that is to be used as an extension must be left to the individual set owner, but he must be careful that he chooses a speaker that can be matched to the one he is using on his set.

The Question Of Matching.

There are two ways of doing this. One is to ask the makers of any speaker you fancy for an extension model that will suit the speaker on your set, telling them the type of output valve you are using. The other is to use a speaker that is fitted with adjustable matching devices, such as the W.B., when you can be sure of getting it

A GOOD EXAMPLE



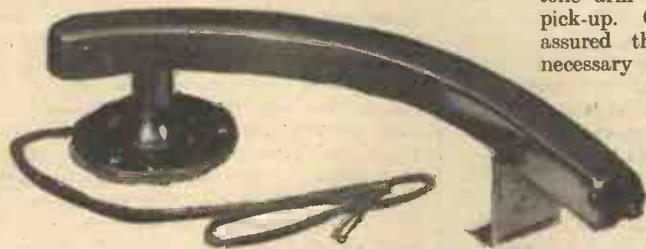
The W.B. Stentorian Baby has a series of sockets for matching purposes. It costs only 23s. 6d.

THOSE who have built or are building the S.T.700 will have observed that Mr. Scott-Taggart has made provision for the use of a gramophone pick-up in order that constructors may utilise the L.F. side of the set for the electrical reproduction of gramophone records.

This method of playing records is far superior to the ordinary acoustic method, in which a sound box is employed, giving much better tone, especially on the bass notes.

The connections for a gramophone pick-up are clearly shown in the theoretical diagram of the S.T.700 which appeared in the November 2nd issue, and also last week. A pictorial diagram appears on this page.

Those who already have one of the ordinary acoustic gramophones can, in most cases, fit a pick-up by the side of the existing turntable. Often there is no need to remove the sound box and tone arm in order to find room for the pick-up. With many of the cabinet types of acoustic gramophones there is adequate space for



The B.T.H. Pezoelectric pick-up—one of the types marketed by the Edison Swan Electric Company.

both sound box and pick-up on the turntable mounting.

By using the existing gramophone the expense of installing a pick-up is considerably reduced, because otherwise it would be necessary to purchase a turntable and motor as well as a pick-up.

There are a number of excellent gramophone pick-ups on the market, and provided the makers' instructions are followed in regard to tracking, there is no fear of rapid record wear. As a matter of fact, the modern pick-up is very light on records.

Some Suitable Makes and Types.

One very well-known gramophone pick-up is the "B.T.H." The makers of this particular component have had many years of experience in pick-up design, and constructors of the S.T.700 can purchase either of the following types supplied by this firm with confidence.

The least expensive in the B.T.H. range is the "Minor." Retailing at one guinea, this model is equipped with a volume control embodied in the tone-arm pedestal, and the component is finished in brown bakelite.

Recently the same firm has brought out the Pezoelectric model. This pick-up has many advantages, among them being freedom from amplitude distortion and resonance effect: It is a very high quality job and, moreover, is very sensitive. The price is two guineas.

The Graham Farish Company market a very moderately priced pick-up. The response curve is definitely a good one, and is designed to fall away fairly sharply at

about 4,000 cycles in order to minimise needle scratch. The low note response is also very good. The price, complete with volume control, is 18s. 6d., or without volume control, 14s. 6d.

At this stage we would remind constructors that in many cases where the volume control is integral with the pick-up itself—

USING A PICK-UP

Here are some hints on the choice of a gramophone pick-up and turntable for your new set

that is to say, where it is actually embodied in the tone arm pedestal—there will be only two leads going from the pick-up. One will go to the pick-up terminal on the S.T.700 and the other to the G.B.—1 socket on the grid-bias battery.

In some cases there may be a third lead for connection to earth. This is to earth the tone arm and metal parts of the pick-up. Constructors may rest assured that they will find the necessary instructions given in the makers' leaflet.

The Marconiphone Company include a pick-up in their range, giving an average output of $1\frac{1}{2}$ volts, a figure denoting high sensitivity. And there is also the Garrard pick-up made by the well-known

makers of the Garrard gramophone motors. Both the Garrard and the Marconiphone pick-ups are priced at 32s. 6d.

When a separate volume control is used, this can be mounted near the turntable and the connections will be as shown in the sketch on this page. The resistance of a gramophone volume control is not very critical, although it must not be too low, otherwise it will reduce the voltage across the pick-up and probably the high-note response. Generally speaking, a value of 100,000 ohms is a safe figure, but it should be remembered that the pick-up makers often specify a particular value, in which case this should be adhered to.

If you haven't already got an ordinary acoustic gramophone which you wish to utilise, then it will be necessary to purchase a turntable unit. In the Garrard range will be found both clockwork and electric turntable motors. And these, of course, are readily obtainable with the necessary turntable and speed indicator—in fact, all ready for mounting in a home-built cabinet. Those who are not on the mains—and this will apply to a large percentage of S.T.700 constructors—will naturally choose a clockwork motor.

An Inexpensive Motor.

In the Garrard range a good high quality motor is available for 17s. complete with all the necessary equipment and ready for mounting. You will not have any difficulty in fitting the pick-up to the motor-board because when you buy your pick-up you will also be supplied with a template giving

the measurements between the pick-up and the centre of the turntable.

You must follow these measurements very carefully, otherwise you will get the pick-up out of track and rapid record wear will probably result.

You will remember that when you use a pick-up with the S.T.700, you must first of all adjust the main tuning control in a position where no broadcasting is coming through, otherwise you will hear a mixture of broadcast programmes and gramophone records together in the loud-speaker.

Make sure also that the volume control on your S.T.700 is at its minimum position, that is, turned fully anti-clockwise. When radio is to be received again, the external wire going to the pick-up terminal should be disconnected from it.

A. J. R.

YOUR AERIAL AND EARTH

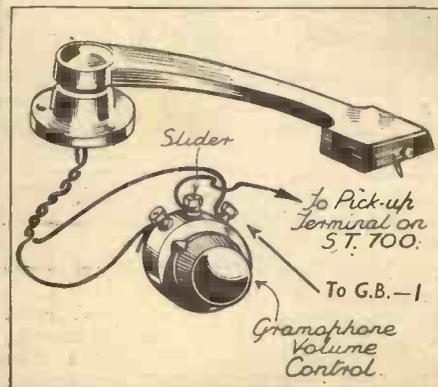
(Continued from page 425.)

Aerialite "Levenstrand" is also sold in cartons in the same lengths and prices as above, with the exception of the 25-ft. coil, which in this case is not available.

Incidentally, if you buy a coil of aerial wire slightly longer than is actually required, you can use what is left over for your earth lead. This must be taken either to a convenient water-main pipe or, as is more usually the case, to the nearest "direct" earth point to your set.

The point where your earth lead joins the earthing device is a particularly vulnerable spot in the case of an "earth" earth, and it is one which requires fairly regular attention. That is why it is very desirable to have a robust terminal at this point, for

SIMPLE WIRING



How a pick-up and external volume control are connected to the S.T.700.

it does enable you periodically to remake the connection with the minimum amount of inconvenience and trouble.

The Graham Farish "Filt" earthing device is a particularly useful accessory when contemplating the overhaul of your earth, for, in addition to providing a sturdy terminal for connection, it contains certain moisture-attracting chemicals which ensure a perfect earth under all climatic conditions. It costs 2s. 6d.

G. T. K.

ANY battery set, provided it is stable and adequately decoupled, will work from a mains H.T. eliminator. Some of you may not know what an eliminator is. It is a small unit equipped with smoothing chokes and condensers, together with resistances, which is plugged into a convenient wall socket or lighting point, so that the high-tension current for the valves can be obtained directly from the mains supply.

An eliminator takes the place of the H.T. battery, and the H.T. wander plugs on the set are connected up to it in precisely the same manner as in the case of the ordinary H.T. battery.

On the battery eliminator will be found a number of sockets clearly marked so that you can tap off the correct voltages for your valves. There are two kinds of eliminators. One type is intended for use on alternating-current mains, and the other for direct-current mains.

Connected Like H.T. Battery.

In size an eliminator is comparable with an ordinary H.T. battery. There is very little difference between them in so far as the actual physical dimensions are concerned, and therefore in sets which are of this self-contained type—that is, those which have the H.T. and L.T. batteries in the cabinet—it is usually possible to place the eliminator in the position previously intended for the H.T. battery. Some eliminators are also provided with what is called a trickle charger. This is a device which, by means of a switch on the eliminator, can be brought into circuit so as to charge an L.T. accumulator at a very low rate and so do away with the necessity for sending the L.T. battery to the charging station.

Many constructors prefer this type of unit, but it must be remembered that it is slightly more expensive than the type intended for supplying H.T. only.

The S.T.700 is admirably equipped for use in conjunction with a mains unit and Mr. Scott-Taggart has already given the connections for two well-known makes (see November 16th issue).

So far as the actual running costs of an eliminator are concerned, these are extremely low, and a mains unit is definitely an economical proposition.

Current Considerations.

As in all other commodities it pays to buy a unit of reputable make, and, moreover, you should see that the particular type of unit you choose is suitable for your set.

We mention this because eliminators are made in various models and are rated in accordance with their current outputs. For example, one model may have a maximum output of 10 milliamps or so. But also in the makers' lists will be found models giving outputs of, say, 20 to 30 milliamps.

What you have to do is to make sure that the particular model you purchase is the one which the makers consider suitable for your particular set. Naturally, the current consumed depends upon the number of valves in the set and the types of valves.

positions, and on 120/150 volts positions already mentioned.

The unit is also equipped with a trickle charger giving a charging rate of $\frac{1}{2}$ ampere. The trickle charger switch being placed in the "on" position during the periods when the set is not in use. The price of the T10/30 is 69/6.

For D.C. mains there is the model D.C.15/25B, which gives alternative outputs of 15 or 25 milliamps. Three positive tapplings are provided, giving 60/80 volts, 50/90 volts, 120/150 volts. This is designed for D.C. mains of 200/250

H.T. FROM THE MAINS

How you can utilise the lighting mains for supplying your valves with H.T. and for trickle charging.

Some makers have adopted the very sound plan of listing mains eliminators which give a choice of three outputs.

One example of this is the Atlas model T10/30 for A.C. mains. This particular unit is provided with a plug and socket arrangement which gives the choice of either 10, 20 or 30 milliamps maximum

A DOUBLE-PURPOSE UNIT



The Atlas T10/30 eliminator for A.C. mains incorporates a trickle charger.

output and, operated in conjunction with the power voltage tapplings of 120 or 150 volts, enables the constructor to obtain the most suitable arrangement for his set.

In this Atlas unit there are three H.T. positive tapplings, giving 60/80 volts with a minimum and maximum position; 50/90 with minimum, medium and maximum

volts only. Its price is £1 19s. 6d.

Another mains unit which has achieved considerable popularity is the Ekco 10/20. Retailing at £2 2s. 6d. and designed for A.C. mains, this model is provided with a variable 50/80 volt tapping, S.G. tapplings of 100, 65 and 40 volts, two maximum voltages of 120 and 150. A similar model is available with a trickle charger and is priced at £2 12s. 6d.

The Earth Lead.

There are no snags with the modern unit of sound make. We mentioned the necessity of choosing a unit having adequate output for the set. This is the one essential factor. Also it goes without saying that the voltages must be suitable for the various valves, but there is no need to worry about this with a good modern unit because the eliminator makers watch this point with great care and naturally provide voltage tapplings to suit the valves in the different stages of the set.

The provision of variable voltage tapplings on the unit also means that one can adjust the actual voltages on the anodes of the valves for maximum results, which is much better than having, say, three fixed positive tapplings on the unit.

When a D.C. eliminator is employed there is normally an earth terminal on the unit, and the earth lead is disconnected from the existing earth terminal on the receiver itself and joined to the terminal on the unit.

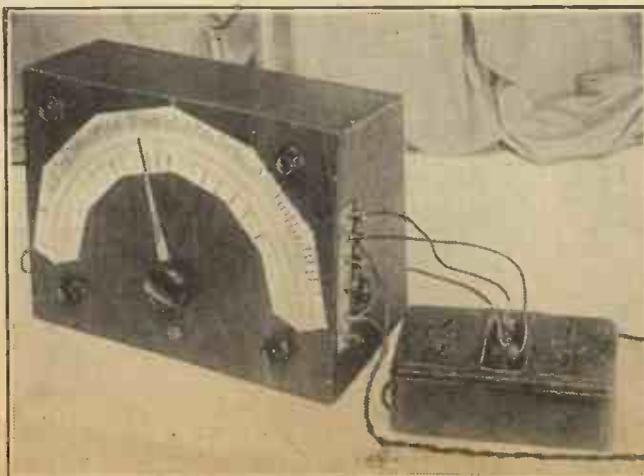
The effect of this is to insert a condenser in series with the earth lead—the condenser being contained inside the case of the unit—and is a necessary protection for D.C. mains work, when frequently the positive pole of the supply is joined to earth.

Making Sure.

With an A.C. mains unit this protection is not necessary, although in some cases there is a small terminal on the metal casing of the unit so that the constructor may join this earth terminal in order to connect the metal casing to earth.

Before putting a mains unit into operation, the makers' literature should be studied carefully and the instructions regarding connecting up to the set followed with care. If you do this there is little chance of your going wrong. **A.J.R.**

ALL READY TO SWITCH ON



The Ekco 10/20 A.C. mains unit connected up to the battery version of the famous S.T.700.

"IN TOWN TO-NIGHT"

Some interesting and not generally known facts about the famous Saturday evening broadcast feature.

PROBABLY "In Town To-night," which is now included in the "Saturday Magazine," is the most popular of all the items broadcast by the B.B.C. And the reason for this is undoubtedly the strong element of surprise and unexpectedness which it possesses.

Listeners are not told beforehand what they are going to hear. There may be a first-class film or stage artist of international repute, but there will also be interesting personalities, many of whom have never previously broadcast. There is an atmosphere of spontaneity and naturalness about the whole feature, as though the various people have just called in, as it were, to chat for a few minutes before the microphone.

A Very Interesting Career.

Actually, however, "In Town To-night" is one of the most carefully prepared of all the programme features. It was originated by Eric Maschwitz, the Director of Variety, and is run under his supervisory control by Mr. A. W. Hanson, a man who has had a very interesting career.

Just before the war Hanson joined the Aeolian Company, and his main activity with this firm was to instruct customers in the handling of the pianola. He says that by some he was regarded as a professor, while in the eyes of others he was looked upon as a kind of mechanic!

During the war he served as a wireless officer in the Navy and, returning to the Aeolian Company was placed in charge of the gramophone-recording department. But eventually company reorganisations in the gramophone industry resulted in something of the nature of an undermining of his position, and so he applied to the B.B.C. for a position. But nothing eventuated until he got into personal touch with Eric Maschwitz, who, subsequent to an interview, had him appointed as his assistant on June 1st, 1933.

A Surprise Feature.

Hanson was given the "Café Colette" and "In Town To-night" features to look after. The first "In Town To-night" half an hour was devised as a surprise feature, but Hanson records that until about two days before the first actual show nothing had been booked for it and he was beginning to get very "panicky."

However, Maschwitz himself arranged with Austen Croom-Johnson, of "Soft Lights and Sweet Music" fame, and George ("Good-Night-Vienna") Posford to give short talks as young composers who were beginning to

make names for themselves, and also Betty Davis who had just obtained her first leading part as Jill in "Jack and Jill" was invited to participate.

Paul England and Tessa Deane were brought in to sing Posford and Croom-Johnson numbers. But as it became apparent that there was rather a lack of variety, a young British film star, Gwyneth Lloyd, and "Believe-it-or-Not" Ripley were added to the list.

On the Thursday evening before the day fixed for the first broadcast of the feature, Hanson was invited to a cocktail party held in honour of the silver wedding of Mr. and Mrs. Christopher Stone. Practically all the famous dance-band leaders, including Ambrose, Jack Hylton, Harry Roy and Lew Stone, were at this party, and it occurred both to him and to Maschwitz, who was also there, that the gathering had the elements of a first-class "In Town To-night" item, although it seemed doubtful if they could get all these famous band leaders to turn up.

But luck was with them, and so a very strong item was added to the first programme, which was given on Saturday, November 18th, 1933.

The Signature Tune.

The "Knightsbridge" movement from Eric Coates' *London Suite*, which has become the signature tune of the feature, was not

introduced in some accidental fashion, as has been freely stated.

On the morning of this notable and historic Saturday it was decided that there should be a signature tune, and Eric Maschwitz consulted Mr. D. H. Munro on the subject, for this B.B.C. official was at that time responsible for many programmes in which records were used.

A number of records were played through, including Elgar's *Cockaigne* Overture, but the Coates' item won the day, and there can be no one to say that it was not a happy choice.

Looking back on the large number of "In Town To-nights" which have been put on the air, one might be forgiven for presuming that a quite essential ingredient of the feature is the rat-catcher, hall-porter, singing dressmaker, racecourse tipster, gipsy, and other such out-of-the-ordinary broadcasters.

Recruiting Outside Assistance.

But it is a fact that it wasn't until the seventh edition that people having unusual occupations, or unusual people occupying usual occupations, were included. Mrs. Nelson, a woman chimney-sweep, and a fireman who related having seen a ghost in the Streatham Astoria, were the first ones to appear. After that similar turns were regularly included.

Outside assistance was recruited in order to interview and write scripts for such people, and the most important acquisition in this respect was Mr. J. C. Cannell, a popular Fleet Street journalist.

An extremely happy choice, for Cannell is a man having just the right amount of wide and unusual experience and just the right "good mixer" personality for such a task.

He has recorded his experiences as a journalist in a book entitled "When Fleet Street Calls," and it is appropriate to remark that he himself could contribute from his own wealth of experience a considerable number of first-class "In Town To-night" turns. It is from his recent book "In Town To-night" (Harrap, 8s. 6d.) to which we are indebted for most of the information included in this article.

Careful Preparation Needed.

We have said that the popular feature is very carefully prepared. Cannell gives some inside information regarding the work which has to be done before the actual broadcasting, which indicates that this is very much the case.

There is not only the difficult task of scrutinising all the hundreds of written applications from would-be broadcasters, but the more likely ones have to be interviewed personally. Then scripts have to be written and rehearsals conducted.

Needless to say, considerable tact has to be employed and special efforts made to make them feel at home before the microphone. Apparently sympathy, good humour and great kindness are the secrets of the successful banishment of nervousness.

(Continued on page 440.)

ON TEST AT THE "H.M.V." WORKS



This is a corner of what is known as the "soak" testing department at the H.M.V. works. Up to 1,000 receivers can be played simultaneously.

COSSOR

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(Less batteries)

H.P. Terms: 12/6 deposit and 10 monthly payments of 12/6.

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Complete Kit with

Variable-Mu H.F. Pentode, Screened H.F. Pentode Detector, and Triode Power output. Heavy duty rectifier. Super-selective Iron-cored Coils. Single knob tuning. Illuminated scale, Wave-length calibrated. Combined On/Off, Wave-change and Pick-up Switch. Selectivity and Volume controls. 8 in. Energised Moving Coil Speaker. Walnut finished cabinet 17½" x 13½" x 9½". Terminals for Pick-up. Plug and sockets for extension speaker. A.C. Mains only. 200/250 volts (adjustable). 40-100 cycles.

£7.19.0

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Prices do not apply in I.F.S.

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AUTOMATIC SELECTIVITY CONTROL

Details of an interesting circuit possessing several desirable features. By J. C. JEVONS.

AMONG its other virtues the ideal receiver should be capable of reproducing distant programmes at the same level of quality as those from the local B.B.C. station. Up to the present we have fallen short of perfection in this respect, because the properties which make a circuit highly selective are opposed to those which favour really high-grade reproduction.

In order to separate any desired item from the hash of programmes available the circuits must offer only a narrow passage into and through the set, otherwise one cannot prevent "gate-crashing" by undesired signals. On the other hand, for faithful reproduction, one must admit all these sidebands which carry the high notes—up to about 10,000 cycles, or more.

In other words, selectivity demands a narrow entrance, and quality a wide one.

As he obviously cannot both hunt with the hare and run with the hounds, the designer is forced to make a compromise. He is quite prepared to guarantee high selectivity and fair all-round quality, or excellent quality combined with fair selectivity, but he cannot conscientiously promise the same high level of both in a single receiver.

The introduction of variable selectivity represents the first real attempt to give the listener the best of both possible worlds. Of course, it cannot perform the impossible, but it does, in practice, make the selectivity of the circuits "elastic," so that no matter to what station the set is tuned the circuits will admit as many sidebands as possible—up to the point where overlap or mutual interference sets in. In this way each station can be treated on its own merits, and full advantage taken of whatever favourable conditions may exist.

If, for instance, a distant station happens to be free—for the time being—from any nearby competitor on the ether, the passage through the set can be widened so that the quality goes up. Alternatively, if the ether is badly crowded, selectivity can be increased so as to shut out interference, though, of course, one must then be content with a somewhat lower standard of quality.

Using Manual Control.

The addition of variable selectivity usually means a separate manual control, though it is possible to arrange matters so that the H.F. circuits automatically adjust their selectivity to different conditions, in much the same way as we use A.V.C. to regulate sensitivity.

It is important not to confuse the control of sensitivity by A.V.C. with the later improvement. Sensitivity depends upon "gain" or amplification, which in turn

governs the range or "reach" of a set, whilst selectivity is entirely a matter of tuning.

The simplest way to apply variable selectivity is to control the coupling between the intermediate-frequency amplifiers in a superhet set. For instance, with transformer couplings the sharpness of tuning will depend upon the mutual inductance between the primary and secondary windings.

The Two Curves.

The sharp-peaked resonance curve A, shown in Fig. 1, is the result of using loose-coupling between the two windings, whilst the double-humped or flat-topped curve B is the result of tight coupling. Curve A gives razor-edged selectivity and passable quality, whilst curve B lets in sufficient sidebands to ensure a high standard of quality, though, of course, it affords less protection against interference.

Between these two extremes there is sufficient elasticity to allow a listener to make the best use of his set, no matter what conditions he may be up against.

In practice, one of the windings of each H.F. transformer is rotatably mounted so that it can be used as a variometer. If there are two or more I.F. stages, the variometer couplings are ganged together and linked up to a selectivity-control knob. Alternatively, the transformer windings may be fixed and provided with a movable iron core. The selectivity of the set is then controlled by moving the cores in and out of the coils, just as one does in permeability tuning.

Fig. 2 shows a scheme for combining A.V.C. with selectivity control, so that the set automatically adjusts itself both as regards sensitivity and selectivity under all

conditions. That is to say, it not only prevents ordinary fading, but also adjusts the circuits to "accept" as many sidebands as possible, without admitting any interfering signals. This is now known as automatic "fidelity" control.

As will be seen from the Fig., the usual I.F. stage of a superhet is replaced by two sets of amplifiers A, A₁ and B, B₁, arranged in parallel between the first detector D and a common coupling-valve V which feeds the second detector D₁. The circuits of A, A₁ are more sharply tuned than those of B, B₁, but both are coupled to the common output circuit of the first detector, and the received signal is divided between them under the control of the A.V.C. voltages.

For instance, in the case of strong signals from a nearby station, sufficient grid bias is developed in the A.V.C. rectifier R to paralyse the upper line of amplifiers A, A₁, and force the whole of the signal to pass through the broadly tuned amplifiers B, B₁, where all the sidebands necessary for high-grade reproduction are preserved.

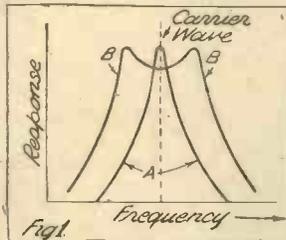
When Signals Are Weak.

In the other extreme of a very weak signal, the second A.V.C. rectifier R₁ comes into action, and there exists a paralysing bias on the grid of the lower valve B, so that the signal is now forced to take the upper line of amplifiers A, A₁. Here it is subject to maximum amplification, and must pass through razor-edged circuits, so that, naturally, the quality is not so good.

But in many cases the signal is of sufficient strength to allow the tuning to be deliberately broadened—in order to improve quality—without at the same time letting in any interference. The grid-biasing voltages applied by the A.V.C. control R, R₁, then bring both sets of amplifiers A, A₁ and B, B₁ into action, and portion out the signal between them, so that the amplifiers A, A₁ take care of selectivity, whilst the amplifiers B, B₁ add an extra margin of sideband frequencies in order to increase the fidelity of reproduction.

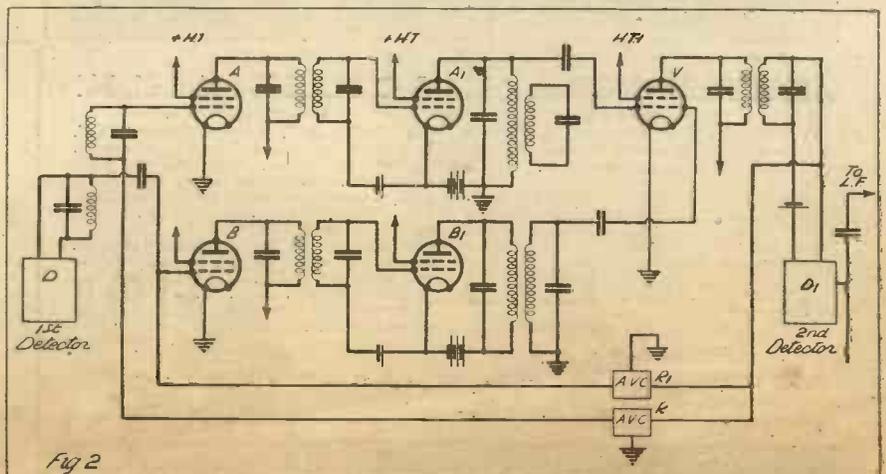
The whole circuit naturally is not easy to adjust, but once set properly in operation the result is remarkably good and quality is well preserved.

TWO EXTREMES



Curve "A" gives razor-edged selectivity, while curve "B" ensures a high standard of quality, but less protection against interference.

COMPLETELY SELF-ADJUSTING IN ACTION



This is a scheme for combining A.V.C. with selectivity control, so that the set automatically adjusts itself both as regards sensitivity and selectivity under all conditions.

PROGRAMME PROBLEMS PROBED - 5

The SPOKEN WORD

MOST of the captious criticisms of B.B.C. operations are the result of a misunderstanding of B.B.C. functions. The misunderstanding can only be on one side or the other and, for the moment, I am not going to say which is guilty. This misunderstanding is very simply stated: the average listener believes he pays his ten shillings for entertainment, and the B.B.C. believes that it should provide other services besides entertainment.

Out of the misunderstanding mutual recriminations arise almost naturally. Listeners become disgruntled when, switching on for some light, frolicsome aerated fun, they are offered Professor Bugwhiskers' views on the "Sex Life of the Centipede." Then they write to the local newspaper.

A Fatal Error.

On the other hand, the B.B.C. gets incensed with the "unfairness" of listeners who, with "Sunday newspaper minds," only want red-nosed comicalities and jazz. "Some listeners," orates the B.B.C., "have no appreciation of the higher functions of broadcasting and no soul-state in which ethical and cultured radio can be received." So there they both are.

To a considerable extent it is the B.B.C. which is at fault. It has fallen into the error that no newspaper (to whose success an acid-test, viz., that of public favour, is applied) ever makes.

Having first of all convinced itself that it "had a duty to humanity," it proceeded to interpret that duty as being to educate and "elevate" paying subscribers by the transparent artifice of coating the uplift pill with thin layers of music and entertainment. Any newspaper editor could tell the B.B.C. that it is either fatal or futile to try to mix his "features" with his "news" pages.

Monopolistic Control.

I am one of those who not only believe in the B.B.C. (that's why I'm its candid critic), but believe in the educational and cultural work that the B.B.C. is doing. I believe that, being a monopoly, it must accept all the social responsibilities that monopolistic control implies. If there were several broadcasting systems in this country each could evade its moral and cultural responsibilities by leaving them to the other. As the B.B.C. is unique it must undertake both the entertainment and the educational functions of a domestic broadcasting service.

The criticism is here made, however, that

the B.B.C. is failing in both departments of activity, because it is trying to make each department "carry" the other. It is defeating both its own objects. It is falling down on both tasks. It is pleasing neither that listener who wants to be entertained nor him who wants to be uplifted.

This is due to the B.B.C. making an incursion into the realm of guile. As an organisation with a high moral mission it is, of course, a failure when it dabbles in

.....
GARRY ALLIGHAN continues his investigations into the working of the B.B.C., and here criticises the talks programmes, suggesting how these could be vastly improved.
.....

guile. It should jettison the "artful-dodger" policy and come straight out into the open. It should renounce the circumlocutory efforts to create an elaborate disguise for "uplift," and label it for what it is—then leave it to the listener to accept or reject it.

That is why I advocate a separate wavelength for programmes that do not come under the spacious description of "entertainment." Just as one is always pretty

wavelengths carry programmes of a distinctive character.

Just recently the B.B.C. has begun to act as if it is beginning to come to my way of thinking. It has been wise enough to congregate all educational and cultural activities into one department, and wiser still to appoint in supreme charge of them a man with a mental equipment that makes him ideally suitable for that responsibility.

Mr. Gladstone Murray—the Controller of the Spoken Word—will be responsible for all educational broadcasts, talks, religion, news, debates, and official statements. That is a step in the right direction—the direction of the classification of wavelengths, of the segregation of the two aspects of programme broadcasting.

Talks and Educational Broadcasts.

The two chief activities in this new "Spoken Word Department" are talks and educational broadcasts. It is almost impossible to indicate wherein the latter could be improved. Their only defect arises from a difficulty to differentiate between those educational broadcasts that are for adults and those for young people—many of the sessions intended for children could, with profit, be broadcast at a time more convenient for adult consumption also.

Adult education, on planned lines, with a not-forbidding syllabus of subjects of a practical nature, is a branch of B.B.C. operations that Mr. Gladstone Murray has ample opportunities for developing and extending. There is a definite and conscious demand on the part of intelligent grown-ups for general knowledge, and the B.B.C. will be justifying its claims to being the Democratic University if it increases its programme activities in this direction.

An Obvious Difficulty.

There is a far greater tutorial skill required for radio lessons than class-room education. The difficulties are fairly obvious. In the class-room the teacher has his students *en masse*, under his eye, and subject to the pressure of his personality. With radio education the "class" consists of thousands of solitary persons sitting alone by the fireside surrounded with the maximum of temptations to let the mind wander.

As the students are separate from each other there is a complete absence of the mass-psychological reactions that are so helpful to the professor in the class-room. His counterpart at the microphone, instead, has to contend with the problem of teaching

(Continued on page 441.)

A TRAINED MICROPHONE VOICE



Our contributor suggests that a special panel of speakers be enrolled by the B.B.C. to deliver the Talks. Obviously, trained microphone voices, like that of the chief announcer, Mr. A. S. Hibberd, whom you see here, would be greatly preferable to some of the voices we hear trying to deliver a radio lecture.

certain of melodrama at the Lyceum, of opera at Covent Garden, of musical comedy at Daly's, and of variety at the Palladium, so a listener should know that certain

helpful to the professor in the class-room. His counterpart at the microphone, instead, has to contend with the problem of teaching

ON THE SHORT WAVES



HOW CONDITIONS VARY.
An explanation of the way conditions change with the eleven-year cycle.

WHEN I handed over the diagram which illustrates this page to the Editorial department, that particular member of the staff with whom I come most in contact gave vent to a snort. Having duly snorted, his remark was, "What! More of these blithering graphs?" (or words to that effect).

Yes, readers—more of these blithering graphs, I'm afraid; but only *one* more. And since it is probably of more concern to the whole short-wave fraternity than all the characteristic curves of all the valves ever produced, I make no apology for talking about it.

An Unusual Graph.

It's a funny graph. Along the baseline is time, in years, from 1927 to the present time. Up the vertical axis I haven't shown any scale, because it's hardly possible to devise one, but the curves represent the *reliability* of reception from America. Reliability includes all sorts of factors, such as fading and signal-strength. These have been combined to form a single curve.

The curves have been prepared from a combination of several different logs over the whole period, and from a series of observations upon one particular station in each waveband, originally published in a very learned publication.

Now what, exactly, do they mean to the ordinary short-wave listener? Well, first of all, they show the eleven-year cycle in a most definite manner. Look at the 20-metre curve, which reached a most distinct minimum in 1930 and has been rising ever since. And as for the 10-metre one—that disappeared completely in the middle of 1929 and didn't reappear until August, 1935!

The Curves Change.

A curve taken for a wavelength of about 15 metres would fall in between the 10-metre and 20-metre curves. A 40-metre curve would not show nearly so pronounced a dip as the "20," and a 49-metre curve would be nearly a straight line.

By the time we get to 80 metres the "bulge" is in the other direction. Reception of America actually improved on 80 metres during the years when the shorter waves were so poor. And the broadcast-wave curve for 250-550 metres explains itself. Everyone remembers the phenomenal way in which medium waves came across in 1931 and 1932.

Note that the curves are not symmetrical. The "peak" in the medium-wave broadcast reception didn't occur until some time after the "trough" for 20-metre work. And the centre of the deep depression on 10 metres appears to have occurred during 1932, leading us to expect a steady improvement until 1937, or even later.

It is perfectly obvious that, just at present, the shortest of the short waves are going to be the most useful and the most reliable. As we progress along our eleven-year cycle, waves above 40 metres are going to fall off somewhat, but the shorter waves will improve enormously.

An intriguing thing to notice is that we have never yet heard 10 metres at its best. It was already on the wane in 1927-28 when amateurs first started exploring it. At the present time it bids fair to give better reception of long-distance signals than has been possible, hitherto, on *any* wavelength.

I myself have been listening to American amateur telephony, on 10 metres, with two valves and "phones on the table" (delightful phrase resurrected from the old days!). I have also heard low-powered U.S. police

The only thing that is likely to fall off seriously during the next three years is long-distance reception on the broadcast wavelengths, which doesn't concern us much.

But now comes an important point—the question of *time*. If all those curves had been plotted, say, at 7 p.m., they would be utterly and hopelessly wrong. They show the reliability of American stations at the *best time* for receiving America on each particular wavelength.

A Common Pitfall.

This is where the new owner of an all-wave set generally falls over himself. He listens, say, at 8 p.m. on 19 metres, and hears nothing whatever (at this time of year). He probably says (a) that his set is no good below 30 metres; or (b) that conditions for 19 metres have been bad lately.

Both conclusions are wrong. At no phase of the entire eleven-year cycle would one expect good reception of America, on 19 metres, in December. We have a seasonal cycle to keep pace with, as well as the long one.

By next summer there is every reason to suppose that 19 metres will be "live" until midnight or even 1 a.m. But by next winter it will be back to a condition not very different from the present one.

So many people are now using all-wave sets for the first time, and expressing a feeling of disappointment with the short-wave side of them, that I hope they are reading these notes and taking heart from them.

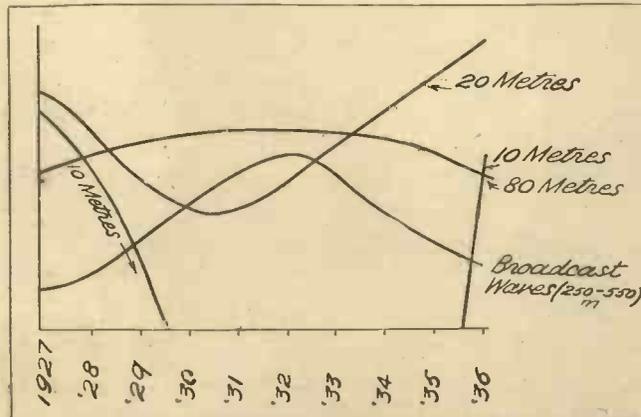
Follow the Fade.

As it gets dark, so the "fade-out" or "cut-off" moves up the scale. Start your listening as low as you can, and move upwards with the "fade-out." By doing this you will find something of interest, on one of the various wavebands, at all times of the afternoon and evening.

As a rough guide, the following should be the best times for December: 1-5 p.m., 16 and 19 metres; 5-7 p.m., 25 metres; 7-10 p.m., 31 metres; 10 p.m.-5 a.m., 49 metres. From 5 a.m. until 10 a.m., 31 metres is "live" again, but the Americans are not transmitting. Sydney (V K 2 M E) may be heard on Sundays, and Lyndhurst (V K 3 L R) on weekdays.

The 25-metre band is rather apt to be disappointing, so don't worry unduly if you find a dull period between 5 and 7 p.m.

RELIABILITY OF RECEPTION



An interesting graph which shows the relationship of reception reliability of various wavebands over a number of years.

stations on 8.5 metres, and everyone who can get down there seems to be hearing them nowadays.

The intriguing part of the business is that we short-wave listeners have everything to gain, and very little to lose, as this sunspot activity increases. The waves from 30 metres downwards will undergo a tremendous improvement, but even those *above*—right up to 80 metres—will not depreciate seriously.

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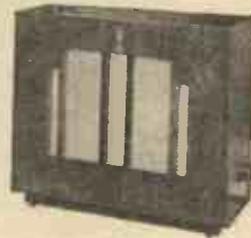
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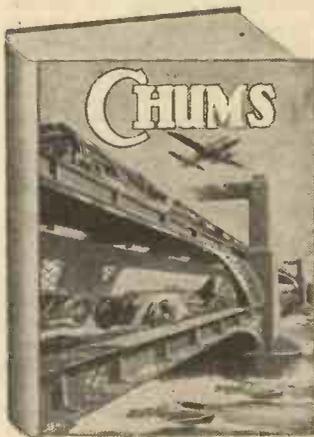
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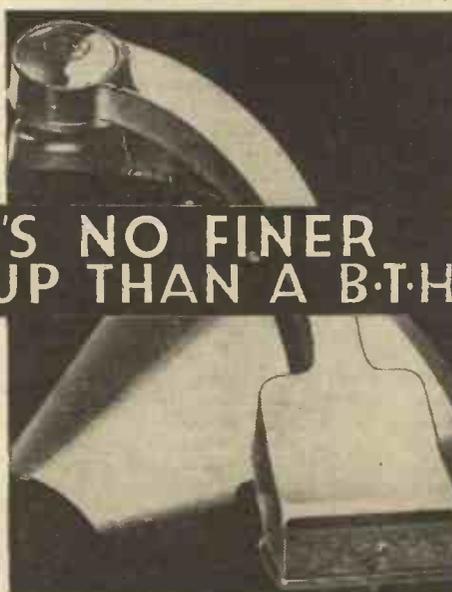
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ON THE SHORT WAVES—Page 2.

Points from the POST-BAG

SEVERAL readers have asked for details of a further resistance-coupled L.F. stage to add to the "Simplex" Two. I am strongly of the opinion that if you want to convert this set into a three-valver, the first addition should be an H.F. stage. After this has been added, however, you may want to make a "four" of it, and the diagram on this page shows a simple R.C. amplifier for doing this.

Note that the L.T. leads are taken to a valve-holder in the "Simplex" Two, and not directly to the accumulator. This is simply to bring the filament of the extra valve under the control on the L.T. switch on the set itself.

The Output Circuit.

Most readers use moving-coil speakers with a self-contained transformer, so I have not shown choke-filter output. Incidentally, it may prove the best policy to remove the fixed condenser which goes from anode to filament on the L.F. valve of the "Simplex," but this is a matter for experiment.

R. R. (Cleethorpes) wants to see a description of a multi-stage H.F. amplifier for short waves. I'm not in favour of making an H.F. amplifier as a separate unit—it should be combined with the detector to facilitate short leads and ganging of controls. An L.F. amplifier is an entirely different matter. But the sketch you enclose, R. R., showing one tuned-grid and one tuned-anode stage, should be quite good.

Incidentally, someone else in the Cleethorpes district might like to "get together" with R. R., whose full address is R. Reeves, 101, Grimsby Road, Cleethorpes.

T. G. W. (Rossendale) forwards a circuit of a "multi-stage" two-valver in which he proposes to use a DB240 valve, the "driver" portion acting detector and the Class B section as Class B output. He wants to know whether it will be stable, and whether, by using a combined valve of this type, he should obtain a quieter background than by using two separate valves. His second valve is a straight-forward and separate S.G. stage.

No Increase In Background.

I've never tried that particular arrangement, T. G. W., so I can't give you any first-hand information on the subject, but I should say that it is well worth trying. My experience with multiple valves, however, leads me to suppose that one does not gain anything in the way of background noise. Sometimes, in fact, things tend to go the other way.

S. A. K. (Dorking) uses a "Simplex" Two, and finds that he can operate a speaker on several stations without bothering to add another stage. Those readers who are getting results as good as this might try the

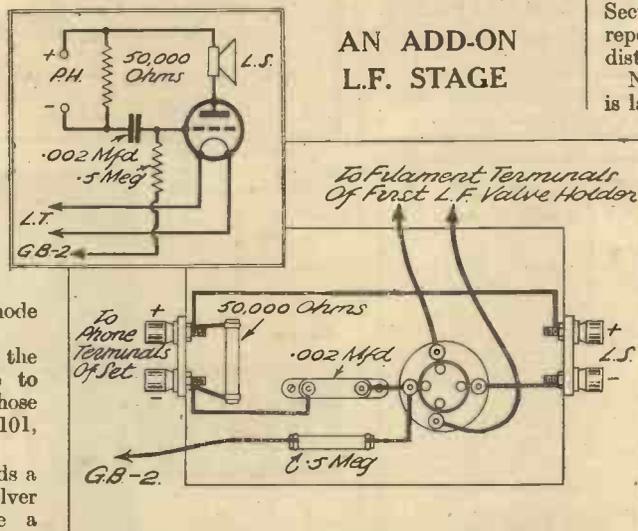
substitution of an output pentode for the existing triode. He also mentions reception of Warsaw on 22.3 metres. This station has been mentioned by quite a number of readers lately.

"Penang," writing from Belfast, expresses disappointment at my statement that my big set will not include a stage of H.F. He says that overseas readers find one H.F. stage absolutely indispensable, and that the present tendency is to use more than one. As a matter of fact, I agree, in some ways, but the gain in the I.F. side of my superhet is so colossal that I am fairly happy about the omission of H.F.

The chief point about the use of H.F. in a superhet is the suppression of image interference; and this is not a serious problem for overseas readers, who want to settle down on one particular station rather more than their brothers of the DX fraternity.

Constructional details, too, are much more simple on the I.F. side than with pre-detector amplification. I am working on a two-H.F. receiver at present, quite apart from the superhet, which is finished and working really well.

A. W. F. (Warwick) asks me to mention that the "Leamington and Warwick Short-Wave Club" has recently been formed. Readers who are interested should write to the President, Mr. A. W. Field, 89, Wathen Road, Warwick.



A simple resistance-capacity amplifier particularly suitable for addition to the "Simplex" Two.

S. G. (Liverpool) backs up all my remarks on neatness, and encloses two photographs (unfortunately too small for reproduction) to show what he can do in that line. He uses a short-wave adaptor standing on top of a big broadcast receiver.

H. J. B. (Manchester) reports conditions up there as being very good lately. He has now been bitten by the 10-metre fever, and spends most of his time listening to the "Yanks" down there. Incidentally, a lot of them are using telephony down there, and coming over more loudly than they have ever been heard on "20."

I can back this up from my own experience of 10 metres, and in both directions. I am getting consistently louder reports on my 50-watt transmissions on "ten" than on any other band, and many of the Americans can truly be described as "R.9."

WITH THE AMATEURS

Notes on the transmissions sent out by amateur stations.

SO many readers have been writing to me with queries about amateur transmissions that I think it is time that I devoted a little space to this subject once again.

The excellent telephony on 20 metres from United States amateurs has been chiefly responsible for this increase in enthusiasm for amateur-band listening. Certainly there are scores of them who put over transmissions quite comparable with the best American broadcasts, and the 20-metre band is well worth listening to in the afternoons and early evenings.

Reporting Reception.

One of the most frequent questions is, "How do I report on an amateur's transmission?" In many cases the chief trouble is finding his address. Where Americans are concerned, reports may be sent c/o A.R.R.L. Headquarters, 38, La Salle Road, West Hartford, Conn., U.S.A., with the addressee's call-sign prominently marked on the envelope or card.

The A.R.R.L. has a comprehensive Q.S.L. Section like our own in this country, whereby reports are sent in batches to the various districts and then distributed.

Next, "How do I report?" Well, this is largely a matter of common sense. The chief things that the man at the other end wants to know are his signal-strength, quality of transmission, and the type of receiver he was heard on. Give also the date, time, call-sign of the station he was working with (for verification purposes), and some brief idea of conditions at the receiving end.

You are more likely to get a reply to a brief, well-worded card than to a long rambling letter.

The Two Types.

Use intelligence in reporting. If you hear a British station who is obviously getting out well to all parts of Europe or even America, then you can take it that he won't be frightened to know that you are hearing him. The people who will most appreciate a report from you are those who seem to be putting out fruitless calls and not getting anywhere.

Most of the amateurs who work on telephony may be divided into two classes: those who are only interested in really high-quality output, and those who are trying to break DX records. The latter, naturally, employ the fullest modulation possible, and their quality is not always of the highest order. Bear this in mind when reporting.

If it is a very long-distance transmission, then intelligibility is the main concern. If it is a "local effort, on 40, 80, or 160 metres, then something better in the quality line is probably aimed at.

American amateurs are allowed to use telephony only on 80, 20 and 10 metres. British, and most European transmitters, also use 160 and 40. W. L. S.

BARRY KENT CALLING

News and Views from the
"Big House."

Provincial Dance Music.

THE B.B.C. has decided, as an experiment, to include special relays of provincial dance bands in the National programmes once a week during January. The idea is to secure variety of presentation of dance music, and not to miss good material wherever it may be in the United Kingdom or Northern Ireland.

House of Lords Debate.

After many adjournments and much cogitation, the B.B.C. has decided to go ahead with its "unrehearsed debate" on the resolution, "That the House of Lords Should be Abolished." It will be given in the Regional on Saturday, January 11th, Professor Laski attacking the Lords and Mr. Boothby, M.P., defending, with Sir Henry Bunbury acting as referee.

These unrehearsed debates have been going so well that we can look forward to some good fun when the House of Lords comes on for dissection.

Broadcasting Circuses.

Christmas season programmes this year promise to be enriched by features taken from circuses both in London and the Provinces. In the past the B.B.C. has been nervous about taking relays from circuses because of the feelings of those listeners who regard the methods of circuses in dealing with wild animals as objectionable. Thus, when a relay has taken place it usually has been of a non-animal act.

This year the ban is at least partially lifted. That is to say, that as long as there is nothing offensive or obtrusive to animal lovers any act can be taken for broadcasting. I believe we are to have the Crystal Palace and Manchester, as well as Olympia this year.

The "A.I.C."

The latest subject of interesting gossip in the B.B.C. is the society that is known cryptically as the "A.I.C." The initials stand for "Anti-Intrigue-Circle."

Some enterprising spirits in the staff, taking alarm at what they thought was a serious spread of intrigue, plotting and counter-plotting, got together and agreed to fight this insidious growth.

Members of the "A.I.C." are pledged not only to abandon all intrigue against each other and anyone else, but also to report to a central committee all cases of intrigue which they hear about or suspect. They also undertake always to speak well of other members of the B.B.C., and if they cannot speak well, then to say nothing. The movement has caught on; so apparently there was need for it.

"Transatlantic Bulletin."

The Columbia Broadcasting System announces that the arrangement by which Mr. Raymond Swing broadcasts regularly to the British public about American affairs will be continued indefinitely throughout

1936. The B.B.C. returns the compliment by arranging the sequel talks about England for the United States.

Private Affairs of Staff.

The Governors and management of the B.B.C. are wondering who stirred up the recent public protest about control of staff morals. An investigation carried out with special care has not revealed any internal collaboration, although some suspicion survives. Anyway, the Governors are not minded to change the existing rule, which is that as and when any member of the staff of either sex is involved in divorce proceedings and is legally "in the wrong," he or she must resign forthwith. Members of staff who are not legally "in the wrong" can do as much divorcing as they like and not resign; but their chance of promotion is not improved by these activities.

There is no other rule; but there is such a widespread impression that staff are "watched" in their private lives, that I would not be surprised if some secret surveillance does exist. Most sensible people are agreed that the matter needs clearing up. The present rule merely encourages subterfuge; it certainly does not promote morality, if that is the purpose.

Countering the Foreigner.

B.B.C. officials especially allotted to the task have just completed a period of "monitoring" foreign short-wave transmissions. There have been several objects in this. First of all, there was the national and patriotic point. There had been rumours and reports about anti-British propaganda, particularly in the news put on in English by foreign short-wave broadcasters. Then there was the matter of programme standards, choice and duration.

The information now available has cleared up the whole area of doubt. The anti-British propaganda is not so pronounced as was thought. There is, however, a growing attempt on the part of several Continental countries to "get the ears" of the British Empire. Programmes in English are being increased and made as attractive as possible. There is also the introduction of "local colour" in the broadcasting of birthday greetings and other special messages to named individuals and families in South Africa, Canada, New Zealand, and even in the Far East colonies.

The Ghost Again?

That there is a ghost in Broadcasting House is the firm conviction of at least one announcer with whom I discussed the problem the other day. My friend has to be on duty at all hours of the night; sometimes his duties take him through the old house in Portland Place, adjoining Broadcasting Place, being adapted as an annexe. In the nearest of these there are strange noises and a weird "atmosphere" usually between two and three in the morning, but only on the second Sunday and third Tuesday of the month. Reports of the manifestations have been made and an investigation is proceeding.

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IS
THE B.B.C.
"TIME-CONSCIOUS"

?

Asks

ALAN HUNTER

in this article which deals with
the fading-out of artists while
their turn is still in progress

EVERY now and then there is a certain liveliness on the broadcasting front when a well-known artist has his or her act "faded out" by a zealous control-man before the climax has been reached. It is naturally very annoying to the artist. No less so, possibly, to the listening millions.

Yet some sort of time limit must be imposed on any single programme, or the daily schedule would rapidly become chaotic. If the programme starts late it is up to the producer to cut as he goes along, so that he will not pass on his lateness to the next programme. Very often this is done without anyone being the wiser. Occasionally the producer fails to make the necessary adjustment and then, as in the recent Will Hay affair, a vital part of the final turn is ruined.

Or, supposing the producer takes the initiative and lets the programme rip—fearful of annoying the artist in question—what then? The people not listening to that programme but frightfully anxious to hear the next programme are very annoyed at being kept waiting.

Two Audiences.

So you see it is all very difficult. Plainly there are two audiences to be considered when something in the programme timing "gangs aghley." There is the audience that is enjoying the programme that is overrunning its allotted span. Equally there is the audience waiting to enjoy the next programme. Someone has got to be annoyed, anyway. Question: Is there no way of avoiding annoyance by a more rigid timing of the programmes?

With that very question in mind, I went exploring the programme departments at the "Big House." And I must admit I came away fairly well satisfied with the organisation as it now exists—and yet baffled at the end by an entire inability to pin the blame on to anyone.

Producers were agreed that they must take the consequences if they dared to

overrun their time—the most dire of which, to them, is a fade-out of an important item. All are united in their desire to avoid any such catastrophe. Stop-watches simply clutter up the control rooms during rehearsals. Every item is carefully timed, the minutes added up, and then something cut out beforehand if the hour or whatever the period may be cannot accommodate everything.

The Music Department, I find, has the easier job when it comes to cutting the items. In the orchestral programme with, say, a couple of soloists it is simple to cut one of the songs in a group without anyone feeling an aching loss. Similarly, the band or orchestra can drop a piece of music. A movement can be cut from a suite even.

Then again, this department works on the principle that it must make allowances for the caprice of conductors. It times an hour's programme to run for 54 minutes, this elasticity being considered essential. In the playing of a symphony, for example, the particular conductor's interpretation may cause it to overrun the normal time taken by as much as ten minutes—or under-run by the same amount. If the programme as a whole does fall short it is usually possible to play an additional piece.

A Mistaken Idea.

Because of this smooth ability to expand or contract without any palpable change in the broadcast programmes, the Music Department may appear to get a better deal than, say, Variety. Many listeners who listen with particular zest to the lighter programmes have indeed got the idea that Variety always suffers, whereas Music is always allowed its full scope. Such an idea is simply not true to the facts.

A SOUTH AMERICAN S.W. STATION



The imposing building and aerial network of the Telefunken short-wave transmitting station at Buenos Aires in the Argentine.

Special shows, such as musical comedies, plays and some types of Variety, cannot be so easily handled to fit the timing schedule if the delay occurs towards the end of the broadcast. Where the broadcast starts late it is of course up to the producer in charge to speed up things accordingly.

In the Will Hay programme, for instance, the broadcast did not get off the mark to

the exact time. Some very important international tie-ups were to follow, making it essential that the show should end dead on time. It was up to the producer to cut something. That interlude by the Variety Orchestra could have been cut. The time saved on that would have saved the whole fracas that ensued.

Elasticity Is Insisted Upon.

Programmes, the B.B.C. recognises, form a kind of mosaic, which over the period of an evening must fit exactly into one another. Wherever possible elasticity is insisted upon so that one individual programme may not encroach upon the timing of another. Personally, I think the B.B.C. exaggerates the self-contained aspect of the audiences listening to its programmes. Many people, I am sure, switch on in the middle of one programme and don't expect to switch off at the end, but to go straight on listening to whatever follows.

The concert hall complex, if I might call it that, simply does not reflect the average listener's habits. What really happens is that the set is switched on to, say, the Regional—and unless there is something terribly uninteresting, the listener goes on with that programme, except when he has made a special date with something on the National.

There is less actual continuity with British programmes than with, say, the American. Over there, although individual programmes are of shorter duration than here, a smooth gliding from one type of item to another is maintained without annoying breaks, overlappings and interval signals.

The reason for this striking difference is obvious enough. Time in terms of seconds is money in terms of almighty dollars in American broadcasting. Even the President himself does not expect the network relaying his speech to allow him to go over his scheduled time.

In our leisurely way we ramble through programmes with a casual unconcern for the odd minute that would deeply shock the average American broadcaster.

Keeping Us Waiting.

Other countries, other customs, as the French say. But although the reasons underlying the different attitudes towards programme timing are both understandable, the listener reaction is much the same the whole world over. No listener—just because he is a listener, and by that much helpless to alter things—really likes being kept waiting. Willy-nilly, the B.B.C. does very often—all too often—keep us waiting.

It invented Bow Bells to pass the time away instead of taking time by the forelock and broadcasting every second of it. Having given us an interval signal, it must needs justify the boon by creating suitable intervals.

In reply, the B.B.C. might say that every time you hear an interval signal you should console yourself with the thought that it is merely a part of the elasticity of the organisation.

But somehow I don't think I feel that way about it. Do you?

ON THE AIR

Candid comments by our broadcasting critic on recent programmes.

JOHN WATT is a good showman who makes you listen to his shows. There is something about these, or, rather, the announcement of them, that stamps them as something different from the ordinary. "It Was in the Papers" is a case in point. It was called a personal tale, and was put over as such. In reality it was, when shorn of its trimmings, an ordinary musical comedy with the ordinary musical-comedy story about a hero, heroine and villain.

The epithet "personal" in the sub-title gave Mr. Watt the opportunity to differentiate his show from the rest by a mass of supplementary matter which he interpolated into the story as *compère*.

Mr. Watt likes to poke fun at all and sundry by innuendo and otherwise. He is a master of the *sotto voce*. Sometimes he sounds sarcastic; at others, good-humoured. His tendency to sarcasm irritates some listeners. I know some listeners who will not listen to his chatter. And I know others who love it.

It is always a pity when the identity of a cast is not revealed in the programme. A lot of us are interested in radio personalities. The Girl in "It Was in the Papers" struck me as being uncommonly good. It is useless for me to make a note of the fact, for "The Girl" is too impersonal to be of any value. I know, of course, that the announcer does sometimes read out the names of the players and the parts they are playing, but unless the people are well-known, the speed at which he moves renders the information next door to useless. This is particularly the case when names are given before the broadcast.

It was the same with "Devonshire Cream." I would like to know who played Elias Widescombe. The "Radio Times" tells us that he was one eight.

I looked forward to "Devonshire Cream." Firstly, because it was by Eden Phillpotts, and, secondly, because it was a dialect play—a fascinating dialect as well. All native dialect isn't easy to follow. But I never find any difficulty with the West Country brand. I like its descriptive words. To "titivate" is just lovely. I like West Country players, too. I

like their honest simplicity. There is no guile or affectation with them. They are as fresh as the wind.

"Devonshire Cream" went with a swing, especially the first act. Some listeners may have thought that the story deteriorated by becoming more conventional as it progressed. Although the cock-crows, etc., helped, the players weren't in any way dependent on them for atmosphere. The four principal characters gave a very commendable performance, but as they were four of twelve, I cannot designate them more specifically.

I liked "The Vagabond Lover." His ten minutes of love-songs, sponsored by a lover, were very enjoyable, more especially as they were sandwiched between a lengthy non-musical play and a thirty-minute News Bulletin.

I wish John Hilton were in the evening programmes. His talks to Unemployed Listeners command a following from outside the ranks of the unemployed as well as from within. Four o'clock is a poor time for listening. And mightn't the unemployed prefer an evening hour?

Never have I heard a more enthusiastic audience than that which listened to The Rooster's Concert Party at the Town Hall, Birmingham. It is clear that the Midland and the North are the laughter wavelengths. The National, especially, with its constant load of heavy music, would seem to have no use for levity. It is to be pitied. I know several Southern listeners whose sets are ever set at 296.2 m. The Midland seems to have a better understanding of the needs of the masses. It knows that most people like to laugh, and as often as possible. So it satisfies this want.

The Roosters haven't a rival in their own line. They are wise to perform before an audience. Without belittling the Rooster's achievements, I must say that I thought that the Birmingham audience made their show for them the other evening.

The World Tour programme of quaint music was very nicely done, and the story which carried it along was by no means an insignificant feature of it.

The life story of Sir William Osler was another big contribution to that remarkable series "I Knew a Man." It has occurred to me that a note (where necessary) on the speaker himself would be appreciated by listeners.

As was only to be expected, broadcasting shared

in the Carnegie Centenary celebrations. There was a relay of the speeches made at a Commemorative Dinner in Dunfermline. Among the several amusing incidents in the famous millionaire philanthropist's life that were recalled, the choicest was the advice he once gave to a Scotch minister whose weakness for lengthy sermons irritated him: "If you can't strike oil in twenty minutes, you should give up boring."

Two things heard on the air, if taken together, should make one think. The one was an Admiralty warning (the like of which we often hear): "The so-and-so light, in such and such a locality, is not working."

The second, an ex-lighthouse keeper with twenty-three years' service, and not now required, said in an "In Town To-night" item: "I am sorry that an automatic machine has taken my place." C. B.

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A SIGHT for sore television eyes greeted me at the Alexandra Palace recently.

For months the section taken over by the B.B.C. has been silent and deserted. The south-eastern tower, attacked by the B.B.C. with a first fine careless rapture in June, has stood minus its spire like a hollow tooth—a melancholy monument to weary months of delay.

Now an army of workmen is in possession and the hammers ring out the song of the dawn (of television), while scaffolding round the hollow molar tells of the dentist's ministrations. Television is on its way, so look out—and prepare to look-in.

In the circumstances the exuberance of these two paragraphs may be forgiven. I, in turn, am prepared to forgive and to believe the information which I have on good authority that the best part of the work of adaptation will be completed in three months. Then the transmitters will be installed and a period of intensive testing will begin.

Finance continues to worry the "televisionaries" at Broadcasting House. I have heard it suggested that the whole £180,000 set aside for the building and running of the London station until the end of 1936 will be swallowed up before the service gets fairly under way. It is said that £25,000 is being spent on the building alone.

The proposal of Mr. Gerald Cock, the Television Director, to give three separate hours daily of short snappy items will increase the number of artists required and also swell the bill. It begins to look as if the £180,000 is ridiculously inadequate. Let us hope that the outcome will not be starvation diet for television programmes at the outset.

Mr. Cock, as befits a B.B.C. pioneer, hopes to recapture the friendliness and easy informality of early broadcasting days. There will be "Welcome" on the mat at the Alexandra Palace, and one of the most important social features of the station will be a first-class restaurant. To accommodate artists whose television and broadcasting dates may clash, a special studio is being prepared so that they may broadcast from the Alexandra Palace and not feel themselves marooned in the wilds of Muswell Hill.

A Special Make-up Room.

Some of the differences between the plans for the Alexandra Palace and those of Broadcasting House itself are suggestive of the complications that television will bring. What a shock for the B.B.C. when they awaken to find, in a year or two, that Broadcasting House is not merely far too small but also completely obsolete.

The Alexandra Palace will have such features as an artist's make-up room, a scene-painting room, and a film projection room.

The two main studios at the Alexandra Palace, one for the Baird and the other for the E.M.I. system, will each be larger than any studio at Broadcasting House, except the concert hall. Two floors, each 30 ft. in

height, have been taken by the B.B.C. The two transmitters will be accommodated in two separate halls at ground level, measuring 70 ft. by 45 ft. Two studios above will have the same dimensions.

The 84-ft. tower, which will carry a 215-ft. aerial mast, also contains two floors, and three mezzanine floors are being added. Mr. Cock's office will be half-way up the tower, from where, by the way, a fine view of half London may be obtained. Power will be supplied by the North Metropolitan

For myself, I had the feeling that when the technique of 240-line transmission is as perfect as that of 180 line, then we shall obtain remarkable results indeed. At the moment the difference does not seem to be so marked as might have been expected. It was curious that the old yarn cropped up that it was being done by land-line. How astonished was the sceptic who made this suggestion to me when I assured him that it came straight over the air from the Crystal Palace and down the aerial

"pipe" into the receiver, and I added that it would be well-nigh impossible to do it otherwise at the moment.

Two receivers seen in action gave a brilliant picture 12 in. by 9, reflected from a vertical cathode ray into a mirror on the underside of a

raised lid. Six controls are used for the picture and ultra short-wave sound reception. In the commercial model, which will be very similar, a switch will be provided to convert the set in one movement from the Baird to the E.M.I. system. Each system will be used for a week at a time. Medium and long-wave circuits will be added to the receiver so that the complete television set of the more expensive type will be able to pick up almost everything on the air.

I have heard it suggested that six knobs will be too much for the average user. But after all, eight knobs were not uncommon in the early days of radio. And, as a matter of fact, the tuning of high-definition television is not half as difficult as the recently departed low-definition. I regard it as simple.

"IN TOWN TO-NIGHT"

(Continued from page 430.)

"Many of them expect to find themselves in an atmosphere of stern microphone discipline, surrounded by people about whom they have previously formed quite the wrong impression. We just walk up to them and greet them with a handshake and a murmured word that means to duke or chimney sweep alike, 'Thanks for coming along so punctually. We know you're going to do well.' Touch wood! But not one failure has yet occurred before the microphone," says Cannell in his most interesting book.

Among the others who comprise the "In Town To-night" team is Leslie Baily of "Scrapbook" fame, and who acted as our northern correspondent for several years and who still frequently contributes to "P.W." Leslie Baily was responsible for introducing Gipsy Petulengro to the microphone. He found him in one of the big London stores, where he was making gipsy rings and telling fortunes.

Apparently this old Romany took to broadcasting like a duck to water, and proved to have a first-class microphone manner.

No less than ten thousand letters arrived for him during a few days following his quarter of an hour talk on gipsy hints and remedies.

THE APPROACH OF TELEVISION

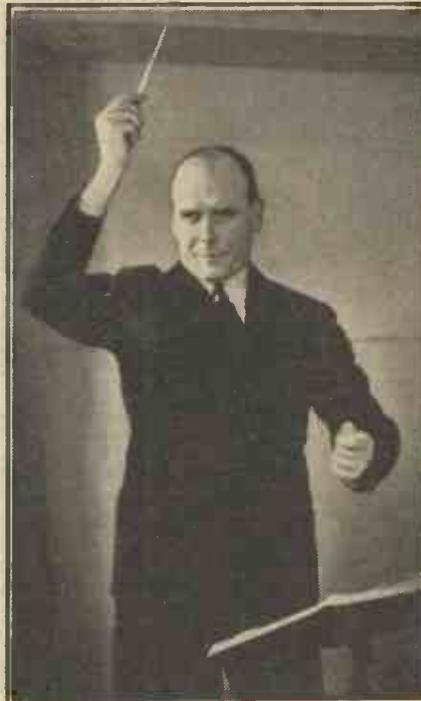
SOME NOTES ON THE PROGRESS WHICH IS BEING MADE WITH THE B.B.C. HIGH-DEFINITION TELEVISION SERVICE.

By L. MARSLAND GANDER.

Supply Co., and each system will have its own conversion plant.

Baird television, as it will be transmitted by the B.B.C., was seen publicly for the first time at a London Press Club television dinner. Chronic local interference did not

A POPULAR CONDUCTOR



This is B. Walton O'Donnell, conductor of the B.B.C. Wireless Military Band. Born in Madras in 1887, he is the youngest of three brothers, all of whom have become service bandmasters and given concerts before the microphone. Studied at the Royal Military Academy for ten years, winning, amongst other honours, the medal for the most distinguished student of his period. Became Director of Music in the Royal Marines, and later he and his band accompanied the Prince of Wales on the African and South American tour, in recognition of which he received the M.V.O. at the hands of the King. Joined the B.B.C. in 1927.

help, but as few present had seen high-definition television before, this seemed a small drawback to the majority who came to marvel and did so beyond expectation.

THE SPOKEN WORD

(Continued from page 433.)

thousands of students, each with a different mental approach to the lesson and with no common bond of interest.

It is therefore highly important that the radio teacher be a person with talents additional to those of intellectual knowledge and professional capacities. He must possess a humanising attribute: a facility for investing his subject with the warmful colours of human interest and a manner that is entirely bereft of aloof austerity or the cold detached mind of the æsthetic intellectualist. He has to direct his lessons and their mode of delivery to the average mental level of a conglomerate studentry, employing an idiom that is not only intelligible to the students in the "Wrangler" category but also to those of Grammar School standards.

A Psychological Difference.

There is a profound psychological difference between class-room and radio educational methods. A group of students in a class-room becomes one solidified mind which can be moulded by the teacher and which is responsive to his lessons with an instinctive unanimity. There is a physical atmosphere that aids this and the gregarious character of schooling is also productive of mass reactions.

With radio education this situation is entirely absent. The teacher faces not the combined mind of his scholars but an assortment of different minds. His scholars are separated and isolated individuals. It is obvious that what will sound natural to thirty unanimously minded students in a class-room, surrounded by all the impedimenta of schooling, may sound stupidly unimpressive to the student sitting by his own fireside, with all the atmosphere of domesticity that is so destructive of the professorial pose of dictatorial infallibility.

It is this fundamental psychological problem that Gladstone Murray will have to solve in order to make broadcast adult education arresting to the listening mind. In the Talks his problem will be simpler. The suggestions that can be made here are, therefore, equally simple.

First, it can be urged that Talks must be shorter. Like radio drama Talks demand listener-concentration. That is far from easy. You read a book and are disturbed—you merely turn back a page and recapture the lost argument. You listen to a Talk, and if the telephone rings, or the baby cries, or the postman knocks, or the wife makes an exclamation, or a vagrant thought returns—if any one of a score of possible normal routine interruptions distracts your attention from the speaker, the thread is broken beyond repair.

Concentration is Essential.

Immaculate concentration, then, is an essential requirement for Talks reception. I am prepared to dogmatise to the extent of saying that it is not normally easy for the average person in the average home to give more than fifteen minutes uninterrupted, concentrated listening to a Talk broadcast. Fifteen minutes, therefore, should be the maximum length of a Talk.

Second, the Talks should be on less abstract subjects. There is, I am convinced, an insatiable appetite for knowledge among

the general listening public. The range of subjects is vast, covering every conceivable aspect of human existence. So vast is the area available that there is no necessity for the territory of nebulous speculation and abstract thesis to be invaded. Talks, to have the widest appeal, must be on subjects steeped in human interest.

The last point to be made in this connection is that the people who deliver the Talks should be both experts and expert in broadcasting. Of the two qualities the latter is the more important. The pulpitizing voice and the bedside manner are exposed mercilessly by the loudspeaker in any domestic radio set. Better by far for the B.B.C. to enrol a panel of speakers who would read the manuscript which the expert authority but defective broadcaster has written. Obviously the vital consideration with Talks, as with Adult Education and every other form of broadcasting, is to broadcast in such a manner that the greatest number of listeners are kept listening.

A WEARITE TRIPLE EXTRACTOR

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For all those who are contemplating the construction of the S.T.700, or who have built the set but have not yet built the Extractor Unit, this ready built Wearite unit is an attractive proposition, and Messrs. Wright and Weaire are to be congratulated upon their enterprise.

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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 specialties 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.

PREVENTING NEXT DOOR FROM HEARING THE LOUDSPEAKER.

P. A. (West Ham).—"Can you suggest anything that will help to prevent our loudspeaker being heard by the next-door neighbours? We want to do what we can as the lady there is very ill with a nervous breakdown.

"She gets very little sleep, and noises which normally would not be noticed worry her so much that we turn our loudspeaker right down most nights. Even then she sometimes hears it, as the houses are semi-detached, and ours is a quiet road with no traffic much after dark.

"It may be months before she is better, and as we are friends as well as neighbours I wonder if there is anything that we can do to keep the noises in our house out of theirs. The set is of the type with built-in loudspeaker. We must use the set in the room where it is at present, and unfortunately that is rather near the invalid's room. Would a long flex, to get the set into the opposite corner, away from the common wall, be any use?"

Yes, the position of the set is of considerable importance in such cases. But before you go to that expense there are several simple precautions that may prove easy to put into force, and possibly quite effective.

The first thing to try is to stand the set on a good sound-absorbing material instead of on a rigid floor or table. Much of the trouble may be due to vibrations transmitted to floor, walls, etc., and this will be reduced if thick pads of rubber, cloth, or similar shock-absorbing material is used.

Next, try interposing something to "cushion" the sounds from the wall and ceiling near which the set is placed. A heavy curtain behind it would probably do a lot of good, and so would a large bookcase, so if you stand your set (on its cushioned feet) in front of a large settee, big easy chair, or anything like that to screen it from the wall which is common to both houses, you may find this makes an immediate improvement.

Generally speaking, any heavy drapings round the set, extra carpets in the room, cushions behind the loudspeaker, or similar muffling materials will be advantageous, since they help the sounds to die quickly instead of to "ring," and to penetrate into adjoining rooms via floor, walls or ceiling.

You will probably find that if you can take precautions of this kind it will be possible for you to turn up the volume control more than you have yet been able to do, without the disturbance getting through to next door. And there should be no troublesome reduction in the room where listening is going on, since a quietly run set will seldom penetrate far if thought is given to insulating the loudspeaker in the manner suggested.

EFFECT OF THE ADDED AERIAL.

W. B. (Long Wittenham).—"My short-wave set's reaction is perfectly smooth when the aerial lead is taken off, and I get perfect control of oscillation on all the tuning positions from top of condenser to the bottom. But when I add the aerial lead (which I must do to receive at worth-while strength) the good control of reaction goes, and I have the greatest difficulty. How can I cure that?"

Yours is not an unusual experience, W. B. On short waves the aerial's effect on reaction efficiency is generally very marked. That is why loose couplings and variable couplings are so commonly used.

Frequently, also, the great merit of an S.G. stage on short waves is that it separates the aerial from the detector grid circuit and so reduces the undesirable "dead spots" due to the coupled aerial. So looser coupling or an S.G. stage preceding the detector would lessen or remove your trouble.

AN UNEXPECTED IMPROVEMENT IN REACTION CONTROL.

C. W. (Wimbledon Park, S.W.19).—"I was never quite satisfied with the set because, although it was very good when reaction was in the zero position, it was uncontrollable as soon as the knob was advanced from zero. This happened on both wavebands, but was worse on the medium waves, where I wanted the reaction most.

"However, the quality was good, and even without reaction in use there was plenty of alternative programme entertainment, so I did not want to go to the trouble of rebuilding. I did, however, occasionally have a half-hearted go at it, to see whether I could improve it, usually without result.

"Last week-end my luck must have been in, for I cured the whole difficulty in a very simple manner. All I did was to try a 1-mfd. condenser in place of the .01 mfd. which was connected between the P and F terminal of the S.G. valve holder.

"I have never read of an S.G.'s screen condenser affecting the detector reaction before, so I should like to know what you think is the cause of the improvement in this case."

From the details you give we imagine that the faulty control of reaction was caused by instability of the S.G. stage—a fault that is often unsuspected or difficult to recognise.

Such H.F. instability does affect reaction results, though usually there are other symptoms, such as bad quality, which lead one to suspect the H.F. stage is not working properly.

In your case, as described, the only alteration you have made was to improve the stability of the S.G. stage by improving its decoupling, so it seems clear that a tendency to H.F. instability was the real trouble all along.

TRAM CRACKLES WORSE IN FROSTY WEATHER.

A. S. (Goodmayes).—"Where I live we get a good deal of interference from trams, which can be heard approaching, then passing, when the noise is at its worst, and then receding.

"But what I do not understand is that the trouble is much worse in frosty weather than at other times. Why is that?"

It would need close investigation on the spot to be sure of the answer to that question, A. S.

A possible explanation is that at such times the roads (and hence the tram tracks, if they are not of the underground type) are treated for the frost in some way which is prejudicial to radio reception.

For example, sand thrown on the roads might tend to fill the track and cover the rails to some extent, causing more than usual sparking when trams passed. Whatever the cause there is very little likelihood of your being able to alter it at the receiving end, since such trouble is generally only susceptible to treatment at its source.

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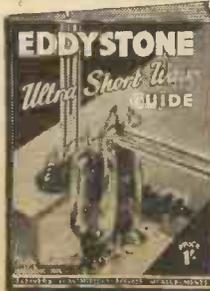
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TECHNICAL JOTTINGS

Items of Interest to Every Enthusiast.

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

Early Wireless Experiments.

THE question as to who first invented, or discovered, wireless telegraphy is one that has often been debated. It is pretty common knowledge that Sir Oliver Lodge was one of the earliest actual experimenters in this field, and I believe it is correct to say that his first experiments took place some considerable time before the more-or-less "commercial" tests of Marconi. The fact that Marconi's name is known throughout the world in connection with wireless more than any other name is because he it was who first brought, or helped to bring, wireless telegraphy into commercial use.

Electricity from the Clouds.

Some very interesting facts have just lately been brought to light with regard to an American dentist named Loomis, who is claimed to have carried out experiments so far back as 1860 on "tapping the natural source of electricity in the upper air." Apparently he used kites, by means of which he drew electricity from the clouds, and was able to transmit some kind of signals. It was even claimed that some years before Marconi was born this American carried on two-way communication without any wires between two points about twenty miles apart.

A patent was taken out, so it is said, for an invention of this kind in 1872, and wireless messages were sent between ships a couple of miles apart. This Mr. Loomis died a disappointed man apparently, because his efforts to raise capital to commercialise his invention met with repeated failure.

Present-Day Sensitivity.

The first real success in wireless telegraphy probably began when Branly, the French scientist, invented the "coherer," which enabled wireless signals to be put to work to actuate a relay and did something more tangible than merely deflecting the needle of a galvanometer.

I do not know how many of you have ever used, or even seen, a coherer, but it is an exceedingly crude instrument compared to the modern thermionic valve. Although the results obtained by means of the coherer were very wonderful—and the action of the coherer itself was indeed a most remarkable discovery—it is certain that wireless could never have advanced very far without the discovery of the thermionic valve.

This has transformed the science out of all recognition and brought it from being little more than an elaborate toy to a thing of world-wide application. The sensitiveness of an ordinary modern broadcast receiver must be many millions of times greater than that of a circuit employing an old-fashioned coherer.

(Continued on next page.)

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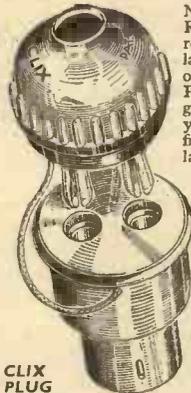
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TECHNICAL JOTTINGS

(Continued from previous page.)

The Short-Wave Fans.

The number of short-wave fans in this country continues to increase rapidly, but they have never been so numerous as in America. I see that the number of short-wave amateur stations in the United States is now about 50,000.

Only about 10 per cent of these, however, use 'phone, the rest preferring code operation because of the possibility of working much greater distances with small power. Moreover, the code station is cheaper to operate than a 'phone outfit. Great activity is centred at the present time on 10-metre reception, and European and African experimenters are being heard in Milwaukee on this wavelength.

Getting Rid of Static.

Professor E. H. Armstrong, who is the inventor of the superheterodyne circuit, and now Professor of Electrical Engineering at Columbia University, U.S.A., has introduced what he calls a "static-less" radio system which he has lately demonstrated

NEXT WEEK

SIR NOEL ASHBRIDGE

(Chief Engineer of the B.B.C.)

TALKS TO "P.W."
READERS

EXCLUSIVE! REVEALING!

before the American Institute of Radio Engineers.

He claims that this system, if applied to broadcasting on short-wave bands, would mark a new era in radio reception and make it possible to send and receive as many as four programmes simultaneously on one wave. In some tests carried out in the vicinity of New York during the past year, the transmission was over a distance of about eighty-five miles, and introduced thunderstorms and other violent forms of interference.

Frequency Modulation Preferred.

Programmes broadcast over regular local stations were compared for clarity with those received on this static-less receiver, and it was shown that the Armstrong system was virtually free of interference due to lightning, while the programmes of much more powerful stations using other kinds of receivers were punctuated by the noise of the flashes. Professor Armstrong says that frequency modulation—the system he uses—eliminates valve noises and distortion due to fading. This system was, I believe, described in "P.W." a few weeks ago. He further claims that the new system is specially applicable to television relaying, where it is so important to avoid interference.

A Ticklish Job.

The other day I saw somebody trying to solder an exceedingly fine enamelled wire on to a terminal, and he was finding it pretty difficult. It is not at all easy to get the enamel off a very fine wire. I am talking now about wires of about 44, 46 or 48 gauge. Some people will advise you to dip the wire in methylated spirit, but I think you will find that this does not always do the trick; in fact, the enamel on some wires seems to be completely proof against alcohol.

It is no use trying to *scrape* the wire with a penknife, because all you do is to break the wire; and, anyhow, it is practically impossible to get the enamel off all round by this means. The best thing to do is to take some very fine sandpaper and to stroke the wire longitudinally against a piece of wood, twisting it over and over so as to rub it all round. You may then be able to see the glint of the copper—more easily, of course, if you use a magnifying glass.

Having got the wire reasonably clear of enamel, the best thing then is to wind it a few times round a short piece of thicker wire, giving it afterwards a touch of solder. The thicker wire will then be much more manageable for attaching to the terminal or whatever it may be.

The Cathode-Ray Tube.

Everybody has heard of the cathode-ray tube and its use in connection with television reception. Not everybody knows, however, that the cathode-ray tube has been used for many years past for various other purposes, one of the principal ones being for detecting and measuring extremely rapid electrical disturbances. In the latter form it is generally known as the "cathode-ray oscillograph." Oscillographs are used, for example, for indicating the wave-form of the current output from electrical generators and for a great variety of similar purposes.

Electrical Weather Forecasting.

The Radio Research Board, of the Department of Scientific and Industrial Research—with which Professor Appleton, the discoverer of the famous "Appleton layer" in the upper atmosphere, is very prominently associated—has for some years now been carrying on all kinds of investigations into atmospheric and their effect on radio transmission and also into the possibilities of weather forecasting by means of atmospheric-electrical indications.

Two of the important experimental stations of the Radio Research Board are at Datchet and at Fife in Scotland. These two stations work in very close and accurate co-operation, and they can arrange to send out radio waves into the upper atmosphere and then receive the reflecting waves back in such a way that the time-interval between the sending out of the wave and the reception of the reflection can be accurately measured.

You can guess how exceedingly short this time-interval will be in most cases, and the accuracy with which this extremely short interval can be measured is due to the remarkable properties of the cathode-ray tube.

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for the Christmas Party

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TAKE a tour round the world with Mappa-Mundi—you'll find it a "capital" game in more senses than one.

First of all, there is the thrill of assembling a marvellous jig-saw puzzle of the world; that in itself is capital fun, amusing as well as educative.

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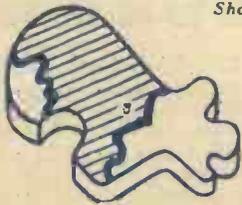
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IMPORTANT ANNOUNCEMENT TO ALL READERS (TURN TO PAGE 451)

Popular Wireless & TELEVISION TIMES

"P.W." PLANS
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THE FUTURE

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No. 707.
Vol. XXVIII.
Dec. 21st, 1935.

Special Articles This Week:

HOW TELEVISION HAS PROGRESSED

LIMITATIONS OF A.V.C.

FACTS ABOUT SOLDERING

A SIMPLE RADIOPHONE

(How to make a novel Musical Instrument)

ALL ABOUT THE NEW LONG-PATH VALVES

HAS SYNCHRONISATION SUCCEEDED?

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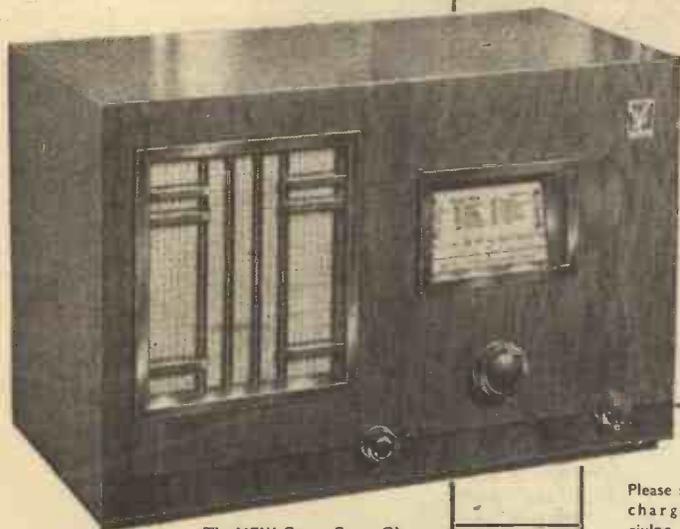
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The NEW Seven Stage Class 'B' Battery Model 376B.

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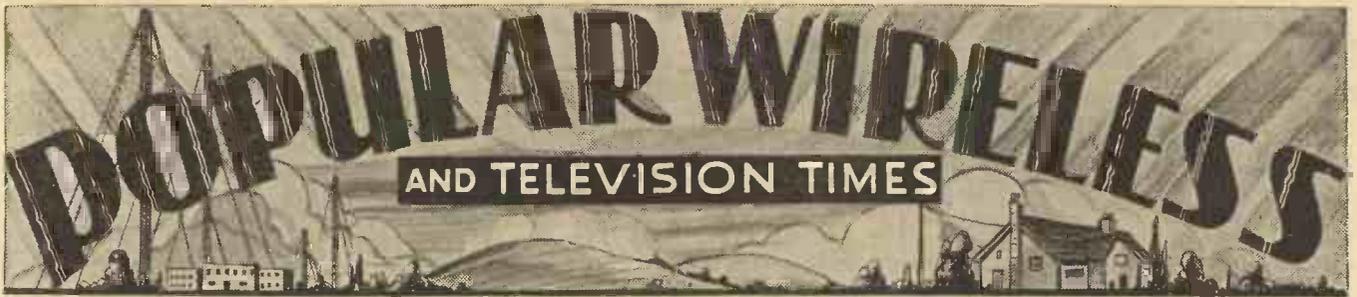
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P.W., 21/12/35.



MANAGING EDITOR: G. V. DOWDING.

ASST. EDITORS: A. J. RANDALL, K. D. ROGERS

S O S
IN 1918
HELPING PILOTS

RADIO NOTES & NEWS

PRETTY HOT:
RADIO DIVORCE
NON-MAGNETIC

Electric Aunt Sally.

WE have heard so many of these "death-ray" stories in our time that the latest must be reported briefly. Inventor: Mr. L. Anderson, of Melbourne, Australia. System: electro-magnetic basis. These things have been claimed: aircraft control or destruction, interference with motor-car ignition, destruction of wireless aerials and power lines.

It is said that not only have the demonstrations shown how electric bulbs can be destroyed, but glass tumblers have been reduced to powder at a distance of several yards. Old Bacchanalians will be glad to know that the said tumblers were empty at the time!

Society Note.

I AM glad to hear that the North Manchester Radio Society, which was inaugurated last October, is growing rapidly, and it is hoped that by the end of the year it will be one of the largest societies in that part of the country.

Meetings are held every Friday at the British Legion, Elms Street, Bury New Road, Whitefield, near Manchester. Open at 7, commence 8 p.m. sharp. For the would-be's there is Morse instruction, commencing 7.30 p.m.

A warm welcome is assured to "P.W." readers, DX and short-wave fans—and blushing beginners. Full particulars (1½d. stamp) from Mr. R. Lawton, 10, Dalton Avenue, Thatch Leach Lane, Whitefield.

Slick Work.

A PIECE of slick work by a Hastings man is well worthy of record, for it sets an example that might conceivably be of great, if not vital, importance one day. The circumstances were as follow: Mr. Alexander, of Old London Road, Hastings, an ex-R.A.F. wireless man, was listening to Morse working on the shipping wavelengths when he heard a weak S O S from a steamer in the North Sea.

Sticking on that wavelength, he heard a second message: "Cabin flooded. Dangerous list. Wireless receiver probably out of action." And to Mr. Alexander's surprise, all the other stations carried on with their own messages. Apparently the S O S had not been heard by those for whom it was intended near to the vessel in distress. So he 'phoned the message to the police, who gave it to Fairlight coast-watchers,

whence it was transmitted round the coast, thus saving precious time.

Congratulations, Mr. Alexander.

Echo From Jutland.

WITH Lord Jellicoe's recent lamented death fresh in our minds, there is special interest in the reminder it brings of wireless efficiency before the Battle of Jutland. One of the portents that convinced the Admiralty that a naval battle was pending was the reception at Lowestoft Wireless Direction-Finding Station of signals from the German fleet. The fleet had moved a mile or so in readiness for putting to sea, and so accurate were the wireless bearings that this small shift of position was discernible on our instruments!

A RADIO FAVOURITE



STAINLESS STEPHEN, the popular comedian, who will take part in the B.B.C. Christmas Party on Christmas evening. Other well-known stars in the programme will be Clapham and Dwyer, Tommy Handley, and the Two Leslies. Besides musical games, chatter, songs and Christmas stories a charade will be staged as last year.

We are all proud of present-day progress, but don't let us forget that there was some very pretty dot-and-dash work going on between 1914 and 1918.

Those Were the Days.

HOW many of my readers, I wonder, can remember the first S.B. programme? It was regarded at the time as a great technical triumph of incalculable significance, and Mr. H. Bishop, Assistant Chief Engineer of the B.B.C., has been recalling with pleasure the joyous adventure.

Mr. C. A. Lewis—Uncle Caractacus of those days—gave out the first S.B. News Bulletin. He was so overawed by the fact that all stations were broadcasting his words, that at the end of the bulletin, and before the switches were thrown, he nervously asked an astonished world, "What the devil do I do next?"

Dublin Comes Closer.

THE announcement that an air service is shortly to begin between the Irish Free State and Great Britain was made by the Minister for Industry and Commerce in the Dail recently.

Wireless equipment, essential to such a service, is being installed at Baldonnel Aerodrome for communication with other aerodromes and for the assistance of pilots in landing and taking off.

The first services planned are from Dublin. One will be to Liverpool and a second to Bristol, to connect with the express trains serving those cities. Later, through services from London to Dublin, and eventually from London to Cork, are visualised.

"Show Me The Way . . ."

THE high state of perfection to which radio aids have brought the blind landings of aeroplanes is soon to be increased—by television. The Air Ministry is putting its hand into its pocket to finance the National Physical Laboratory, which is investigating a proposal to show pilots their own planes and how the land lies below them.

Direction-finders at the aerodromes would locate the approaching machine, project its whereabouts on to a map of the 'drome, and wireless the whole picture back to the pilot. He would thus have before him on the dashboard a plan of the landing-place, with a black dot moving above it, the dot being his own machine!

(Continued on next page.)

MARCONI WAITS TILL LUNCH IS OVER

Tropical Novelty.

DID you hear about the man who, tired of the same old crooners, determined to buy a super all-wavelength set to reach across the world and get something *different* in the way of entertainment?



On its trial run the set picked up a weird station, giving a kind of native chanting that enraptured the owner. Obviously he had got Hawaii, or Fiji, or somewhere equally romantic. He waited impatiently for the announcement of the station's name.

Instead, after a long pause, there was a half-familiar tinkle on a strange instrument, and then, quite unmistakable, it came upon the midnight clear—"Who's Afraid of the Big, Bad Wolf?"

Beating the Clock.

A LONDON business house recently arranged a conference with its representatives abroad by means of the most ambitious international radio hook-up of its kind ever attempted. The firm was International Combustion, Ltd., and in taking leave of his listeners and colleagues the managing director in London ended the "meeting" on a note that must be unique in business circles.

This is how he closed down: "Good-morning to New York and Buenos Aires; good-afternoon Cape Town, Johannesburg, and Bulawayo; good-evening, Bombay and Calcutta; good-night, Sydney, Melbourne, Adelaide, and Perth; good-morning, Wellington! It is 1.30 p.m. here in London, so all here are going to lunch."

I feel I cannot let this occasion pass without handing out heartiest congratulations to all concerned.

Forgiveness Pays.

THE quality of mercy is not strained when it proves capable of whipping up nearly half a million radio defaulters, is it? This is what mercy has done for France.



I told you not long ago how M. Mandel, in taking a firm line with radio pirates, nevertheless gave the unrighteous a month's grace in which to declare before he charged them double fees.

The effect was most illuminating, for the declarations began to drop like gentle dew from heaven upon the place beneath.

It was twice blessed, for not only were the 400,000-odd defaulters saved from ignominy, but the taxpayers were delighted to think of all those fees being safely gathered in at last.

And now France has nearly two and a half million registered listeners, which is a

remarkable figure in the light of past evasions.

Under the Spreading Chestnut Tree.

DID you hear about the blacksmith of Massachusetts getting a divorce on account of his wife's fondness for radio? The late H. W. Longfellow would have shaken his head over the predicament of this particular village blacksmith.

Week in, week out, from morn till night, he could hear that radio; and as he swung his heavy sledge with measured beat, and slow, he swore that she must leave his house, or the wireless set must go.

The lady in question contended that a village smithy without a spot of jazz on tap was insufferable, so the matter came before the court. And the court decided

RADIO TOPICALITIES

For December 23rd are planned two outside broadcasts of topical interest. The first is from the Church of St. Hilary, in the Cornish village of Marazion, whence listeners will hear "The Stranger of St. Hilary," a new miracle play by the Rev. Bernard Walke, produced by Filson Young. The second relay is of the forty-second annual banquet given to little Londoners by the Lord Mayor in the Guildhall. This pleasant function takes place in the middle of the day, and is organised by the Treloar Crippled Children's Christmas Hamper Fund.

Percy Edgar, Midland Regional Director, presents an intimate programme entitled, "I Remember—" especially designed for fireside listening on Christmas Eve, and recalling many old favourites. He will have the assistance of the B.B.C. Midland Orchestra and Singers, and a solo artist. The programme will be his personal choice. Mr. Edgar has been the director at Birmingham since broadcasting began, and is a notable microphone personality; for many of his own broadcasts he used the name of Edgar Lane.

Martyn Webster will present a selection of tunes old and new, under the title, "I've Got Rhythm," in the Midland programme on December 27th. It is to be given in non-stop style—one tune leading to another.

A relay will be taken from the pantomime, "The Babes in the Wood," presented by Francis Laidler, at the Princes Theatre, Bristol, on December 27th. (Western programme).

that if the lady must have her radio jazz, the gentleman should have his freedom. Toiling, rejoicing, sorrowing . . . that's life!

Good Wood.

THE Admiralty will shortly be placing the contract for the building of a most unique ship. She is to be named the "Research," and the reason she will be so unique is that the use of iron in building her is banned, since she is to be the most non-magnetic ship afloat. The bolts which hold her together will be of bronze, the rigging of hemp, and the engines will be specially designed Diesels from which virtually all iron will be eliminated.

The task for which the Research is intended is the investigation of problems of the variation of the earth's magnetic field. This is a problem which is interesting the radio research people more and more as they understand it better, so it is probable that we shall be hearing a lot about the "Research" when she is capable of living up to her name.

One Thousand Different Ways.

WRITING from Staines, Middlesex, a reader stains my post's escutcheon by some very naughty language in a letter devoted to the cost of electricity.

He has all the figures at his fingertips—what they charge up in Blackpool, what the flat rate is in Caterham, and how Fulham, of all places, makes no charge at all for meters!

He says that there are about one thousand different ways of charging consumers for their current in Britain, and if this is true I grant him that perfect standardisation has not been achieved.

He exhorts me, passionately, to give the address of the Electricity Consumers' Association; and, to absolve myself from the result of a burst blood-vessel, I gladly comply. It is 46, Victoria Street, London, S.W.1.

Not Their Pigeon.

TWO important Scottish lighthouses are now being equipped with radio apparatus. One is Ailsa Craig, the towering rock in the stormy Firth of Clyde; and the other is May Island, in the Firth of Forth.

At May Island the lighthouse-keepers will be specially glad to see wireless installed, for often, "when the stormy winds do blow," they are completely cut off from the mainland.

It is rather astonishing to find that, so far as Ailsa Craig is concerned, they have been managing to communicate by carrier pigeons right up to 1935! Carrier waves, however, are much superior, except when it comes to laying eggs!

Man Must Eat.

THERE is a delightful story of Marconi told in a recently published authorised biography. It tells how the inventor was demonstrating his apparatus at Wimereux to General (afterwards Lord) Baden-Powell, at the time when the hero of Mafeking was publicly urging the claims of wireless telegraphy.

To see how it was done, Marconi called up his South Foreland station from Wimereux—but there was no reply. Called again—no reply. Overhauled the aerial and earth, replaced the receiver, and called again—no reply! (*Don't we all know the feeling?*)

Just as the suspense was getting unbearable the receiver leapt into life and announced "South Foreland. Now back from supper. Anything doing your end?"

ARIEL.



HOW TELEVISION HAS PROGRESSED

Rapid strides are being made in the science of "looking-in," as you will see from these interesting notes on the various aspects of television

By L. H. THOMAS

A FEW days ago I was lucky enough to be able to see for myself the progress that has been made by one of the two companies who will be in charge of the B.B.C.'s first television transmitters. Earlier in the year I saw a demonstration of 240-line television, but the latest high-definition pictures are undoubtedly a huge advance on what I saw before.

Ordinary news-reel films, without special "editing" for television purposes, are reproduced on the home-size screen with sufficient detail to give one the illusion that one is sitting in a cinema, while certain specially chosen films almost seem to be reproduced with a greater profusion of detail than one is accustomed to from the back row of the "sixpennies."

Wonderful Results Obtained.

One of the developments which struck me most forcibly was the extraordinary improvement in the electron-camera since I last saw it. About this time last year, the people who were supposed to know were saying that the electron-camera was "impracticable." Back in February and March they were getting very respectable pictures from it; now it is giving results that are definitely better than those obtained either by the intermediate-film or the direct-scanning (spotlight) methods.

As a rough indication of the kind of detail that may be expected from really first-class high-definition television, think of this little demonstration. Standing in the glare of several powerful lamps is a friend of yours whom you know quite well. You are looking at his picture on a screen about ten inches in diameter—the standard cathode-ray tube.

With the old 30-line television you might have hesitated a moment before definitely recognising him; with the present system you can read the words on a packet of cigarettes that he holds up in front of his face. An ordinary eye-test (memories of school and visits to the oculist!) is easily readable down to the lines which stump most people when they are viewing it directly; and newspaper advertisements, pasted in large numbers on a big sheet of paper, can be identified without a thought.

End of Time-Signals?

The suggested idea of filling the television screens during intervals by a clock-face is a distinct brain-wave. It is restful to look at, has a distinct suggestion of radio about it, and is decidedly useful. Does this fore-

cast the death of time-signals, ultimately, as we now know them?

* * *

I understand that no sensational developments in receiving technique are to be expected from the firms marketing television receivers. At least one, however, is pinning its faith elsewhere than to the

★.....★

This century-old treadmill tower in Brisbane, Australia, is one of the few remaining relics of the old penal settlement to which convicts from England were sentenced to serve varying terms of imprisonment under the colonial penal system. In those days even the most trivial offences were liable to punishment by deportation. Upon their arrival the worst offenders were compelled to tread the mill, a task which often proved beyond their powers of endurance. Later the mill was dismantled and the tower used as an observatory. The ball, seen surmounting the cabin, served for over 30 years as Brisbane's standard time signal. To-day the old tower has been converted into a wireless and television research station.

★.....★

superhet. The only alternative that is workable is a receiver with signal-frequency amplification—the dear old "T.R.F." receiver, as the Americans call it.

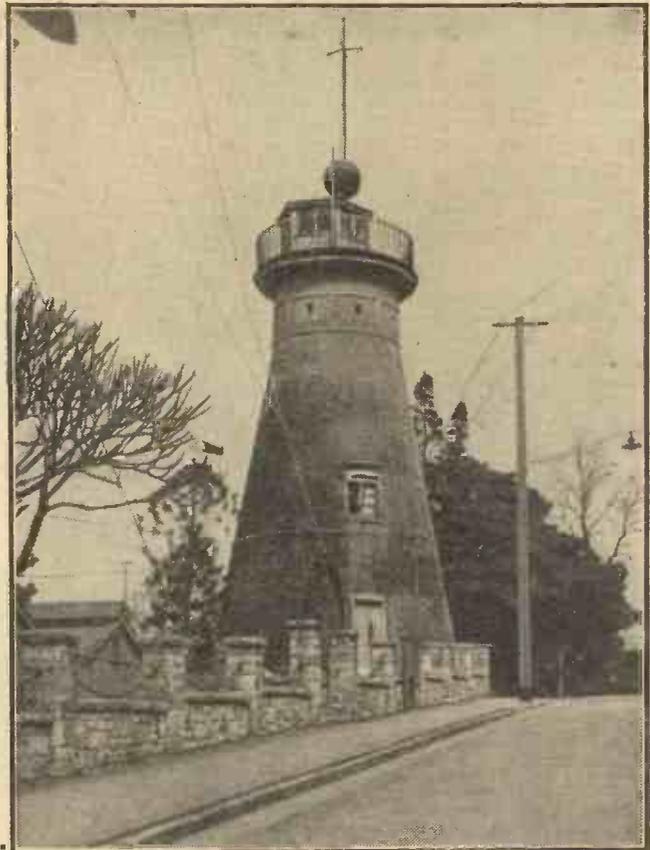
Many small patents have been taken out covering sections of the superhet receiver—detail improvements, mostly, I imagine—but no really startling changes have been made in the schemes that were originally put forward for reception.

One commercial receiver that I have seen is smaller than the average radiogramophone. It has a cathode-ray tube facing vertically upwards, with an inclined mirror in the lid; a loudspeaker grille high up in the cabinet—nearly at the top; and three tuning controls. A number of controls of the "pre-set" type are hidden away behind a small and almost unnoticeable door in the large front panel of the cabinet, but these are "works-adjusted" and should not need any attention.

I can definitely promise that the handling of a good commercial television receiver will be a childishly simple business.

* * *

Judging by the B.B.C.'s recent statement, there seems a distinct possibility that we shall have some television programmes to play with as early as next



February. This news should act as a spur to those who are half-heartedly constructing television receivers in the hope of being ready by "some time in the Spring."

I seem to have dealt, at one time or another, with all the possible types of receivers that should be suitable for the job. There are so many possibilities that the would-be television enthusiast has every excuse for getting himself into a thorough muddle.

A Simple Design.

For this reason, it may be as well to give the plain facts about my own receiver, which has been designed in collaboration with a friend who has somewhat better laboratory facilities than I have myself.

There are six valves: detector, separate oscillator, three I.F.'s, second detector. The input circuit is designed for a di-pole aerial, and "mixing" from the oscillator is effected by the "cathode injection" method. The first detector itself is an H.F. pentode.

The oscillator is a straightforward "tuned-grid" job at present, but is being converted almost at once to a cathode-tap circuit, which is more stable. The I.F. stages are a mixed bag. The first uses two tuned circuits, much flattened out with parallel resistances, and the other two use plain resistance coupling with small inductances in series with the anode resistances, to give a "lift" to the curve at the top end.

The second detector is a bigish valve (actually a Cossor 41 M.P.) biased nearly to cut-off point. The output on a locally generated (but very weak) 7-metre signal is tremendous, and the selectivity is as nearly non-existent as one can hope for!

(Continued on page 465)

NO doubt every listener has experienced fading to some extent or another. Many suffer from it in regard to their nearest broadcast station when this is about forty or more miles away. It is all very annoying, but it must be remembered that it is part of the price which must be paid for the greater distances which a station can cover after dark.

On practically every set there are programmes which would not be heard at all if there were twenty-four hours of daylight. But as soon as the night has well and truly set in, they come thumping over, but with a tendency to fall away in strength every now and then.

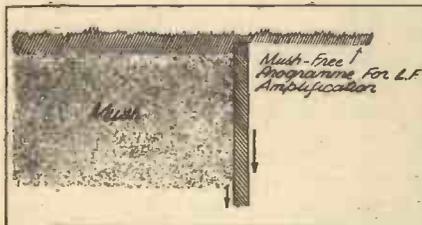
This is because it is their reflected waves which are reaching your aerial, and these waves are reflected not with unchanging consistency from something as permanent and smooth as a mirror, but from an ionised layer in the upper reaches of the atmosphere which has a shifting surface subject to continual alteration.

Automatic and Alert.

Fading can be counteracted to some extent by keeping one's hand on the volume control and altering this adjustment as the effect occurs. A.V.C. is a vastly superior method, for not only does this make it unnecessary for a manual volume control continually to be adjusted, but its action is naturally more alert. When you try to cope with fading by means of a manually-operated volume control you can operate it only as your ears guide you to do so. You have to wait until you hear the fading commence before you start "turning up the wick," and vice versa.

Automatic volume control operates in an entirely electrical manner. And it comes into action with every slightest change in the output from the detector valve, and is there in an attempt to cope with drops in signal strength before they reach the point where they would become

ABOVE THE "MUSH"



When a station is received very strongly all the background "mush" vanishes in the de-sensitising action of A.V.C.

appreciable to the ear. In this way the fading is, in practice, completely washed out—within limits.

The A.V.C. action is fundamentally an extremely simple one. There is a certain type of valve known as the "Variable-Mu," and it is available in both the screened-grid and pentode forms. The power of a variable-mu valve to magnify the energy fed into it can be varied by varying the grid bias applied to its "control" grid.

The so-called "variable-mu" volume control which figures on many sets is used to adjust the grid bias of a valve of this kind. And, as you can see, it makes a very efficient volume control, too, for it has the effect of adjusting the sensitivity of the set according to the requirements of the moment.

the highest state of the sensitivity of the set. This means, in practice, that if a station fades away down below a certain level, which will vary as with different sets, the restraint of the A.V.C. having been taken right off, as it were, and there being no further margin, the volume will have to fall away.

But such is the sensitivity of the modern set of the type to which A.V.C. is usually fitted that this condition is not very frequently encountered. At least, it is seldom that there will be that falling away from good volume to inaudibility such as you get with

THE LIMITATIONS OF A.V.C.

By H. A. R. BAXTER.

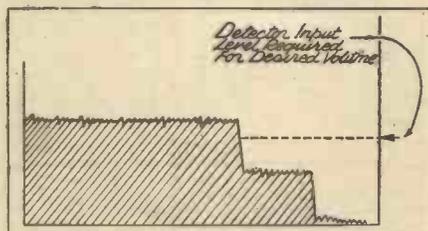
Some listeners seem to expect too much from this valuable refinement, but, as our contributor points out, there are definite limits to its powers.

Automatic volume control is really only an extension of the idea. A small part of the energy is filtered from the detector valve and applied back as bias to the variable-mu valve.

It is easy to see that as the detector output increases so is the grid bias increased, and the amplification of the set as a whole reduced. On the other hand, if there is a falling-off due to fading, then there will be a decrease in the output of the detector and a decrease in the grid bias applied back to one or more of the H.F. valves and an increase of sensitivity of the set.

The term "Delayed," which you often see applied to A.V.C., does not mean that there is any loss of time between the rising and falling of the strength at which a station

INEVITABLE FADING



If the strength of the station falls below that point where it is possible for the set, going "all out," to bring it to the desired volume, obviously the A.V.C. is powerless to overcome the fading.

is received and the subsequent compensation which is applied to offset it. It means that the A.V.C. does not operate in such a way as to cause loss of sensitivity when the very weak stations are being dealt with. That, in fact, below a certain level of signal strength the set goes all out with no restraining bias on the grid of its "variable-mu's."

Below the Critical Strength.

There is a popular notion that a set with A.V.C. always works with a brake on, as it were, and that the brake is automatically taken off every time it is necessary to provide increased amplification in order to maintain the level of volume and cope with fading. But this is only true up to a point. When stations are weaker than a certain point, then the set works all out all the time and with all restraint removed.

Obviously, this is a point where any further weakening of the station must become noticeable, for the A.V.C. does not and cannot pile on amplification beyond

sets not equipped with A.V.C.

There can be no doubt of the success of A.V.C. properly applied, but it can function only within certain very definite limits although these limits are widely apart.

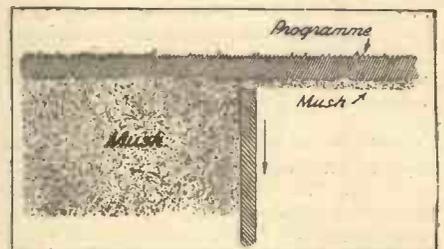
We have already indicated one limitation. There is another, and that is due to the mush that exists in the ether. It is sometimes less and sometimes more, but it is always there and is mainly caused by thunderstorms. Thousands of thunderstorms occur every day. There are dozens of them going on at any given moment. A thunderstorm hundreds of miles away will add greatly to the disturbed condition of the ether.

When Mush is Present.

The more sensitive a set is made the louder becomes this mush or atmospheric interference. It doesn't trouble the owner of a set of only moderate sensitivity. It will trouble most of all a superheterodyne set, first because of its extreme sensitivity and second because of the tendency of a super to "beat up" transient effects in the ether over a wider waveband.

One of the diagrams accompanying this article is designed to show the conditions existing when a programme can be received well above the "mush level."

INCREASED SENSITIVITY



Should it be necessary for the A.V.C. to release its restraining effect considerably, in order to magnify the programme of a given station and bring it up to the desired strength, then "mush," too, may be let in.

The bar to the right of the diagram represents the sensitivity control of the set (automatically applied in the case of A.V.C.). Now the programme is supposed to be coming over so strongly, and is so much stronger than the mush, that the brake of the sensitivity control can be put on pretty hard. Therefore, you get the programme nice and clear with no mush.

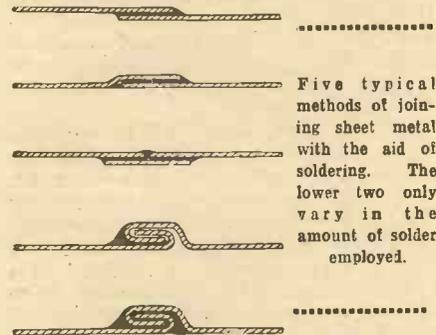
(Continued on page 468.)

Facts about Soldering

I WONDER if wireless experimenters, accustomed to using solder for making sound electrical contacts, have any idea of the enormous number of other uses to which solder is put to-day, or the immense amount of solder that is used, or the fact that the operation of soldering dates back to the earliest Roman times?

In 1933 the consumption of solder was about 30,000 tons, of which quantity about 8,000 tons were used by the motor car industry and another 8,000 tons by the canning and tinplate box-making industries. The amount of solder used in making radio sets, although very large in a sense, is only a relatively small item in the total amount of solder employed for all industrial purposes.

The history of soldering—you hardly think of such a mundane thing as soldering having any history—is extremely interesting. The old Romans used solders consisting



Five typical methods of joining sheet metal with the aid of soldering. The lower two only vary in the amount of solder employed.

of alloys of tin and lead which differed very little from those employed at the present time.

According to Pliny, they used two kinds of solder, one of two parts of lead to one of tin, and the other containing equal proportions of tin and lead. It seems that until the introduction of machine soldering, as in the motor-car and tinplate industries, there was little fundamental change from the Roman times to the present century.

The Plumber's Wiped Joint.

There was one improvement in soldering operations, however, with which the Romans were not familiar, namely, the production of the wiped joint in lead piping. Although they soldered other lead work with a typical plumber's solder, and sometimes soldered the side seams of their sheet-lead pipes with the same alloy, they generally used pure lead for joining lengths of piping together. This they did by packing the pipe ends with sand and casting a collar of lead around the joint in a sand mould.

The use of plumber's wiped joints dates probably from about 1430, when they were employed on the Bayswater lead conduit.

Soft solders are essentially alloys of tin and lead. They came early into use by reason of their low melting points, but another all-important property is that they readily adhere when molten to the surfaces

of other metals. What we call "tinman's solder" consists approximately of two parts of tin to one of lead, whilst "plumber's solder" is roughly one part of tin and two parts of lead. This latter alloy has the property of solidifying more gradually,

★ Did you know that solder was used by the Romans 2,000 years ago? Or that an enormous amount of experimental research work has been done in improving different kinds of solder? Thousands of tons of solder are used every year for industrial purposes, and in this article our Scientific Adviser, Dr. J. H. T. Roberts, F. Inst. P., gives you a brief but fascinating account of the history of this humble but important material.

that is, of passing through a "pasty" condition, and it is this property which enables the typical plumber's "wiped joint" to be made.

Soft soldering, as you know, is greatly facilitated by the use of some form of flux, and different fluxes are used according to the different compositions of the solder. In the accompanying table is given a list of the fluxes to be used with different solders. You will notice that the commonest flux is a zinc chloride solution, commonly known as "soldering juice."

In order to simplify the application of the flux, cored solder was introduced some years ago; this consists of a fine tube of the solder, the inside of the tube being filled

with a paste flux. Cored solder is now very greatly used in the vacuum sealing of tin can containers and in the electrical industry, especially for telephone work.

Supplied on Drums.

The cored solder is supplied wound on a drum, just like wire; it saves time and is economical, since correct and constant proportions of solder and flux are obtained simultaneously. A resin core is the most often used, since this is not corrosive, but acid-cored solder, containing zinc and ammonium chlorides, is often used for outdoor work, such as soldering telephone wires, where the acid spray produced is not harmful, since it is soon removed by the weather.

Solder pastes and powders, in which powdered solder and flux (general ammonium chloride) are intimately mixed together, are also available. These pastes are formed by mixing the powdered flux and

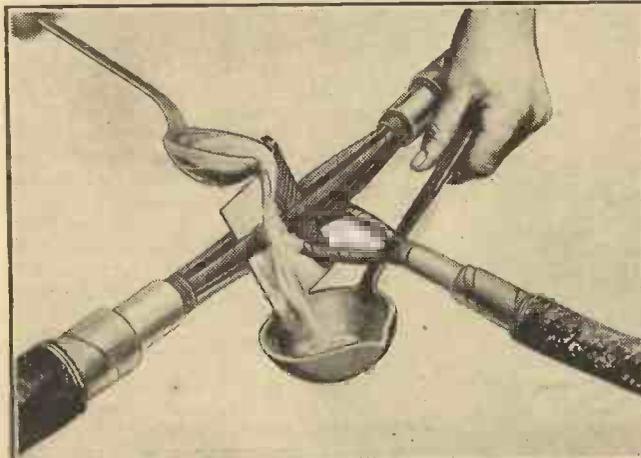
THE BEST TYPES OF FLUX

Lead to lead with coarse solder	Tallow
Lead to brass or gunmetal with coarse solder	Tallow
Lead to brass or gunmetal with fine solder	Tallow or resin
Tinning brass or gunmetal for soldering	Tallow or resin
Clean zinc, copper, brass, etc., for bit soldering	Zinc chloride
Zinc, not cleaned	Dilute hydrochloric acid
Tinplate for bit soldering	Zinc chloride
Pewter and block tin	Olive oil, tallow, etc.
Tinning copper bits	Ammonium chloride or zinc chloride
Nickel or Monel metal	Saturated zinc chloride in 50 per cent hydrochloric acid
Stainless steel	Zinc chloride
Wrought iron	Zinc or ammonium chloride
Cast iron	Zinc chloride, resin or ammonium chloride
Brass, gunmetal or copper	Zinc chloride or resin
Bronze	Zinc chloride
Gold	Zinc chloride
Silver	Zinc chloride
Bismuth	Zinc chloride or resin
Terne plate	Zinc chloride

the solder with about 15 per cent of glycerine, the proportion of chloride flux being about 2 per cent of the total weight. When soldering light articles with these preparations it is usually sufficient to smear the surfaces to be joined, and then to press them together with the hot soldering bit.

The reason that a flux is necessary is because most metals when heated in the air acquire more or less rapidly a film of oxide which prevents intimate contact with the solder. The primary function of the flux is to ensure perfect adhesion

POURING ON MOLTEN METAL



(Photo: W. T. Henley's Telegraph Works Co., Ltd.)
How copper conductors are joined in cable work.

(Continued on next page.)

FACTS ABOUT SOLDERING

(Continued from previous page.)

between the metal of the job and the solder, and this it does mainly by excluding oxygen and so preventing oxidation.

Two general classes of flux are in common use, one class includes substances of the type of tallow, resin, olive oil, etc., which are believed to act mainly as a precaution against oxidation during soldering, whilst the other class includes substances of greater chemical activity, such as zinc chloride, ammonium chloride and hydrochloric acid, which not only prevent oxidation but also remove any oxide film already formed.

I daresay you have all noticed the difficulty encountered in soldering plain carbon steel. The trouble can be overcome, however, by first applying a very fine layer of copper. This is easily done by wetting the steel and rubbing it with a crystal of copper sulphate (blue vitriol); after drying, a surface is obtained which takes the solder quite satisfactorily.

Joining Aluminium.

Many of you have no doubt tried at some time or other to solder aluminium. The soldering of this metal presents rather a special problem, owing to the tenacious nature of the oxide film present on its surface and the rapidity with which this film reappears after removal.

Since the usual fluxes do not dissolve the film of aluminium oxide, most of the methods recommended depend on removing the film by mechanical means during the actual soldering. Various fluxes, such as zinc chloride, paraffin, stearic acid, resin,

soap, sugar, and mixtures of these are often used in addition to help in excluding the air, but their value is doubtful.

Numerous compositions of other solders for aluminium have been recommended or patented, various tin-base alloys being usually considered the most satisfactory.

Typical tin-base solders contain tin 50-85, zinc 15-50, and aluminium 0-15 per cent.

Heat With a Blow-Pipe.

Before joining two aluminium surfaces the surfaces should be cleaned by abrasion and heated with a blow-pipe (a "bit" is sometimes used for thin sections). The hot surfaces are then rubbed with a stick of the proper solder, with or without the application of flux, the temperature being controlled so that the solder is in a pasty condition for some time. The rubbing removes the oxide film before the solder is completely fluid. After the surfaces have been satisfactorily tinned they may be joined with an ordinary soft solder in the usual way.

In some of the accompanying illustrations



(Photo: W. T. Henley's Telegraph Works Co., Ltd.)
How a "pot" wiped joint is made on a lead cable.

found set out at great length in a booklet to which I am indebted for the information in this article and for the tables, recently issued by the International Tin Research and Development Council. This is issued under the plain title "Solder," and is described as Bulletin No. 2 of the Council. It gives a full description of the methods of using solder in all the more important industries, and concludes with a very valuable bibliography of the subject.

For Further Information.

Those of you who are interested in soldering for special purposes, or in any industrial problems involving the use of solders, or in the subject in a general way, should get into touch with the International Tin Research and Development Council, at Manfield House, 378, Strand, W.C.2.

Full details of a special any-mains superhet unit in next week's "P.W."

THE PROPERTIES OF VARIOUS SOLDERS

Properties	Tin per cent (balance lead)					
	100	63	50	40	30	0
Temperature of complete liquefaction	232°C. (450°F.)	183°C. (359°F.)	212°C. (414°F.)	238°C. (460°F.)	257°C. (496°F.)	327°C. (620°F.)
Temperature of complete solidification	232°C. (450°F.)	183°C. (359°F.)	183°C. (359°F.)	183°C. (359°F.)	183°C. (359°F.)	327°C. (620°F.)
Freezing range	0°C. (0°F.)	0°C. (0°F.)	29°C. (85°F.)	55°C. (101°F.)	74°C. (137°F.)	0°C. (0°F.)
Specific gravity	7.31	8.42	8.91	9.34	9.48	11.34
Tensile strength* (tons/sq. in.)	0.94	3.35	2.75	2.75	2.66	0.89
Elongation (% on 4 in.)	55	32	43	35	26	39
Shear strength* (tons/sq. in.)	1.28	2.78	2.56	2.22	2.06	0.90
Izod impact strength (ft. lbs.)	14.2	14.8	15.5	14.1	11.5	5.6
Brinell hardness*	4.6	13.9	12.0	11.3	8.7	4.1
Electrical conductivity (% of conductivity of copper)	13.9	11.9	11.0	10.2	9.5	7.91
Viscosity (poises) at:						
280° C.	0.0112	0.0133	0.0142	0.0150	0.0160	Solid
300° C.	0.0109	0.0109	0.0136	0.0145	0.0151	Solid
350° C.	0.0098	0.0120	0.0127	0.0134	0.0140	0.0183
Surface tension (dynes/cm) at:						
280° C.	546	490	476	471	469	Solid
300° C.	544	489	475	468	462	Solid
350° C.	540	484	472	465	458	441

*These values are the results of tests at fairly rapid rates of loading, and may be markedly different at slower rates.

THOSE WIPED JOINTS



(Photo: W. T. Henley's Telegraph Works Co., Ltd.)
Making a "stick" wipe on a lead cable.

you will see the correct methods of making reliable soldered joints in certain typical cases.

You would hardly think it, but an immense amount of research has been carried out on solders and fluxes of all kinds and on methods of soldering adapted to the requirements of different industrial processes. Solder, for example, plays an immensely important part in telephone equipment, in electric cables, water pipes and drainpipes, in the motor-car industry, in the tinplate canning industry, and in a host of different trades.

A Fascinating Story.

I have not the space here to touch on the many interesting uses of soldering, but the story, which is a fascinating one, will be

PANEL WEAKNESS

IT sometimes happens that a newly made receiver functions perfectly—until it is popped into the cabinet. Then, perhaps, it is a mysterious failure!

Likely enough, the panel has been forced over a bit because it did not meet quite flush with the woodwork. This should never be done. Indeed, it is advisable to have the panel fixed immovably, by angle brackets to the baseboard, even before wiring the components mounted on it.

The reason is, that if the panel is forced afterwards, the connecting wire is usually stiff enough to pass on the strain to the panel's components.

It is surprising how some tuning condensers need very little pressure on the terminals to distort them out of their true capacity. What happens then is, either the tuning position on the dial has a peculiar way of altering itself at times (due to the panel being pushed over on disturbance); or possibly a loss of signal altogether, through the vanes shorting out. E. O'M.

"P.W." PLANS FOR THE FUTURE

AN IMPORTANT ANNOUNCEMENT TO ALL READERS

By The Editor

FOR nearly fourteen years POPULAR WIRELESS has maintained a leading position in radio journalism.

This might justifiably be some cause for satisfaction, but we hope that the time will never arrive when we shall be content to sit back and just let the wheels keep turning.

Although it may not bear strict scientific analysis, the old saying that "unless you go forward you must drop back" seems to work out pretty often in practice.

Well, you can take it from me that we are still aiming to go forward. And quite a long way, too.

Our creed is that however large the number of readers who may be buying "P.W." at any one time, there are just as many more to be roped in.

And we have decided that 1936 is as good as any other year for the breaking of new records.

If we were superstitious we might think it better than most other years, for it is a Leap Year, and to us that might just as well signify a leap forward!

So somewhere in the earliest weeks of 1936 we will commence a series of sustained efforts to achieve a better and more widely-read "P.W." than ever before.

It sounds an almost impossible goal.

We are going all out for it, anyway.

Not in any tentative, timidly exploratory manner either, but boldly, enterprisingly. There will be a first broadside within a few weeks.

If anyone is waiting for me to *plead* for support from readers for these efforts, he'll wait a long time. The kind of results we have in mind are those which can only be obtained by making the support of more and more readers automatic and inevitable, cause hesitant hands to snap to it and grab their "P.W.'s," make their owners glad to do it every time and mighty pleased when they have discovered what they have received in return for their threepences.

It would obviously be unfair to stop at this point and say nothing at all about what we intend to do, although it will be appreciated that our plans, though complete in broad

outline, may be subject to modification in detail, for we have embarked on a campaign which is to continue unceasingly and indefinitely. Therefore, right up to its first actual inception in print there will be an absorption of new ideas.

First of all, we are going to have a series of really interesting competitions, and there will be unique prizes. Not for just a short period, but every week through the whole year. Competitions which will amuse, competitions which constructors, listeners and even those who neither construct nor listen for regular periods will enjoy. Novel competitions for prizes which will make your mouths water!

And then there are already fixed at least two special editorial features to run in parallel through the year, aiming at a definite goal, and about that I fear I can't say more at this moment. All I can say is that I am convinced that these alone will cause "P.W." to hit new high levels in circulation and we have still a whole bunch of unique single items which is growing in size daily. Among these I include novelties which will, editorially, have a life of only one week. There is in this bunch a cunning little originality which will cost you no more than a penny or two to make, but which may well become a national craze.

And now I have told you more about our plans than at first I intended. In three or four weeks' time we shall be able to launch the grand attack. And there's going to be no slowing down, but an increasing of its intensity as the weeks pass.

Someone who knows something about our intentions asked me the other day:

"What is the date of the number in which the balloon goes up?" Which convincingly shows he was not completely in our confidence or he would not have used the singular. There are to be many "balloons"!

P.S.—Just before going to press with this article I managed to convince Victor King he ought to tell the world (through "P.W.") about his RAD-PIN. This will be an experiment in radio "with a difference." No, it isn't a set or an adaptor, or anything at all like that. I have a wager with him that at least twenty times as many people will make Victor King's RAD-PINS as built his most popular set, even including his phenomenal success, the "Vi-King" Three. **AND I DON'T THINK HE WANTS TO WIN THAT WAGER!** You'll understand why when you discover the nature of this unique Victor King proposition.

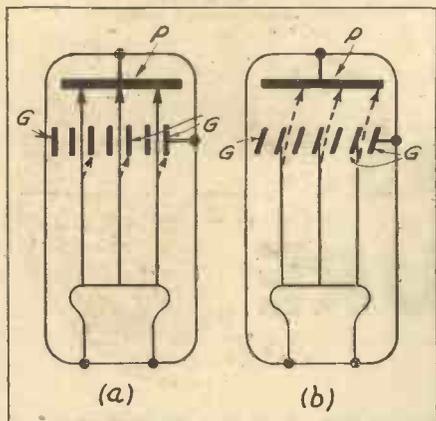


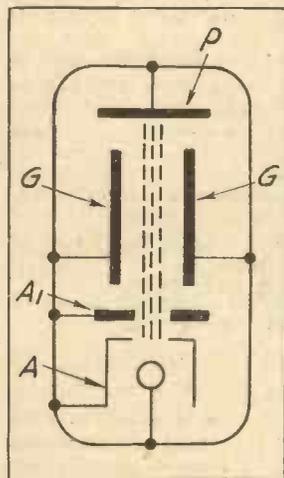
Fig. 1.—Controlling the electron stream by deflection. In (a) the grid wires G are set parallel to the path of the stream. In (b) the wires G, instead of being arranged parallel to the stream, are inclined to it.

IN the ordinary or "short-path" type of valve the distance between the electrodes, and particularly the spacing between the grid and filament, is cut down to a minimum, because the closer the grid can be brought to the filament the more effective is its control over the electron stream and the higher the amplification factor of the valve.

The grid is, of course, arranged across the path of the stream and acts on it electrostatically, making use of a positive charge to draw the electrons forward on to the anode and a negative one for forcing them back towards the filament.

Resembles Cathode-Ray Tube.

A very different arrangement is used in the new "Renode" valve, which is the latest addition to an already large family. In the first place, the path of the electron stream, from filament to anode, is deliberately made as long as possible, and in the second place the grid wires are set parallel to the stream instead of across it. In this position the grid is used to control the number of electrons which can reach the anode by swinging or deflecting the stream to one side or other out of its normal path.



THE STREAM IS FOCUSED
 Fig. 2.—Showing how the electron stream, as it leaves the filament of a Renode valve, is focused by the electrodes A, A1 into a clear-cut beam.

In order to make this method of control more effective, the electrons as they leave the filaments are first concentrated into a beam, so that in this respect the new valve rather resembles a cathode-ray tube.

Fig. 1 illustrates the broad scheme of controlling the electron stream by deflec-

LONG-PATH VALVES

A NEW DEVELOPMENT
 DESCRIBED BY
 CARDEN SHELLS

tion. In Fig. 1 (a) the grid wires G are set parallel to the path of the stream, which normally sweeps straight through them on to the plate P. An applied signal voltage, however, deflects the stream out of the straight, as shown by the dotted lines, so that it is caught up by the wires G and prevented from reaching the plate.

In Fig. 1 (b) the wires G instead of being arranged parallel to the stream are inclined to it, so that they normally intercept the whole of the discharge current. Here the effect of an applied signal voltage is to deflect the electrons to one side, so that

SHOWN IN SECTION

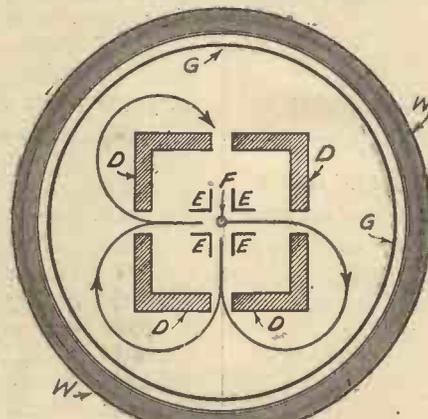


Fig. 5.—In this form of Renode valve the total length of the electron path is deliberately designed to be as long as possible.

they sweep through the barrier and so reach the plate P. The control can be applied either to the wires G, or to a second grid set closer to the filament, or to a coil of wire wound round the outside of the valve.

Using a Beam of Electrons.

Fig. 2 shows how the electron stream, as it leaves the filament of a Renode valve, is focused by the electrodes A, A1 into a clear-cut beam, which normally sweeps between the grid wires G on to the plate P. If, however, received signals are applied across the grid wires G, as shown in Fig. 3, then the electron stream will be deflected first to one grid and then to the other.

In other words the grids G act in push-pull to give full wave rectification of the incoming signal. Or the two grids can be connected together inside the valve, and the signal input applied between the combined grids and the filament, in the usual way. The valve then acts as an ordinary grid-leak detector.

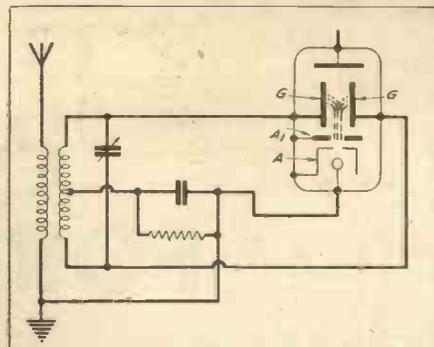


Fig. 3.—When the signals are applied across the grid wires G, the electron stream will be deflected first to one grid and then to the other.

Fig. 4 is another interesting example of a Renode circuit. As previously mentioned, the electron stream can be controlled either by a magnetic field or electrostatically. In this particular instance both forms of control are used in combination.

Plate Consists of a Coil.

The plate of the valve is formed as a small coil P of wire, which is actually included as part of the aerial circuit L, C. The centre of the coil P is tapped to earth as shown, so that H.F. oscillations are built up in the tuned circuit L, P, C. These in turn set up a magnetic field inside the valve, which, as it changes direction with the aerial currents, serves to sweep the electron stream from side to side on to the grid wires G.

The current collected by the plate coil P will therefore fluctuate, since some of it is now being diverted to the grid G. In addition, the output coil L2 is back-coupled to a coil L3 in the circuit of a second grid G1, which is set across the path of the stream in the ordinary way. The feed-back voltage on to this grid can be arranged to assist the effect of the magnetic field due to the plate coil P.

By inserting a resistance R in the output lead from the first or deflecting grid G, it is possible to use the current taken by this grid to secure a third form of feed-back,

AN INTERESTING SCHEME

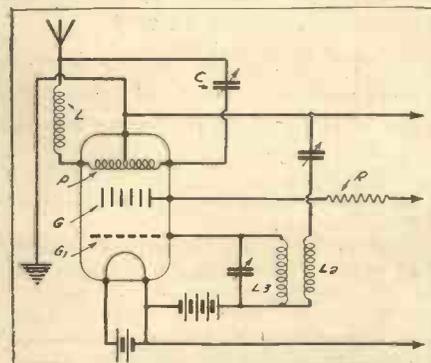


Fig. 4.—An interesting form of Renode circuit. Magnetic and electrostatic control are both used in this scheme.

because the deflected electrons trapped by the grid wires G increase the voltage drop across the resistance R, and thus further assists the controlling action.

Fig. 5 shows a form of Renode valve which is deliberately designed to make the total length of the electron path as long as possible. The valve is shown in section,
 (Continued on page 465.)

ON THE SHORT WAVES



WAVECHANGE COILS.

Some practical details of various efficient switching methods which can be employed on short waves.

By W. L. S.

WE short-wave enthusiasts have lots of fun in many ways, but there has always been one point on which we suffer from a disadvantage. We have such an awful lot of space to cover compared with our radio brethren who listen on the two broadcast bands.

A Very Wide Band.

The medium-wave broadcast band is only about 1,000 kc. wide, and the long-wave band not much more than 100. We poor folk who listen "down below" have to look after a band 15,000 kc. wide, even if our sets only tune from 15 to 60 metres! If we go the whole hog and tune from 10 metres to 100 metres, then we have no less than 27,000 kc. to wade through!

As a rule, however, the man who goes in for really "hot-stuff" DX reception does not object to frequent changing of coils; in fact, if he has any suspicion that wavechange switching will cost him anything at all in loss of efficiency, he won't tolerate it.

The other type of short-wave man, the broadcast listener, only wants to cover the wavelength range between about 16 and 50 metres, and for this purpose a simple wavechange coil is quite a workable proposition. Many commercial "all-wave" sets use a single coil with a three-way switch for the short-wave sides of their sets, and they appear to be perfectly efficient for short-wave broadcast listening.

Quite Easy to Arrange.

Fig. 1 shows the simplest possible scheme. The whole coil consists of 15 or 16 turns (for the grid circuit), and two tapings are provided. A switch, with its spindle earthed, is arranged to have three positions—one "off," one shorting out about 8 turns, and the other shorting 11 or 12 turns.

In other words, we can use "a plus b plus c," or "b plus c," or "c" only. These three sections may be arranged to work out as 16 turns, 8 turns and 4 turns, which will give us nice comfortable tuning ranges and ensure that the whole band is covered.

Readers who have tried to evolve their own wavechange schemes and make their

own coils have invariably run into trouble with the reaction circuit. Obviously, we don't want to complicate matters by introducing switching into the reaction coil as well. The less switches we have about the place the better.

One common reaction coil for all three "sizes" of the grid coil is a most unsatisfactory arrangement, when used in the normal way. Fortunately, if both coils are "sectionalised," as in Fig. 2, the scheme works very well indeed.

The grid coil remains one continuous coil, but at the points where the tapings are taken it is spread out. In other words, the three sections are wound as three separate sections, but with one continuous length of wire.

The reaction coil is similarly wound in

tuning condenser you should obtain ranges of roughly 14 to 25 metres, 24 to 40 metres, and 36 to 65 metres. Each of these is quite a manageable range, short-wave condensers and slow-motion dials being pretty good nowadays.

"Shorted turns" used to be looked upon with horror; the "dead-end" effect was a terrible bogey that led to a tremendous loss in efficiency. And so it does, when used in a straightforward coil in what should be a low-loss circuit. In a circuit to which reaction is applied, however (one which has a negative resistance, in other words), the effect is not worth worrying about, provided that the coil is sensibly made and the switch is good.

Three Important Points.

It is most important to wind the coil with one length of wire; to solder tapping points on; and to use a really low-loss, low-capacity switch. If you don't watch these simple points you will be disappointed with your wavechange arrangement.

In any case, I don't advise it for the man who wants to cover the amateur bands in search of new DX records, or even to cover the short-wave broadcast bands looking for those weak stations that most of us never manage to hear at all.

The plain truth of the matter is that the ordinary short-wave broadcast listener, who wants to obtain programme-value and amusement from his short-waver, does not need to worry about 100 per cent efficiency nowadays. If the overall sensitivity of his receiver is down a little bit, that merely means that his volume control spends its life turned up a little more than it would otherwise do.

Little Loss Doesn't Matter.

The short-wave broadcasters that have much-vaunted "programme value" are strong enough to be picked up on the most inefficient of receivers, anyway; and by sacrificing 5 or 10 per cent of efficiency to the convenience of wavechange switching their owners simply won't notice any difference!

In the average superhet, too, there is every reason why the oscillator coils should employ a convenient wavechange scheme; so long as the oscillator fulfils its function and oscillates, all is well.

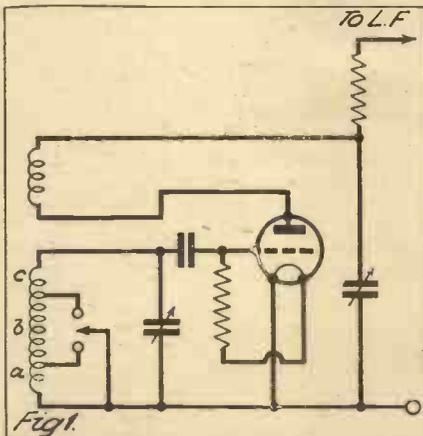
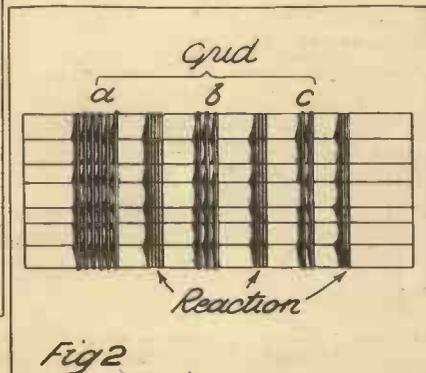


Fig. 1 shows a suitable coil-switching scheme for short-wave broadcast reception, and Fig. 2 the practical form which the coil should take.

FOR BROADCAST WORK



three sections, each one of appropriate size for coupling to the particular part of the grid coil with which it has to work. Any reader can get hold of a ribbed former and make his own wavechange coil along the lines shown in Fig. 2, and should have no difficulty in obtaining smooth reaction control on each of the three bands; but he may have to do a little experimenting with the reaction turns.

The Wavelengths Covered.

With a ribbed former of the standard diameter and the turn-numbers already mentioned, the reaction coil will probably need 6 or 8 turns coupling with "a," 3 or 4 with "b," and 2 with "c"—also wound continuously, i.e. with one length of wire.

With such a scheme and a .0001-mfd.

ON THE SHORT WAVES—Page 2.

Points from the POST-BAG

SCORES of readers are inquiring about the new experimental transmissions from H A S 3 (Budapest) on 19.52 metres. These transmissions have been coming over at colossal strength occasionally, although at other times they have sounded like a long-distance programme and made me say things after wasting a lot of time listening to the "newcomer"!

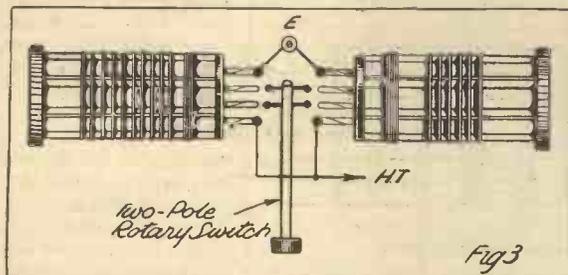
The programmes are announced by a lady in English, and the quality of the transmission is excellent. Budapest is hardly DX to the short-wave man, however, and I should not think there is much point in writing for a "veri."

R. J. B. (Burgess Hill) wants to place a milliammeter in the anode circuit of the detector in his short-waver, and to calibrate it in "R" strengths, so as to be able to give consistent reports. Unless it is a superhet with an anode-bend second detector, of course, it can't easily be done. Anode-bend is not too suitable for the ordinary short-wave detector. An external valve voltmeter is quite easy to make, and far more reliable for taking accurate readings of signal-strength. I will try to give details later, R. J. B.

Aerial Coupling Too Tight.

C. S. D. (Harrow) complains of trouble with the "B.C.L." Two, which is all right on the 31-metre band, but very little good elsewhere. I rather suspect that his trouble is over-tight aerial coupling. If he inserts

A NEAT CHANGEOVER SCHEME



This good suggestion for changing the waveband comes from a reader.

a small pre-set or neutralising condenser in series with the aerial lead-in, all should be well. Provided that the coils are O.K., there's no other conceivable reason why the set should not work equally well on all bands.

C. A. A. (Sanderstead) wants to build a good radiogram that takes the short waves in its stride. He asks my advice on the laying out of the various parts. I am strongly in favour of making (1) a good amplifier; (2) a broadcast receiver consisting of S.G. and detector; and (3) a short-waver with either S.G. and detector, or detector only. A three-way switch may then be installed to switch over to (1) broadcast; (2) short waves; (3) pick-up. The amplifier can conveniently be built in one unit with the power-pack and speaker. It does not

matter a bit about having it close up against the short-waver; as a matter of fact it would really be a disadvantage to do so. Put it on the bottom deck, C. A. A.!

F. R. M. (Birmingham) is playing with a similar idea and wants a complete design for an all-A.C. amplifier. This isn't quite within the scope of my short-wave section, F. R. G., but I'll talk nicely to some of the people responsible for the rest of the paper. Incidentally, there are no particular snags about feeding a battery-operated short-waver into a mains amplifier.

Another "Club" Wanted?

R. D. E. (Great Gransden), whose verifications from DX stations run into several hundreds, suggests to me that some short-wave people don't seem to play the game. He reads reports of reception of some of these stations that no one ever hears, and often wonders whether the writer has a "veri" to prove his statements. And another reader suggests that I should start a "V.A.C." (verified All Continents) Club.

R. D. E. wants me to state the most suitable times for logging (and verifying!) some of those elusive stations like Hong Kong (Z B W), Vancouver (V E 9 C S), Suva (V P D), not to mention C R 6 A A and C R 7 A A. Wait till I hear 'em, R. D. E.—than I'll tell you when to listen.

I have been talking at length on the previous page about wavechange coils. Fig. 3, on this page, shows an ingenious idea received from a reader. He only sent me a skeleton diagram, but I think the scheme is clear enough. Two coils are mounted back-to-back. One end of the reaction coil and one end of the grid coil (low-potential ends in each case, of course) are "commoned" and taken to the appropriate spot in the wiring. The two live ends are changed over by a home-made switch of the wiping-contact type, the spindle of which may be extended through the front panel. This gives a very compact layout with short wiring, and should be more efficient than most similar schemes.

Try This.

The other diagram refers to a test with the purpose of seeing how good your receiver is. Will it oscillate with a 1½-in. loop of wire substituted for each coil? If not can you make up a single-valver as shown, in

Fig. 4, and make it oscillate? The wavelength will be something of the order of 1 metre with the average valve. It's only suggested as an interesting experiment.

H. H. E. (Wellington, N.Z.) buys "P.W." at 6d. a week and thinks it worth it. He sends a most interesting list of stations heard out there. Can anyone tell him where to obtain the electrolyte for "Willard" rectifiers? He can't get hold of replacements.

B. J. L. (Pinner) cures hand-capacity by using a plain wooden baseboard instead of a metal or metallised one! He also suggests coupling the aerial by means of an untuned coil with the bottom end left free instead of being earthed. And he wants me to describe an all-mains two-valver. I think I will, seeing that I've been using one for a long time.

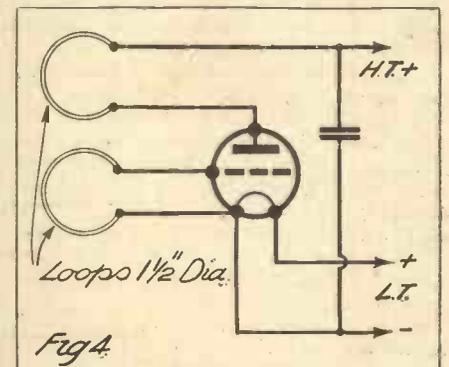


M R. G. A. LEE, the Hon. Secretary of the North Shields Short-Wave Club, writes to tell me of the Club's existence and to ask me to draw it to the notice of readers. Lectures and discussions form the greater part of the programme, but for a change there is an occasional "Members' Night," when anyone can ask questions, and anyone who knows how can get up and answer them! Full particulars from Mr. Lee, at 41, West Avenue, Balkwell, North Shields.

I have also a letter from Mr. Allbright, G 2 J L, saying that he would be glad to hear from anyone in South Wales and Monmouthshire who is interested in short-wave work—either transmitting or receiving. He is trying to arouse local interest and form a live "gang" in the district.

Conditions for the last fortnight have been fairly good on the short-wave broadcast bands and extremely good on the 10-metre amateur band. Just why this neglected band has

JUST AN EXPERIMENT



An interesting experiment consists of seeing whether you can make your set oscillate with a 1½-inch turn of wire in place of each coil.

suddenly taken it into its head to come over all freakish, I don't know!

In the old days 10 metres was never good unless all the other bands were simply terrific; nowadays it is 10 metres that is "terrific," while the others are about normal.

La Paz; C P 7, is being heard quite a lot in the 19-metre band, although he has no regular schedule. Most readers who hear him at all report very good signals. L S Y, the Buenos Aires station on 16.6 metres or thereabouts, has also been heard working with La Paz.

An addition to the long list of Venezuelans is Y V 4 R C, Caracas, on 47.1 metres. At least, I say this, but it may have been on for years! At any rate, I logged him for the first time a few days ago, and it strikes me that it is about the twenty-fifth Venezuelan I have heard between 40 and 50 metres.

In the Early Hours.

Readers who really want to be kept busy at the dials should set their alarm-clocks for 2 or 3 a.m., and listen round the 49-metre band then. It sounds more crowded than the medium-wave broadcast band during the evening. Most of the strong stations—apart from four or five really good U.S.A. transmissions—are South American. All the H Js and Y Vs are there, in a row, with only an occasional North American to relieve the monotony.

Incidentally, the North Americans that run a long schedule are still very good at 6 or 7 a.m. Someone tells me, too, that medium-wave Americans can sometimes be heard at breakfast-time on a good set. This seems inconsistent with the progress of the sunspots and the good behaviour of 10 metres.

PROGRAMME PROBLEMS PROBED—6

B.B.C. MONEY

AT the base of the programme problems discussed here is the financial factor, and in the last of this present group of articles this particular problem must be probed. In studying the financial bases of B.B.C. operations an amazing situation is revealed which probably holds the key to all the locked doors of programme development.

This amazing situation centres on the fact that there is no detailed account of B.B.C. funds available to the people who provide those funds. All that are available are the totals of income and expenditure for the years from 1927 to 1934, but these reveal why there are so many deficiencies in B.B.C. programmes. During those eight years the B.B.C. has received a total of £11,191,067 and have spent only £5,179,428 on programmes. During the last year for which figures are available only £915,025 out of an income of £2,058,983 was spent on programmes.

It should be emphasised that the £2,058,983 was a year's *income*—not capital. Any public company with two million *capital* is considered to be a mighty concern, but in the case of the B.B.C. the two million is revenue. With an annual revenue of such dimensions a public company would have to produce a closely detailed balance sheet for its shareholders, and which would be accessible to the public. How much more should that formality be necessary when the money is contributed by the public?

“Running on Unsound Lines.”

The second point for emphasis is that less than 50 per cent of the money the public has subscribed has been spent directly on the objects for which they pay. I am not being so foolish as to expect programmes to be broadcast without expenditure on stations and staff. My contention is that a concern whose overheads eat up more than 50 per cent of its revenue would, if it were a public company, be running on unsound lines.

It is obvious to anyone with a knowledge of commercial practice that the B.B.C. is spending its money unsoundly. Take the last year's figures. No less than £1,143,958 went on overheads as against only £915,025 on the actual output of the “products” of the firm—B.B.C. programmes. The proportion and relationship of those two sets of figures are bad; they do not improve under analysis.

I have said that £915,025 was spent on programmes, but I am only using that word in the generic sense that the B.B.C. uses it. According to the B.B.C. the

word “Programmes” includes payment of artists, orchestras, news royalties, performing rights, simultaneous broadcast telephone system, salaries and expenses of programme staff. As the B.B.C. does not indicate how much of the total was spent on these seven separate items the public must remain in the darkness of ignorance. A

looks as if the average payment per broadcaster is about £4 per session, and so now listeners can realise why there is uneven programme material broadcast.

The strange accountancy methods that are employed in presenting the B.B.C. official “Revenue Account” makes it impossible to ascertain how much is spent on specific objects. For instance, how much goes in salaries—and who gets what? The “salaries and expenses” of the programme staff is hidden somewhere in the seven items I have already analysed as making up “Expenditure on Programmes—£915,025.” The “salaries and expenses” of the Engineering staff is similarly hidden in another entry: “To maintenance of

power, plant, etc.—£334,958.” That is a very large sum and listeners—whose money it is—might be curious to know how much of it is devoted to the “maintenance of power, plant,” and how much to “salaries and expenses of Engineering staff.”

The only other “labour” payments shown are under two separate heads. One: “Governors fees—£6,100”; and the other: “Administration salaries and expenses—£92,875,” or a total of £98,975, which is not far short of what is available for 28,000 people who contribute the broadcast items in the programmes.

Programmes Must Come First.

Do not misunderstand me: I do not consider that £98,975 is too much for administration expenses in a concern with over two million annual revenue. I merely state that £110,000 is, in proportion, far too little for the professional broadcasters who—additional to the orchestras—have to help provide the year's programmes. My whole point is that there is serious misproportionate spending of B.B.C. revenue—the financial emphasis is inverted.

The incidence of expenditure should be in favour of the programmes. Buildings, administration, organisation, machinery should be secondary. Programmes must come first. Listeners provide the B.B.C. with two million a year, and when they do so the only thing they have in mind as return for their money is the programme service.

They are not in the least concerned with the fact that a highly organised oligarcha system has been evolved which skilfully holds the reins of radio government. They are not thrilled to know that a considerable chunk of their money (exact sum mysteriously withheld from Press, Parliament, and Public) was spent on a marvellously marblesque Broadcasting House which was

(Continued on page 465.)

IN THIS FINAL ARTICLE OF HIS SPECIAL SERIES ON THE B.B.C., GARRY ALLIGHAN EXAMINES THE FINANCES OF OUR AUGUST BROADCASTING ORGANISATION, AND EXPRESSES HIS OPINION THAT “THERE IS SERIOUS MISPROPORTIONATE SPENDING OF B.B.C. REVENUE.”

little private knowledge clears some of that darkness.

For instance, it is known that the musical activities of the B.B.C. takes about £500,000 out of the revenue. I have learned from the Performing Rights Society that the B.B.C. pays them about £100,000 yearly. We know that the Post Office receives about £20,000 a year from the B.B.C. for the rental of telephone lines for outside and simultaneous broadcasts. We know that of the 2,100 people employed by the B.B.C. nearly 700 are on the programme side and take more than £175,000



Sir John Reith, Director General of the British Broadcasting Corporation, has a salary of £8,000 a year.

per year in salaries. We also know that the news royalties costs somewhere about £10,000 a year.

Five Per Cent on Artists.

It is therefore comparatively easy to see that the B.B.C. spends little more than £110,000 on artists, or about 5 per cent of its total income. As the B.B.C. programmes give an average of 28,000 broadcasting dates yearly to broadcasters, it

HOW TO MAKE A SIMPLE "RADIOPHONE"

A Novel Musical Instrument for Home-constructors.

By BERNARD HAPPÉ, B.Sc.

EVER since the early days when hand-capacity effects caused howls in our headphones there have been ideas for producing musical notes by means of a similar but controlled processes, and some forms of apparatus based on this principle have even attained the dignity of a public performance.

But of the numerous designs which have appeared for electrical "musical" instruments of this sort, the following is perhaps the simplest for the home constructor, as its circuit contains only components which nearly every experimenter has to his hand.

Very Little Required.

The principle of the apparatus is very simple: it consists of two radio oscillators tuned to slightly different frequencies of oscillation so that in combination they produce a beat-note of frequency within the range of hearing. These two oscillators are screened from each other and from outside influences, but while the frequency of one is fixed, that of the other may be altered by varying the inductance of two coils in its circuit which are themselves unshielded.

This variation of inductance is carried out by the operator moving a small piece of metal in their effective field. In this way an output of beat-notes of different frequencies may be obtained at will, and if the instrument is carefully made and used a scale of notes extending over several octaves can be produced. The output of the apparatus can be connected directly to headphones or by way of the L.F. amplifier of a wireless set to a loudspeaker as required.

Coming now to the actual circuit shown in the diagram, C_1 and C_2 are the two coils open to outside influences and can consist of two windings of 25 turns each in the same direction, close wound in 26 D.C.C. wire and separated by a quarter of an inch on a 2½-in. diameter former.

The Variable Condensers.

These sizes are by no means critical and may be altered to suit the components available, but care should be taken to make the coils as nearly exactly similar as possible. The four leads to these coils should be twisted together and led through the metal screening surrounding the rest of the apparatus.

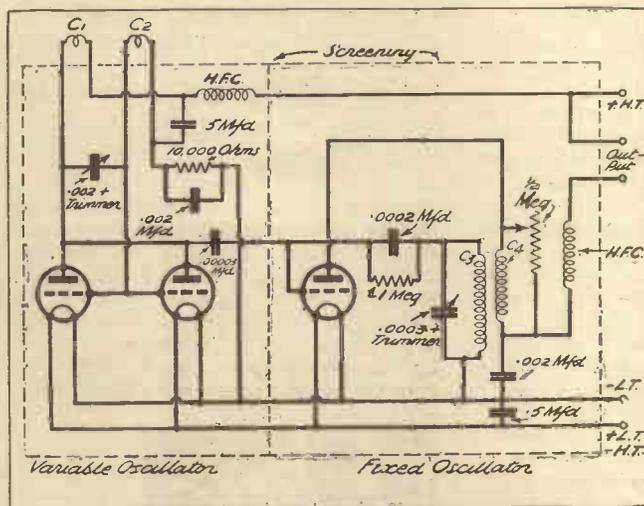
There is no need for anything elaborate in this matter of screening, the most important separation being that between the two oscillators—a pair of biscuit tins (empty) inverted over the two halves of the set on its baseboard will probably be quite sufficient.

For each of the components shown as variable condensers it is simpler and more satisfactory to use a fixed condenser of the value shown, together with a trimmer of the pre-set type in parallel. These trimmer condensers should have a maximum capacity of .0002 or .0003 mfd.

In the fixed oscillator the inductances C_3 and C_4 are both wound on the same former about a quarter of an inch apart; suitable values for these are 80 and 20 turns respectively of 26 D.C.C. wire on a 1-in. former. The variable resistance shown acts as a regeneration control for the volume of the output and its setting is not critical; the two H.F. chokes should be about 10 milli-henries each, or may be made by pairs of 5 milli-henries each mounted at right angles.

Any L.F. or general purpose valves are suitable for the circuit, but they should, of course, take the same L.T. and H.T. voltages in operation. It is sometimes an advantage in stability to earth the L.T.

A GOOD CIRCUIT TO TRY



The screening in this experimental circuit need not be elaborate. A couple of inverted biscuit tins will probably be quite sufficient.

negative terminal to the screen through a large capacity condenser, say, .5 mfd. Suitable values for all other components are shown in the circuit diagram.

When all the parts have been mounted and connected up, the leads marked "output" should be connected to a pair of headphones and then, keeping the coils C_1 and C_2 well away from the set, the settings of the trimmer condensers should be adjusted until an audible note is obtained. Further adjustment should be made until the lowest stable note that can be produced is found—reduction of the H.T. voltage at this point will often aid stability.

Learning to Play the "Radiohone."

Leaving the instrument set in this condition, now try the effect of bringing a flat piece of metal, such as a tin lid, near the coils C_1 and C_2 ; if everything is functioning correctly the pitch of the note heard should begin to rise when the metal is about ten inches away, and on coming nearer and nearer the coils it will go higher and higher until it disappears out of the range of hearing.

With a little practice the position at which the metal plate must be held to give the required note will soon be learnt and simple melodies can then be attempted.

The effect is not unlike that of a Hawaiian guitar on account of the slurring up and down the scale on passing from note to note, but the judicious use of a small spring-contact switch in the output leads will enable the performer to cut out the unwanted notes of the "glissando."

On humanitarian grounds, however, the use of headphones rather than a loudspeaker for the performer should be made compulsory during the early stages at any rate!

A PECULIAR EXPERIENCE

An interesting letter from one of our readers.

The Editor, POPULAR WIRELESS.

Dear Sir,—Wireless is a strange thing, and the following experience is hard to beat. The truth is, I was too lazy to set it right—the lamp-holder, I mean. It worked all right, gave a perfectly good light except when somebody walked on the floor above. At such times it gave just the merest suspicion of a flicker, but if the set happened to be switched on a crackling sound could be heard. Thus it had been for many a long day.

Until the day came when the star that rules my destinies saw fit to vouchsafe something in the nature of a miracle.

I was tuning-in on the long waves, when simultaneously I heard someone in the

room above. As the crackling began I was surprised to hear snatches of a voice in between the crackles. Sure enough, I heard "the," "you," "test" and other monosyllables whilst the person was walking about upstairs.

Greatly interested I stood on a chair and lightly tapped the electric-light bulb with a pencil. In this way I was able to keep the holder in more or less constant vibration, so that I could get an idea of what the voice was saying.

Judge my surprise when I found that I was listening to a local amateur transmitting on a wavelength around 5 metres!

The arcing which was taking place at the lamp-holder had apparently emitted waves which heterodyned with the 5-metre signals, producing a wave which could be picked up on the receiver. At least, that is the only explanation I can find to fit the facts. Perhaps other readers will have a better one.

Yours faithfully,

WM. NIMMONS.

Has SYNCHRONISATION Succeeded?

EUROPE, although the second smallest of the continents of the world, has a population of around 500 million souls scattered over every conceivable kind of country. Its passion for dividing itself into the largest possible number of national units, each having its own language and culture, is another characteristic.

With this preliminary reminder, let us come to the point. The coming of broadcasting has presented Europe with peculiar difficulties—just because, in an ether sense, it is a relatively small area; just because it contains, in spite of this fact, so many millions of potential listeners, and just because there are so many subdivisions demanding individual services of programme material.

Services Which Overlap.

The result is plain to see. High-powered stations have been erected primarily to serve national interests. Due to the peculiar disinclination of ether waves to acknowledge political frontiers, these services overlap. A high-powered station in France, for instance, will inevitably provide many German listeners with a loud night-time signal. One might say that the whole basis of foreign station reception possible on a modern set depends on this fortuitous overlapping of national broadcasting services.

Implicit in the erection of so many high-powered stations all over Europe is an inevitable wastage of power—and wavelengths. If Europe were like the United States—a homogeneous comity of peoples—it would be possible to conceive a drastic reorganisation of its broadcasters, a wholesale rearrangement of the locale of each rationalised service area. Europe is not likely to coalesce in such a facile manner—not in our time, anyway.

The Overcrowded Ether.

Meanwhile, the ether is overcrowded with stations. On the long waves there is really only room for 17 stations between 1,000 and 2,000 metres; on the medium waves, for 106 stations. Under the Lucerne plan each country of Europe accepted—many unwillingly, it must be said—the share-out of these precious broadcasting channels as offering the best compromise in the conflict between national interests and international chaos.

Our B.B.C.'s share was barely enough to meet existing needs, and certainly not enough to cope with future developments. We got, or are now using through subsequent adjustments, a total of twelve wavelengths—one on the long waves and two on the medium for the National programme, and nine on the medium waves for Regional alternatives.

At the moment there are five high-powered Regionals—North, Scottish, West,

London, and Midland. The rest of the wavelengths are occupied by national and regional auxiliaries of medium or low power. Envisaged are three more high-powered Regionals—North Ireland, which is nearly ready for aerial tests; North Scottish, which

.....
Sir Noel Ashbridge, Controller of Engineering of the B.B.C., discusses broadcasting with Alan Hunter in an exclusive interview.

is now being built; and North-Eastern Regional, the site of which has now been chosen.

North Ireland Regional will take over the low-powered Belfast's wavelength. North Scottish—what? There is no obvious wavelength available, simply because this high-powered station is covering new ground, not improving the service in an existing area—in an area already covered by the B.B.C.



.....
 Sir Noel Ashbridge, B.Sc., A.M.I.C.E., M.I.E.E., took over the position of Chief Engineer of the B.B.C. on the resignation of P. P. Eckersley. He is now "Controller of Engineering," in charge of the whole of the technical side of the B.B.C.

North-Eastern Regional will presumably take over the present Newcastle's wavelength, thereby solving a problem with comparative ease. Here the conditions are different from North Scotland, for the Newcastle low-powered station already supplies part of the area it is hoped to extend for good reception when North-Eastern Regional takes the air.

Not Enough Wavelengths.

If we look at the wavelengths carefully, we see at once a significant trend. On a wavelength of 261.1 metres are working three stations—London, North, and West Nationals. In the West, it might be added, the B.B.C. proposes to extend this idea of common working by erecting a 5-kilowatt transmitter at Besumaris, Isle of Anglesey, to work on the same

wavelength as West Regional, when that station assumes its eventual role of serving only the Welsh country across the Severn and Bristol Channel. That can happen only when the West Country stations have been put up at Plymouth and Bristol.

The immediate point is this: we have more stations in existence or coming into action within the next few years than we have wavelengths for them to work upon. Something has to be done. What has been done may be taken, at least, as an indication of what may be done in the National wavelength economy.

Those Who Complain.

One hears varying reports as to the success of this daring experiment in synchronised station working. The bulk of listeners whom these medium-wave Nationals are intended to serve live within, say, 20 to 25 miles of the station sites, and they are not complaining. It is the less fortunate people living over 30 miles from the station who are apt to suggest it is very wicked of the B.B.C. to deprive them of a reasonable night-time service.

Knowing that we have fewer wavelengths than we need for the forthcoming stations planned by the B.B.C., I wanted to find out whether synchronisation, in the opinion of the Engineering Department, had succeeded. For upon its success, I assumed, the future status of new Regionals might largely depend.

Sir Noel Ashbridge very courteously agreed to see me on this important question. Like all really busy men, he found time to give me half an hour's invaluable insight into the whole business.

I am not going to quote Sir Noel verbatim. It was just an informal chat. I find that informality among the B.B.C. chiefs leads to more information.

Day and Night Difference.

For a start, the Controller of Engineering—to give Sir Noel Ashbridge his full title these days—pointed out to me that the conditions for synchronisation were quite different at night-time from day-time. If, as he said, two stations are synchronised, all is well during daylight provided they are separated by two or three hundred miles and are using fairly short—that is, quickly attenuating—wavelengths. The reason being that, within the recognised service area of each station, there will not arrive sufficient signal energy from the other to cause any appreciable interference.

At night, though, the indirect ray from the distant unwanted station—the ray reflected back to earth by the Kennelly-Heaviside layer, that is—will introduce a complication. At one moment this ray will add to the ground-borne energy of the local wanted station; at another moment it will

(Continued on next page.)

THOSE RADIO COMPONENTS

WHEN you construct a wireless set you are probably handling component parts each of which, in the first place, cost hundreds of pounds to develop and perfect, for the days of simple hit-and-miss methods of design are over. Modern radio and present-day reception call for something more than these methods.

Even a simple component such as the small fixed condenser—of which you will find many in the average receiver—has now reached such a stage of perfection that it is possible to obtain these condensers with characteristic standardisation which was only dreamed of years ago.

Effect of Mass Production.

These important developments, even in the smaller components, have enabled manufacturers to give a far higher guarantee of reliability than was hitherto possible, and mass production has brought down to a very fine art one of the most important components of modern radio.

Tuning coils are also a remarkable example of the science of modern radio. Whereas only a few years ago we were content to use large diameter coils covering only a limited waveband, to-day we have small, compact and extremely efficient coils.

HAS SYNCHRONISATION SUCCEEDED?

(Continued from previous page.)

subtract from it. This, it should be emphasised, is a function of the reflecting medium, and cannot be prevented, however good the synchronisation may be.

As a matter of technical fact, the present degree of synchronisation is extraordinarily good. At the beginning of the experiments the B.B.C. could claim an accuracy of some three to five parts in a million. This meant, roughly, that the strength of the local signal received had to be five times that of the distant signal energy working on the common wavelength.

A Common Tuning-Fork Drive.

Nowadays, with the common tuning-fork drive keeping all three stations on the same wavelength by a land-line link, the accuracy of synchronisation has been improved to such an extent that only a 2½ to 1 ratio of wanted to unwanted signal need be received in order to enjoy interference-free reception. The gain is obvious; a larger area of mush-free reception is now possible within each station's orbit.

As Sir Noel added, if there is a signal coming down from the layer with a peak strength of 2 millivolts per metre, it needs only a 5 millivolts per metre of energy from the local station to provide adequate service. A figure of 2½ millivolts per metre is, in any case, about the usual minimum for a signal energy able to over-ride static and general background. So it will be seen that comparatively little loss of real service area is now sustained by syn-

Due to mechanical research into their construction, modern coils are not only rigid, but it is possible to operate their wave-change switches without fear of the coils coming adrift in the changeover.

There is still some room, however, for further improvements in coil switches, for a few ganged coils still have a nasty habit of failing to change over without the control knob being waggled several times.

In most cases, however, this is due to the failure of the manufacturer to employ satisfactory bearings for the actual switch rod, thereby allowing the coils to become out of alignment. A metal spindle in a powder-moulded bearing is sure to give trouble sooner or later unless the spindle is of round section and of reasonable diameter.

Nevertheless the foregoing fault, which is easily overcome, does not detract from the fact that modern coils are rapidly approaching perfection.



ELSIE CARLISLE the popular vocalist who is now running an act of her own in which she is accompanied by two pianists.

chronisation, always assuming the same programme can be radiated from the stations concerned.

A great deal of work on tuning-fork drives has been conducted in the past year by the research station at Nightingale Square, Clapham. Engineers of the B.B.C. have been particularly engaged in studying the necessary precautions at each station using the tuning-fork drive—precautions designed to counteract variations at each station, quite apart from the drive itself.

These experiments have had a great effect on the efficacy of the synchronisation gear. Work on the special filters through which the stations are driven has improved the accuracy to such an extent that only a 2 to 1 ratio of wanted to unwanted signal is now necessary. It does not matter which station has the actual tuning-fork, so long as the lines connecting the stations are suitably tackled with these filters.

I suggested that the B.B.C. was going ahead with synchronisation more than other countries, but Sir Noel reminded me that the Germans and the Americans are

There is, however, one component which still needs a certain mechanical examination, and that is the valveholder.

I have often wondered why the present small valve base has not been scrapped ere this, for on valves with a large number of electrodes the pins are arranged on a surface which is really too small to allow the manufacturer of the valveholder scope for a perfect design.

Ingenious Valveholders.

Several component manufacturers have produced extremely ingenious holders for these multiple types of valves and have overcome, to a certain extent, the limitations due to the present small valve base. But if the present valveholder is to be retained there are several improvements which are called for. One is, some means of locking the terminals so that it is possible to screw down the terminal head without fear of the screw passing through the holder becoming loose.

Iron-cored components have been changed to a greater extent than any other group of components. Small low-frequency transformers, for example, are now available which a few years ago would have been of such dimensions that they could not conveniently have been incorporated in a radio receiver, and having characteristics which are nearly perfect, while the price is well within the reach of all.

J. R. W.

also working on a similar idea, although their detailed arrangements are rather different. We were, he admitted, the first to synchronise three high-powered stations on one wavelength.

I hinted that the so-called high-powered medium-wave Nationals were not really high-powered any more, seeing that their advertised rating was only 20 kilowatts, instead of the original 50 kilowatts. Sir Noel gave me a very good reason for this reduction. He explained that there was an economic limit to the worth-while power for synchronised stations—anyway, in such a tight little island as England.

Powerful Indirect Ray.

If the original power had been retained it might have defeated its own end, he said. For a 50-kilowatt aerial power will mean a more powerful indirect ray coming down on the distant listener, and a stalemate might result. It is no use having a stronger local signal if the indirect ray from the synchronised station is equally stronger. With full power it might take a 10-millivolt per metre local signal to give freedom from indirect ray interference. Whereas now, as already stated, a 2½ to 1 ratio is quite sufficient.

Sir Noel agreed that the future expansion of the B.B.C.'s service depended on how far wavelengths could be economised. He did not give me the slightest indication that any stations now in operation might be scrapped. His obvious faith in the idea of synchronisation points to the logical alternative—to more and more stations working on shared waves.

In answer to my original question: "Has Synchronisation Succeeded?" the Controller of Engineering would seem to imply by his remarks a fairly unequivocal answer: "It has!"

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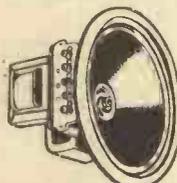
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BUILDING A TELEVISION RECEIVER

Is it possible for the home constructor to make his own high-definition television receiver? A topical question that is discussed and answered in this outspoken article

By
G. STEVENS

NOW that the details of the new television service have been published, there must be amateurs who are asking themselves this question. From the published specification of the new systems, the problems involved may well seem outside the scope of the ordinary home constructor—a receiver to cover a frequency band of 2,000,000 cycles, for example.

How many of us have tried to build a "high-fidelity" amplifier? The frequency range of a good amplifier should cover 20 to 10,000 cycles, and with a little extra trouble it can be extended to 100,000 cycles. But two megacycles!

It is an audio-frequency amplifier no longer, but a very wide-range radio-frequency one! And this is to be added to a short-wave receiver to pick up a signal on the waveband far below that usually favoured by amateurs.

Here again the difficulties of design increase very rapidly as the wavelength goes down, and previous experience on the amateur bands may not prove as helpful as one expects.

The New Technique.

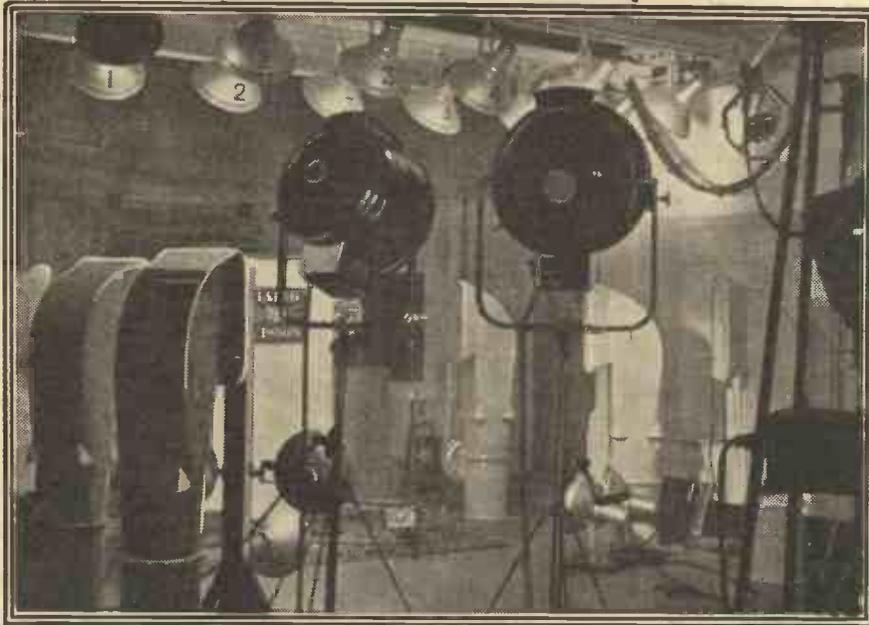
Finally, there is the new technique of the cathode-ray tube used as the reproducer of the picture. This has its own problems, not the least of which are the provision of high voltage and the adequate protection of the components.

Truly the home constructor may feel disheartened at the prospect, and wonder whether he will not spend more time and trouble in the long run than the value of a ready-built receiver.

The answer to all the doubts and fears is this: What sort of home constructor are you? The right sort, of course, or you wouldn't be reading this article.

But, seriously, it is no good going in for this new science unless you are prepared to work carefully and skilfully on the building of radio sets and exercise more care and more skill (if possible!) than you have done before.

Here is an example of the thing you will be up against. The scanning circuit may be a high potential one—there are both types, and it may be that you elect to build



Groups of up to six persons are scanned by mechanical means in the French television studio seen here. Special ducts for cooling air are used to counteract the heat dissipated by the 40 kws. of lighting employed.

a high-voltage one, with, say, 1,000 volts between live terminals and earth.

You make your usual neat job of the wiring with all the leads nicely insulated in systoflex and running neatly through a hole or two in the chassis. You test all the connections and switch on. All is well, but presently a smell of burning is noticed and one of the resistances starts to smoulder. Bang goes 3s. 6d. on a new resistance!

What was the cause? You can't find out, but it may have been that the systoflex was not quite as good as that last lot you had, and it got frayed where it passed through a hole in the board. On an ordinary 250-volt circuit it would have probably gone on behaving as though there was no fault, but the extra potential on the lead has done the damage.

Every wire has to be scrutinised with the utmost care and the wiring done as though a hyper-critical inspector was standing at your elbow ready to pounce on the slightest fault.

Good Joints Required.

By the way, do you ever pull on a soldered joint after it has been made to see whether it will stand up to a strain? It is surprising the number of constructors who leave it because it looks all right. And it is still more surprising the number of constructors who avoid soldering a joint if they possibly can.

Take it as quite definite—a short-wave receiver and a cathode-ray tube circuit will need every joint soldered if it is to stand up without flickering and scratching.

Components—it is a fatal temptation to use things out of the store box, to use a more polite term for the junk box! But are you sure that the reason for the dis-

carding of the component was not that it gave suspicious behaviour? Some people hate to throw things away, and after they have been in store for some time it is difficult to tell whether they were quite a "right or a little bit off!"

A five-pin valveholder is needed for the short-wave receiver, and is looted from an old eliminator which will never be used again. And when the set is built the volume does not come up to expectations. The valveholder should have been a low-loss one, and there is all the trouble of investigating and putting in a new one.

The hard-bitten constructor will say: "Yes, but I know all this. I never use any but specified components, and I always check everything before I switch on." Good, and in the television receiver, check twice before switching on and then have another look!

These warnings may seem childish to some experimenters, but how many of us can truthfully swear that we have never put in a wrong

component or made a wrong connection?

An experienced radio engineer was tuning up a cathode-ray tube apparatus the other day when the beam suddenly disappeared. He said: "I know what that is—had it before—it's the condenser shorted," and proceeded to cut the lead to remove the short. After the second cut lead he found that the H.T. fuse had gone, and on replacing it everything worked merrily! Moral—don't suspect the most obscure causes of troubles before looking at the obvious ones!

More Care Necessary.

All the foregoing can be summed up into the words—extra care. There will be nothing fundamentally new in making television apparatus, the components will not be made of glass or require cooling in liquid air, but they will require care both in their assembly and in the connections to them. A short-wave receiver is like a broadcast receiver in appearance, but things which we could afford to overlook in the one will be of vital importance in the other.

Soon the B.B.C. programmes will be announced and the constructional articles will appear. But don't wait for them or you may find your hands full with so many new things to try out and new principles of working to understand.

Start now and experiment with short waves. Make up a straightforward design if it is your first experience, and try for yourself the effect of altering the positions of the various components.

If you are used to handling a short-wave receiver by the time that the transmissions are in progress, so much the better. You have made a step forward, and are ready to turn to the cathode-ray tube side.

AS part of his aim to popularise the B.B.C., Sir Stephen Tallents, new Controller of Public Relations, has started a monthly Press Conference in the Council Chamber at Broadcasting House. To this are invited all the regular radio scribes, including your humble servant. This month we foregathered to be introduced to Mr. Cecil Graves in his new capacity of Controller of Programmes.

Needless to say, it was a very lively meeting; for if there is one aspect of broadcasting everyone thinks he knows something about, it is programmes. Mr. Graves manfully stood up to any amount of cross-examination; to enquiring from the back benches, from left to right.

To carry on the Parliamentary metaphor, I should say that Mr. Graves, our new Controller, is a very good party man. By which I mean that, although he is obviously very keen on infusing new ideas into the programmes, he is fully conscious—perhaps a little *too* conscious—of the machine in the background.

He mentioned that he had been on the job only two months. That although he was an old hand at the broadcasting game, he had been out of the main track for two or three years while devoting all his energies to the getting going of the Empire Service. He told us of the new men who were still feeling their feet. He hinted that rush tactics were not in his mind. He said quite categorically that apart from minor modifications there would be no upheaval of the programme layout until next Autumn at the earliest.

I do not in any way criticise Mr. Graves for taking his time. He is quite right to explore every avenue, as the politicians would say. I only hope that in doing so he will still further emulate the worthy "M.P.s" and leave no stone unturned.

The Sunday Programmes.

For there are a good many stones that need not merely turning but heaving right out of the broadcasting system. Sunday programmes, for instance. We ask for bread, they give us stones. Or perhaps that is too overdrawn.

I am not going to tell you what happened about Sunday programmes, because we were asked not to. But a pretty definite intimation was given by those present that a *real* brightening of these week-end programmes was demanded. More dramatic items, a shade more light music here and there—these proposals from the Programme Controller were only pinpricks where a shovel is needed.

Similarly with another crying reform: the provision of real alternatives. Although he did not commit himself, the Programme Controller hinted at the possibility of reducing the number of alternatives at any given time, the idea being to share, say, three programmes among the whole B.B.C. network.

On the other hand, he did offer some hope of late night alternatives. Admittedly only a minority of the total listening public wants anything at all after, say, 10.30 p.m.—most of us being safely tucked away in bed

by then—but for the rest it is no longer denied that dance music is not enough. We may hope for shorter individual dance band broadcasts, with contrasting programmes until midnight for those who do not care for any dance band at all.

Another late night innovation will be an 11.30 p.m. news summary, if Mr. Graves has his way. He thinks that many people who have been out to a show or otherwise spending their evenings out of doors will

He is at least amenable to reasonable requests, I am sure.

He would also like to cut down the radio drama to a one-hour maximum, but quite rightly points out that the material for such broadcasts in any case is limited and many of the productions taken from the novel or theatre will not stand cutting down to one-hour shows. He offered it as his own personal opinion that once one tuned-in a play one simply went on listening to it without bothering about the time.

Another broad sweeping change that will eventually come about through the work of the new Controller is the improvement in the quality of the morning and afternoon programmes. At one time these programmes were thought to be merely stop-gaps, mainly for the benefit of radio dealers;

but as Mr. Graves admitted, "there are several distinct audiences to be catered for throughout the day and we shall endeavour to provide each separate audience with better programmes."

The scandal of song-plugging has not been overlooked, added Mr. Graves. He intends to tighten up control of all outside broadcasting material, to treat it all as though it were emanating from a B.B.C. studio. With greater control as to the choice of items broadcast he hopes to strike at the root of the evil. Everyone who has listened with intense boredom to the repetition of certain dance numbers will be glad of his promised attack.

In the Talks section he did not offer any hope of immediate change—nor, I think most people will agree, is there any particular grouse about this part of the broadcasting service. He has a feeling that the new men ought to be able to find their feet before being asked to try out novel and exciting ideas. I translate that as meaning that by the time these young hopefuls *have* found their feet they will also be "good party men" and not want to try anything too desperate.

Regional Criticisms.

The representatives of the provincial papers—given for the first time possibly in years of writing about broadcasting a chance to get into touch with a key administrator—offered some refreshing comments. They especially wanted to know how far the Regions were "dictated to" by "H.Q." Fortunately this question could be put upon Mr. Charles Siepman to answer, for he is the new Director of Regional Relations.

Altogether the meeting was most illuminating. It showed Mr. Graves as a very human sort of man, by no means high hat or highbrow. It showed, too, that in his function as Director of Public Relations, Sir Stephen Tallents is fully alive to the representative nature of criticism offered by the assembled Pressmen. Another jolly meeting next month, chaps!

Mr. GRAVES MARKS TIME

Our Special Correspondent tells "P.W." Readers what happened at the first of the monthly Press conferences at Broadcasting House.

welcome a final summary of news—a repetition, presumably, of the second news bulletin. One is inclined to suggest here that an 8 a.m. news review would meet the needs of millions where this suggestion will cater for only thousands, but the N.P.A. agreements effectively muzzle B.B.C. activities in the news line before 6 p.m.

Where I do think Mr. Graves has hit upon a reform that will meet with widespread approval is in the shortening of the

PROGRAMME CONTROLLER



Mr. Cecil Graves, Controller of B.B.C. Programmes, says that, apart from minor modifications, there will be no upheaval of the programme layout until next Autumn at the earliest.

symphony concert broadcasts—and indeed so far as possible all broadcasts—to a maximum limit of one hour. Side by side with this he promises a series of Toscanini-conducted concerts some time in May or June of 1936.

In response to the outcry for more music-hall broadcasts—it will be remembered that the B.B.C. cut down this regular weekly feature to one a month when the present autumn plans were decided upon—Mr. Graves promises at least one a fortnight.

★ NEXT WEEK. ★

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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.

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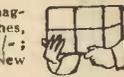
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QUESTIONS AND ANSWERS

ANOTHER RE-TRIMMING PUZZLE.

H. C. (Nottingham).—"Although I had read in your paper some accounts of surprising alterations in the settings of trimmers caused by small alterations to the sets concerned, I must admit I generally took these with a grain of salt, thinking to myself that the chap who did the re-wiring, or whatever it was, probably interfered with other wiring without noticing it."

"Having gone to no end of trouble to get my own trimming right, I was very sure that nothing would induce me to alter it unnecessarily. So when fitting a new grid condenser I was particularly careful about the job."

"The new wiring was short, and easily gettable. And the only alteration was that in replacing the condenser I shortened its leads by about one inch all told, as the new condenser was more easily fitted "in the air" by its tags than the old one, which was mounted by screws through the metal base-board."

"Well, perhaps you can guess what happened. I switched on and found every sign of mis-trimming. And sure enough, when I readjusted the detector trimmer, I found I had to put in a good half turn's extra capacity on it to get the circuit properly trimmed again."

"The more I think of it the more puzzling it seems, since I would have expected only the very slightest readjustment would have been required, if any. Can you suggest why such a very small alteration in the length of the wires produced such a very pronounced change in the capacity?"

We do not think it was the length of the wires that made so much difference. The fact that the condenser was formerly screwed to the metal base-board, and is now "in the air" is a much more likely explanation. In the former position it evidently had an effect on tuning capacity that had to be compensated for when it was placed in its new position.

WHEN TUNING IS UPSIDE DOWN.

G. S. (Stanford, Essex).—"I have built a radio-gramophone. The set is the 'Unity' Two, published in 'P.W.' December 9th, 1933. The results I get are very good, considering it is only a Two which works on an indoor aerial."

"I get about ten stations at good volume, and on the gramophone side it wants some beating."

"The trouble is that the tuning is upside down. The London Regional comes in where the London National should be, and vice-versa. Can you tell me why this is?"

"The set is built with all components as specified, and everything of the best. The speaker is a Senior Stentorian, B.T.H. pick up, and Garrard motor. I have been a reader of your paper since 1924, but have never had trouble with tuning before."

Yours is certainly a very unusual case, G. S., and we are inclined to think that the tuning condenser is incorrectly mounted in relation to its dial reading.

We have known of instances where, through some mistake in condenser assembly, the mechanism governing the dial movement has had its action reversed, so that with the vanes completely interleaved the dial indication is at 0.

Whatever the type of condenser used, the indication should correspond with the amount of interleaving of the fixed and moving vanes. That is to say, it should show maximum when they are fully enmeshed, and 0 when they are completely disengaged one from the other.

If this state of affairs does not apply to your condenser, the mechanism needs reversal to make it apply.

WHAT IS A BARRETTER?

A. M. (Grantham).—"From a friend in Vancouver I have received a circuit which he has found very satisfactory, but I notice that one of the components (see the enclosed copy) is marked 'Barretter.' This is a new one on me."

"Is it a Canadian term for a resistance or something, or is it a component which we do not use over here?"

Barretters have long been in use in this country, though they are not always called by that name. Instead, they are often called current regulators, or some similar term, since that is the purpose for which they are employed.

The device is of special value for use in a design in which valve heaters are wired in series, and must

(Continued on next page.)

WIRELESS AND TELEVISION REVIEW

is THE BEST RADIO SHILLINGSWORTH Have You Seen the December Number Yet?

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Valves. It is as well to remember that NO Barretters, NO Breaking Down Resistances and NO Mains Transformers are required. There is an O.G. Valve for every purpose—and every valve is guaranteed for 6 months.

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Universal "High-Mu 3" Kit, 200-2,000 m.	£5 17 6	6-Valve All-Wave Super	
Universal 3-Valve All-Wave Receiver, 19-2,000 m.	£7 10 0	Kit, 13-2,000 m.	£14 14 0
Universal "High-Mu 4" Kit, 200-2,000 m.	£8 10 0	Amplifier Kits from	£5 5 0
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A modern Receiver in every sense of the word. Beautifully constructed from finest materials by skilled technicians. The controls are simplicity themselves, yet the results astonishing, for the new REVOLUTIONARY SOUND DIFFUSION BY MEANS OF SOUND REFLECTORS incorporated removes many of the inherent defects in present-day Loud Speaker reproduction, and ensures a degree of fidelity which was thought impossible. Our Catalogue contains interesting specifications of the complete range of HYVOLTSTAR UNIVERSAL Receivers, Radiograms and Amplifiers. Write for Particulars, Prices from 10 to 60 gns. Obtainable in Chassis Form. Universal High Voltage Radio Ltd. (Dept. D), 28-29, Southampton St., Strand, London, W.C.2. Telephone: TEMple Bar 8608 and 4985.

An Ideal Christmas Gift for the Home



Ask for details of our 'ON APPROVAL' scheme.

RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

operate at a constant current. The barretter is able to maintain the current passing through it (and therefore through the circuit of which it forms a part) within certain fairly close limits, despite the fact that fluctuating values of voltage may be applied across the barretter in series with the load.

Various types of barretter are available, to cover the different requirements of load and limits that are necessary in practice. So if you are thinking of getting a barretter for any particular circuit it will be necessary to choose one suited to the current that is to be passed and to the voltage-variation range applicable to the set in question.

CAN RE-TRIMMING AFFECT WAVE-LENGTH?

F. W. C. (near Singlewell, Kent).—"Does the re-trimming of a set sometimes alter the wavelengths over which it can be tuned? I ask because, although I have been successful in re-trimming so far as increased strength goes, I seem to have made my set 'tune higher.' My lowest station used to be Bournemouth, on 203.5 metres, and being an English programme I was certain that this was the lowest wavelength which my set was capable of receiving.

"Since the re-trimming I cannot get down as far as 203.5 metres, but my lowest station is a Frenchman, which I think is Radio Lyons. I get no extra stations at the top of the dial to compensate, so can you tell me how to get back to the former wavelength coverage?

"I do not want to re-trim, as I went to a lot of trouble over that, and I am sure it is now as perfect as can be."

You may have done the re-trimming perfectly so far as getting the different circuits in tune is concerned, but all the same there is something wrong. You have not obeyed the injunction to keep the trimming capacity as low as possible.

Unless this is done, the effect of adjustment of the trimming capacity is noticeable at the lower end of the tuning scale; and since a very small tuning capacity there will re-tune, and replace the lowest station by another, so the re-setting of the trimming capacity (which is in parallel with the tuning capacity and is indistinguishable from it, from the tuning point of view) will have the same effect.

To restore your former minimum wavelength you must readjust the trimmers. Begin with the one that has least capacity in circuit, reduce it a little, and bring the others into line with it, as when re-trimming before. Repeat this till one (the lowest capacity) trimmer is virtually all out, and the former wave-range should be restored.

AN ADVANTAGE OF PUSH-PULL OUTPUT.

E. B. H. (Shanklin, I.O.W.).—"I have seen it stated that when push-pull output is employed, the transformer employed can be of smaller dimensions than if the two output valves were employed in parallel.

"Presumably this would be so if the current, voltages, etc., were the same, but no reason was given for this, and I am unable to see any reason. What is the explanation?"

The reason for using a large transformer is well known. It is to prevent magnetic saturation of the core due to the current passing through the winding.

How is this affected by the two examples you raise? If you think it over, before reading any further, you will probably get the solution to the apparent discrepancy.

The explanation is that the magnetisation of a core is dependent upon the amount of current passing, and upon the direction of flow. In a push-pull circuit the directions of flow are different, and so the effect of the currents is to cancel one another out, so far as the magnetisation of the core is concerned. So it is possible to use a less generously dimensioned core for push-pull without the risk of magnetic saturation.

WHEN THE LAUNDRY COMES HOME.

F. S. (Bromley South).—"There is a peculiar thing about my set which I do not want to alter, but I should like to have explained.

"It always lets me know when the laundry is coming home! Strange as this may seem, it is perfectly true.

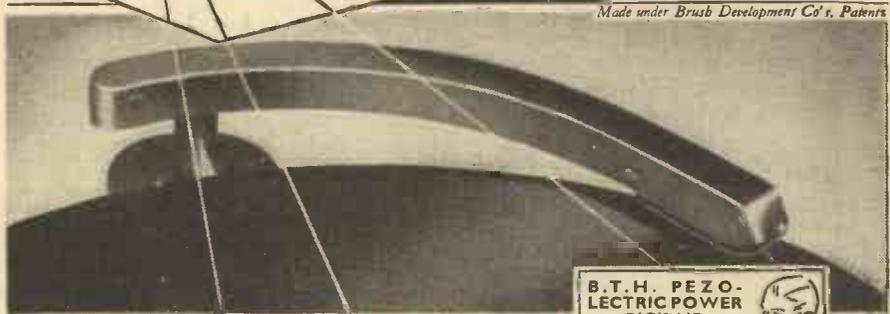
"I have several times surprised my wife by announcing 'Here is the laundry' before the

(Continued on next page.)

CHRISTMAS PRESENT SUGGESTIONS

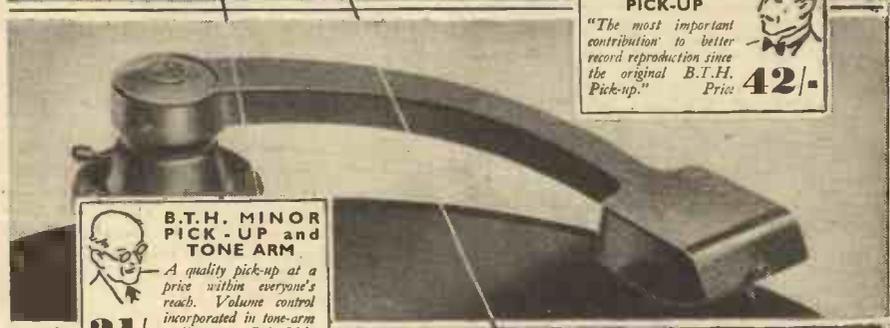


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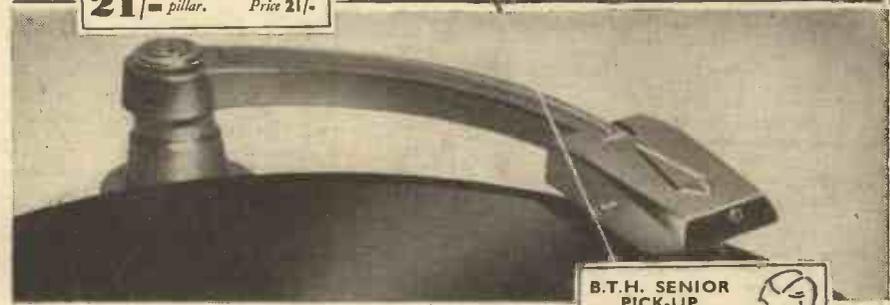


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RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

front door bell rings, and she was very puzzled as to how I knew it was the laundryman coming until I explained.

"The explanation was that I had noticed a sort of ticking noise in the set one evening when my wife was answering the door to take in the laundry, which always comes rather late in the evening. And this noise went away at exactly the same time as the laundry van moved off.

"I did not connect the two events at the time, but the noise did not occur again till the following week at the same time, and almost at the moment that I noticed it the bell rang. So it seemed certain that it was due to the laundry van.

"I find that my neighbours do not get it even when it is very strong on my set and the van standing outside their door. Why should my set alone respond to it?"

The reason that your set picks up the noise and that other sets do not is probably merely because yours happens to be tuned, in one of its subsidiary circuits, to the wavelength on which the interference is radiated.

For example, if we assume that the ticking noise is caused by the car's ignition circuit—as seems likely, if not certain—it will have a wavelength depending upon the length of the wiring, size of condenser, etc. So any set "tuned" to the wavelength in question will respond, while others would not.

Your set, with its tuning circuits apparently the same as those of surrounding sets, has nevertheless some special affinity with the source of disturbance. Possibly its aerial primary winding, or some similar subsidiary circuit, has just the right capacity and inductance to bring it into tune with the wavelength of the disturbance.

That is the reason why you receive the interference more strongly than your neighbours.

WHY THE ACCUMULATOR WON'T HOLD UP.

E. S. (Nr. Oswestry, Salop).—"I do not get satisfactory service from my accumulators, of which I have two, same make and type. When I first had them they held up for a week's listening easily; and on one occasion, when I could not get in to the charging place, one of them lasted well on till the tenth day. Now, however, that one will sometimes go low before the week is out, while the other one is worse still.

"Up till about three months ago they were alike, and neither of them gave out before the week was up. Then one started to let me down towards the end of the week, and now they both do it.

"After reading what was said in 'P.W.' I bought a hydrometer to use with the voltmeter. A test of the acid showed that it was rather above than below the mark.

"On the voltmeter the reading is exactly 2 when returned from the station, but it only stays at that for a couple of days, after which it drops quickly to 1.8.

"It is nothing to do with the set, I am sure, as there have been no alterations to that all the time this trouble has been going on.

"Can you suggest why the accumulators will not hold, as the chap where I take them says he cannot make it out. He says he has topped them both up with acid, and he is sure that the charging is right."

It looks to us as though the fault lies in that topping up. You say that "the chap" who cannot make out what is wrong "topped them up with acid." That is incorrect treatment, unless some of the acid had been spilt.

What the chap should have done, to make up for the ordinary loss by evaporation in the summer, was to have topped up with water, not with acid. You had better show him this reply, and suggest that he pours out a little acid—about as much as he put in—from the accumulator when it is freshly charged.

Then add water to make up the deficiency, and carry on with further charging. The removal of the acid and its replacement by water will have lowered the hydrometer reading a little, and the further charging is necessary to bring the reading up.

THE OSTAR ALL-WAVE SIX

A Remarkable
Home-Constructor Design.

ONE of the most interesting home-constructor kits that I have ever come across is that provided by the Ostar Ganz valve concern for use with their famous full voltage indirectly heated valves.

As you probably remember, the Ostar Ganz valves are universal in operation, that is, they are equally suitable for A.C. or D.C. mains, and they do not require a voltage breakdown resistance in series with their heaters. The heaters take the full voltage of the mains, and are wired in parallel like ordinary electric lamps.

The Circuit of the Set.

The kit in question is one for all-wave reception, and is an extremely efficient super-heterodyne. The basic circuit consists of a pre-mixer H.F. stage in which a screen pentode is employed, then the heptode mixer valve, an I.F. screen pentode stage, Westector second detector, an H.F. pentode as first L.F. valve, and then a power pentode output giving some three and a half watts undistorted output.

That is the main circuit. The "extras" are full A.V.C., which is more than ever valuable when listening to short-wave stations, tone correction, radio-gram. switching and wavelength calibrated dial, even right down to 13.4 metres.

The set is designed for use with a mains energised speaker, the one recommended and supplied extra for 45s. being a Magnavox 152. It has a 6,500-ohm field winding.

The whole kit, less speaker but including valves, costs 14 guineas. A cabinet is available for 35s., and the speaker I have already mentioned.

The kit when built up, by the way, is extremely compact, the overall dimensions being 14 in. wide, by 10 in. deep, and under 9 in. high.

I have tried one of these sets, made up for demonstration purposes by the makers, and can vouch for its efficiency and ease of handling. The kit should not be unduly difficult to wire up. The chassis is drilled ready and a very clear blueprint is provided.

Naturally, in accordance with modern design, the whole set is pretty compact, and the job necessitates soldering, but this is an advantage, for in a mains receiver of these dimensions it would not be conducive to efficiency and reliability to have all connections taken to terminals.

From 13.5 to 2,000 Metres.

The wavebands covered are 13.5 to 27 m.; 23 to 52 m.; 200 to 550 m.; and 800 to over 1,900 metres. So everything worth hearing is included in the span of the set. For those who have no facilities for or doubt their powers of ganging, the makers provide a service of full adjustment and calibration at an extra charge of 15s., and I should say that with a set of this size the price is reasonable and the service a most commendable idea.

But the firm is prepared to go even further than that. For a cost of 35s. extra you can obtain the set completely wired, fully tested and calibrated. In other words, for the price of £16 9s. you can obtain a full-blooded all-mains receiver chassis which will give all-wave operation of no mean order. If you are not over-fond of the "donkey work" of set construction, to say nothing about ganging, I should certainly plank down the extra 35s. I should if I were buying one of these sets. It is an excellent idea. K. D. R.

HOW TELEVISION HAS PROGRESSED

(Continued from page 447.)

Used on 5 metres, this set has picked up several very weak amateur transmissions that have been inaudible (or, rather, submerged by noise) on a fairly good set of the super-regenerative type.

On 10 metres several U.S.A. amateurs have been received on telephony, but this is not much to go by, as they can be heard quite well on a simple detector and L.F. receiver.

The set stops short at the second detector, which appears to give a sufficiently high output to operate a C.R. tube. In any case, the design of an L.F. stage to give reproduction up to 1.5 megacycles is not a very easy matter.

There may be some possibility that a new type of receiver will be developed in the next few months. I cannot say more about it than this—that it is a combination of the superhet and super-regenerative principles, with the super-regen-operating at a particular frequency which will fit in with one of the scanning frequencies used by the television transmitter. This sounds extraordinarily interesting, if a little complicated to the lay mind, but the inventor expects great things from it.

In passing, it is interesting to note that American police stations working between 7 and 9 metres are now being heard quite strongly in this country. It is what one would expect, judging from the phenomenal results being yielded by the 10-metre band these days.

B.B.C. MONEY

(Continued from page 455.)

discovered to be unsuitable soon after its gilded doors were flung open.

I am urging that the B.B.C. shall not only spend its money more wisely, but also make public a detailed account of its expenditure. Raymond Postgate in his Hogarth pamphlet, "What to do with the B.B.C.," shows how the Post Office reveals, via a White Paper, the details of its internal expenditure, and I agree with him that the B.B.C.—the only sub-department of the Post Office that does not disclose the ways by which it spends public money—should be compelled to table a White Paper similarly informative.

They should be made to do this for their own sake. Public knowledge of B.B.C. expenditure will safeguard the B.B.C. against the attacks of critics who allege that nepotism, favouritism and inflated salaries for the hierarchy are common at B.B.C. headquarters. I disagree with such criticism if only for the reason that, in the absence of any details of expenditure, it is impossible for anyone to possess grounds on which to base such allegations.

Nor do I believe that publication of detailed expenditure would provide such grounds. On the contrary. Sir John Reith's salary is £6,000, which is not, comparatively speaking, anything but modest for a man who is really the Managing Director of a multi-millionaire concern. There are a few—not more than eight—men at the B.B.C. headquarters who get more than £2,000 a year, and no one can say, in view of all the circumstances, that they are overpaid.

One is Dr. Adrian Boulton, whose salary is £2,000 a year. It should be £10,000 a year. Toscanini, who does infinitely less for the B.B.C. or British music in five years than Boulton does in one, came here and conducted four concerts for which he was paid as much as Boulton is for a year's work. This is just another instance of the inverted emphasis that the B.B.C. cashiers place on programme values. If and when Dr. Boulton leaves the B.B.C. for—shall we say?—the Principalship of the Royal College of Music, some more adequate idea of his true worth will be gained.

To conclude: (1) Most of the programme deficiencies are due to shortage of money; (2) last year the B.B.C. spent only £915,000 out of its income of more than two million for the all-in programme services; (3) if the B.B.C. were compelled to make public the details of expenditure they would, under conscience-compulsion, increase the allowance for the things that matter (programmes) and economise on the paraphernalia of unapplied power. Moral is obvious.

LONG-PATH VALVES

(Continued from page 452.)

with the filament F surrounded by focusing electrodes E. Beyond these is a rectangular arrangement of deflecting electrodes D, formed with apertures through which the electron stream can pass into the open space between it and the glass wall G of the valve. Around the outside of the valve is wound a coil W, through which current is passed to create a magnetic control-field which serves to repel the electrons back towards the filament.

When the various electrodes are properly biased, the electron stream sweeps clear through the first grid aperture, in the direction shown by the arrow, until it gets near the glass walls. It is then forced back by the Renode coil W in a curved path which brings it into the second aperture in the grid. Here it is forced back again by the cathode F and electrode E, and starts out in another curved track, and possibly still another, until it is finally caught up by one of the angular grids D and so escapes into the external circuit.

The longer the path is made, the more subject it is to control by applied signal voltages, and the more sensitive the valve becomes in operation.

THE SHORLON 7-WAY SWITCH

IN our Christmas number we described a useful 2-way volume control idea.

Mr. K. T. Hardman has written to us to point out that with his Shorlon Variable Aerial 7-way switch the scheme is in existence with no less than seven variations of aerial "pick-up."

The device is marketed by Central Equipment, Ltd., of 188, London Road, Liverpool, and readers who are interested should apply to that firm for details.

It is an excellent idea and one which we have tested and found to give most effective results.

THE S.T.700.

Mr. Thomas More, of 1064, Argyle Street, Glasgow, asks us to say that while he will be "only too pleased to chat to intending builders re. this wonderful set," he is not able to give demonstrations as was recently stated in "P.W."

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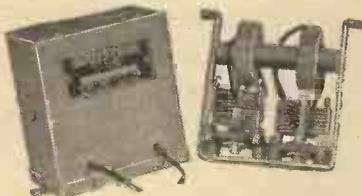
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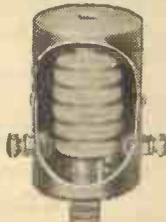
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Compact unit with high efficiency air trimmer and genuine litz wound coils. Total tuning coverage 400 to 500 Kc/s. Gives high stage gain with approximately 9 Kc/s bandwidth. No. 1014. 450 Kc/s. Price 13/6.

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Prevents choke coupling with other components, a frequent cause of instability in S.W. receivers. Honeycomb wound sections. Frequentist former, copper container. No. 982. All Wave. 13-2,000 metres. Price 5/- No. 983. Short Wave. 10-200 metres. Price 3/6.



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EDDYSTONE

SHORT WAVE COMPONENTS

BARRY KENT CALLING

News and Views from the "Big House."

Pantomime From Manchester.

ON Monday next, December 23rd, Frank A. Terry will produce in the Manchester studios a special version of his pantomime "Aladdin." This feature will be included in all the Regionals and promises to be particularly attractive.

B.B.C. Christmas Bonus.

The Board of Governors of the B.B.C. are certainly doing their staff well this Christmas. There will be six days' holiday and a bonus of one week's pay for all grades. This treatment is another sign of a more tolerant attitude generally. There is now much less evidence of suspicion and more of confidence in the *bona fides* of individual broadcasters.

Sir Charles' Holiday.

Vice-Admiral Sir Charles Carpendale, the Deputy Director-General of the B.B.C., becomes increasingly expectant as the year ends. The reason is that he takes his annual leave in January and February. He makes up a little party and goes winter-sporting on the Continent. It is usually Switzerland; last year it was Austria, and I hear that it is to the latter country he will go in 1936. With Sir Charles goes his stalwart son "Dick," now an official of the Outside Broadcast department of the B.B.C.

More Announcers?

As more B.B.C. officials return from visits to America the pressure grows for something to be done about intervals between programmes. The American split-second transitions are much neater than the rather leisurely changeovers of the B.B.C. Various proposals for speeding up B.B.C. procedure are being considered. I believe it is likely to be decided to add considerably to the number of announcers. The present number is not nearly adequate for split-second switches. It will not be necessary for the B.B.C. to go the full length of the American method. That probably would irritate British listeners.

Regional Re-planning.

Mr. Charles Siepman, the recently appointed Controller of Regions of the B.B.C., has reached the end of the second stage of his preliminary report. This is believed to contain important recommendations about staff and organisation. Mr. Siepman's terms of reference were to suggest ways in which the regions would be brought up to the London level of output. In examining this problem the possibility of amalgamating some regions has not been neglected.

The Midland Region, for example, might be merged with the North or with London, thus liberating a wavelength for perhaps another distinctive London alternative. Any staff displaced by a scheme of this kind would be absorbed in London or sent overseas to one of the various broadcasting services which B.B.C. officials are framing in the outer Empire.

Cecil Lewis Back.

Cecil Lewis tells me that he has been asked to draw up an outline for a big feature programme about flying. The plan is to make this the "curtain" for a special series of talks on important aspects of aviation, the whole to be concluded by H. G. Wells. These programmes are down for the second quarter of next year.

The "Right" To Broadcast.

It was Lord Beaverbrook, I believe, who first claimed the "right" to broadcast about his Empire Free Trade policy. The B.B.C. ultimately let him talk, but there was certainly no admission of his "right" to claim microphone time as an individual. Now George Lansbury is making a similar claim. He wants to explain to the listening audience all about his pacifist views which induced him to resign the leadership of the Labour Party in the House of Commons.

Discussions continue, but I doubt if Mr. Lansbury will get the facilities he seeks. The precedent would be extremely awkward if a concession were made to any "right" of an individual to broadcast.

No More Winter Proms.

This is to be the last year of Winter Proms under the auspices of the B.B.C. The experiment is proving too costly in relation to the results, from the point of view of broadcasting as distinct from public concert performance.

Boy Scouts and Girl Guides Relays.

Boy Scouts and Girl Guides are getting much more prominence in the B.B.C. arrangements than ever before. Lord Baden Powell for the Scouts and Lady Baden Powell for the Guides are both to be relayed from South Africa to the world early in the new year. Then, in June, the annual religious service of the Scouts will be relayed in the National B.B.C. network.

B.B.C. Staff Honours.

As I have already prophesied, the next two official B.B.C. honours will be to the advantage of Captain Cecil Graves, Controller of Programmes, and Mr. B. E. Nicolls, Controller of Administrations. These are arranged to take effect in the Birthday List next summer. Meanwhile, circles otherwise affected have been urging that honour should be preferred in relation to the musical interests of the B.B.C. And, I believe, fortunately, these circles are winning. All of which means that a B.B.C. conductor is certain to be knighted in the New Year's Honours. Having said that, I know that I shall not prejudice his chances, while giving exclusive advance information to the readers of "P.W."

JOLLY PRESENTS FOR BOYS

Give Books for Lasting Enjoyment

BOOKS are unbeatable presents for boys, and here are two suggestions that are sure to please the healthy youngster.

The MODERN BOY'S BOOK OF ADVENTURE STORIES (5s.) is a splendid book containing no fewer than 30 first-rate stories, written by the pick of boys' authors. Flying and sport, motor-racing, and thrills and mystery on land and sea are presented in a programme that will grip from cover to cover. The magnificent MODERN BOY'S ANNUAL (6s.) contains long stories by favourite writers, and a host of authoritative articles on Flying, Railways, Ships and Motors. The annual is beautifully illustrated, and contains full-colour plates.

You can see these books at any newsagent's or bookseller's.

ON THE AIR

Candid comments by our broadcasting critic on recent programmes.

FOLLOWING my protest last week against what might be styled "the spot the player" type of programme, we were treated this week in the "Radio Times" to a specimen of the best sort. In the "A Bill of Divorcement" programme not only were the players' names printed alongside the names of the parts they played, but also they were arranged "in order of appearance." This sort of arrangement is excellent, Mr. Editor. Of course, it is the ideal one. Please keep to it whenever possible.

Now what shall we say of the play. Edna Best was at her best in a part which eminently suited her. She didn't sound a day older than her alleged seventeen years. There was sparkle in her dialogue, and precision; especially in the opening scenes, in her dealings with her Aunt Hester, was this apparent. Anyone with an Aunt Hester must have enjoyed the way in which Miss Sydney scored off her relative. There was never any doubt about Edna getting to the end of the play. She was always completely in control. I like vigorous acting such as this.

Listening—"In" and "From."

Considering the success that stage actors and actresses always achieve in the way of perfect enunciation when on the air, it is surprising that on the stage itself some should be charged with mumbling their words. Isn't it perhaps only mumbling by comparison? Or isn't this possibly all the difference between listening-in and listening from an auditorium?

Malcolm Keen played a difficult part well—and not too pleasant a part to play either. I should hate to play such a part. All the cast were good, and the production, straightforward and with no fussy trimmings, was quietly planned and carried through. The two pauses were quite in keeping with the general spirit of the play. I liked the broadcast because it was realised there was sufficient meat in the play to present it as it was, without aids or props.

It was surprising to hear the relay of Polish music from Warsaw on the Regional. 'Tis true that the National was otherwise engaged on a programme of Old Ballads at the time. The clash was unfortunate, as many listeners would have liked to hear both. I decided in favour of the Polish music, chiefly because of the attractive arrangement of the programme into four parts. There was a big orchestral item, a solo pianoforte, a solo voice, and a solo violin.

The Symphonic Poem by Karłowicz was too full of musical problems which I couldn't solve.

The Fantasia on Polish National Songs (Chopin) was naturally more easily understood, and one's enjoyment of the performance was real. The Pianoforte solos were delightful.

The three songs sung by Aniela Szieminska came next in my estimation. They were sung feelingly, and with an ease that was striking.

The Violin Concerto ended the programme on the same lofty note with which it began.

This Polish programme was an example of good programme-building, for it provided entertainment for a variety of tastes.

An Excellent Talk.

It is difficult to understand why this Polish music should have been thought a fitting preliminary to a talk on the Australian Aborigine. Or, alternatively, that a talk on the Australian Aborigine should be thought a suitable sequel to a programme of Polish music. At one time it was a common practice of the B.B.C. to stick a short talk in at any odd time of the day. The practice is less common to-day. A fifteen-minute talk often has some connection with the bigger item that follows it.

Louis C. S. Mansfield's talk on the Australian Aborigine stood in splendid old-time isolation, having nothing in common with anything fore or aft. This may have lost Mr. Mansfield many listeners. Yet he was very interesting with his unshakable belief in the mentality of the Aborigine. He was delightfully sarcastic over the differences between the native and the higher Western civilisations.

It would seem from the Red Sarafan broadcasts that our idea of a joke isn't very unlike the Russian's. Quite a number of English jokes are trotted out here

in the broken English of these Russians. All the same, I like this cabaret show. There's jollity and snap about it all. Nothing is done to death. It is forty-five minutes, without a break, of short and varied items. The Red Sarafan Orchestra under its leader Emilio Colombo are a sound foundation on which to build up a show. They play a characteristically national type of music.

Ever since I heard the story that "Red Nose, the King of the Down-and-Outs" told us in one of the "In Town To-night" programmes, I have been in a state of exasperation with this popular Saturday-night feature. Not that I object to hearing "down-and-outs" and the miserable ways that they have of earning a few coppers. On the contrary, I agree that we should hear these things, and frequently.

But the idea of incorporating them into a programme whose avowed function is to entertain and amuse us is revolting to me. I literally sweat under the collar when I hear these poor wretches, especially when they are illiterate, stumbling over their scripts. Their embarrassment is often all too obvious. Are we to be entertained and, worse still, amused at this?

Do you remember the story "Red Nose" told us about his "tobacco business"? How women pickers did the dustbins and he the posh cinemas for far ends; then the blending and the packing; next, the sale of the same to his regular customers of taxi-drivers, and down-and-outs? And all this, mark you, is for our amusement and entertainment? "In Town To-night" is a high-sounding title worthy of better advertisement than it is giving.

C. B.

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A practical explanation of resonance and some notes on other technical matters.

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

MANY people do not seem to understand very exactly what is meant by "resonance." This is a term which we frequently come across in radio work, and it is important to know just what it means. Perhaps the best way to explain it is as follows: Any system, whether it be a mechanical system or an electrical circuit, which is capable of being set into vibration or oscillation, has what is called a "natural period" or "natural frequency of vibration."

For example, a weight hanging on the end of a string forming a pendulum will, if set into motion, swing to and fro under the action of gravity, and its natural period is the time required for one complete oscillation, whilst its natural frequency is defined as the number of complete oscillations which it makes per second.

(Continued on next page.)

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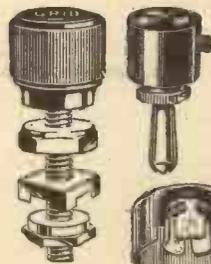
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THE MEANING OF RESONANCE

(Continued from previous page.)

Natural Frequency.

All this is on the assumption that the system is set into vibration and left to itself. In the same way a wireless circuit can be set into electrical oscillation—that is to say, electricity in the circuit alternates in opposite directions at a certain frequency and the natural frequency of the system depends upon the inductance and capacity in it.

Forced Oscillations.

A vibratory system can, however, be made to oscillate at a frequency different from its natural frequency. If periodic forces are applied to it they will set it into oscillation in the same frequency as the frequency of the applied forces. But you can easily see that as the frequency of the applied forces is brought nearer and nearer to the natural frequency of the vibratory system, so the latter will respond more and more readily or easily to the forces impressed on it.

We express this scientifically by saying that the system is approaching the "resonance point" and resonance is reached when the frequency of the applied forces is the same as the natural frequency of the system. In this case the response of the system is usually enormously greater than it is when the applied frequency is removed from the resonance frequency.

What Happens During Tuning.

When you tune the high-frequency circuit of a radio receiver to an incoming carrier wave, what you are really doing is to adjust either the inductance or the capacity in that circuit so as to make the natural frequency of vibration of the circuit the same as the frequency of the incoming waves. If you tune away from that particular frequency and to another frequency, you exclude the first set of waves and bring in some other wavelength at a different frequency.

Probably you have noticed sometimes a glass ornament or some such object will suddenly begin to vibrate or perhaps rattle when a noise of a certain pitch is produced in a room. This is because the frequency of the noise happens to coincide with the natural frequency of vibration of the object and so "sympathetic" or "resonant" vibrations are set up. It is even possible to break a glass tube by rubbing it in a special way so as to set it into violent vibration.

Reproducing Gramophone Records.

At one time there was a great demand for sensitive and ever more sensitive pick-ups for record reproduction, on the theory that everything gained in sensitivity at this point was so much saved in amplifying stages. That, however, was before amplification per stage had become so efficient

as it is to-day. In these days we don't worry over-much about the amount of amplification we have to supply, because it is so easily obtained, and we are able to turn our attention to the other important point, that is, the disadvantages which arise from the use of a too-sensitive pick-up.

If the pick-up is too sensitive it is apt to become rather difficult to handle, and many people believe that it reproduces the record "scratch" to an undue extent. There are now quite a number of people who prefer to use a pick-up which is not in itself especially sensitive, and then to make this up in amplifying stages, because they consider that this gives a nicer all-round tone and a greater freedom from scratch.

Cutting Out Scratch.

Personally, I am inclined to agree with this latter argument, and if you think about it for a moment you will see reasons for it. Nobody can tell you exactly all that goes to make up "record scratch," but it is a kind of mixture of noises of all sorts of frequencies, both high and low, but mainly

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high frequencies, and a very sensitive pick-up seems to respond more to the higher frequencies. For this reason, therefore, you would expect the sensitive pick-up to favour the reproduction of the scratch noises.

By using a relatively insensitive pick-up you would (on this theory) escape a good proportion of this scratch and then, amplifying up, you would have a purer tone to work on. I think the idea that a sensitive pick-up is more liable to reproduce record surface noise is very widespread.

A Point Worth Considering.

Another point is that if there are any advantages in a relatively insensitive pick-up, it is just as well to make use of them, because it is ten to one your amplifier will give you plenty of amplification, some of which will have to be cut down by means of a volume control if your pick-up is very

sensitive. Therefore, you are taking on all the disadvantages of the extra sensitive pick-up and throwing away some part of the amplification which you have available and which, if used, will enable you to go over to the less sensitive pick-up with its greater freedom from surface noise.

The Rectifying Valve.

I expect you have all heard of the cold valve, the valve without a filament. I have on one or two occasions in the past brought to your notice new inventions or discoveries which have been announced in different parts of the world in this direction, but the fact remains that the valve that requires no energy for maintaining the electron emission from the filament has still not reached the stage of a really practical device. The trouble with the filamentless valve is that although it can be used for rectification purposes, no one seems to have made it operate as an amplifier and, of course, this is absolutely essential if it is to replace in any shape or form the really wonderful valves which we now have available to us based on the ordinary principle.

A Slight Amplification.

Rectifying cold valves are based on the same principle as the excellent metal rectifiers which are now so widely used for converting A.C. into D.C.; in fact, the metal rectifier itself may be described as a cold rectifying valve.

A valve of the ordinary type, even when used as a rectifier and not specifically as an amplifier, almost invariably functions to a greater or less extent as an amplifier, and this amplifying property is very useful in some types of circuit. A cold valve which can merely rectify and not amplify can, however, be used as second detector in a superheterodyne circuit.

THE LIMITATIONS OF A.V.C.

(Continued from page 448.)

But supposing the strength of the station fades down so that the sensitivity of the set has to be increased quite a bit; the brake taken off, in order to maintain a reasonable level of volume. Obviously, as the other drawing shows, there will now be sufficient sensitivity in the set to start amplifying the mush. Should the strength of the station still further decrease, then the point may be arrived at where the mush is just as strong, and will receive equal amplification.

And you won't hear much of the station through the roaring and rushing and crackling. You could not reasonably expect the A.V.C. to discriminate between the station and the mush. The set is bound to amplify them to an equal extent.

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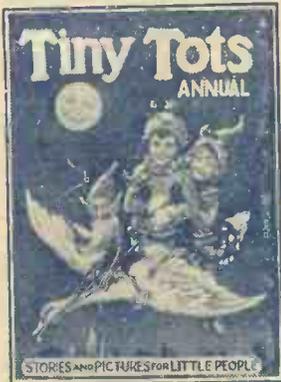
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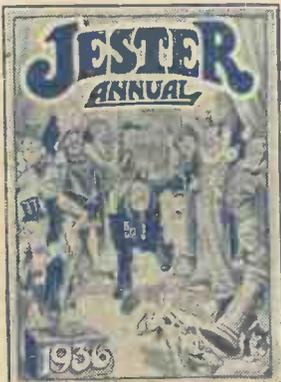
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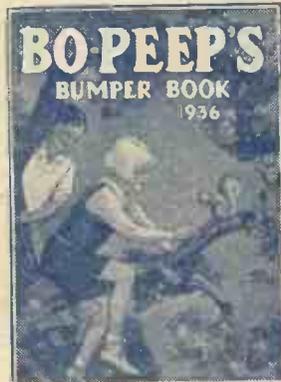
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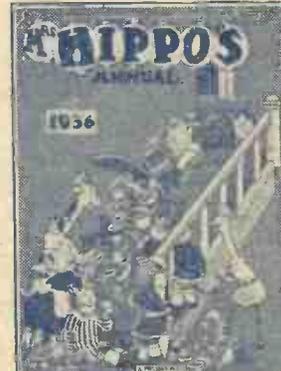
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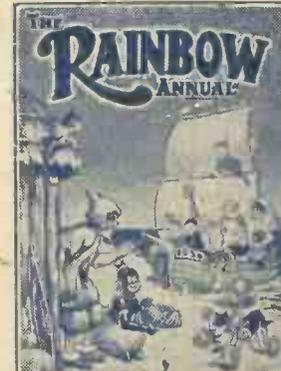
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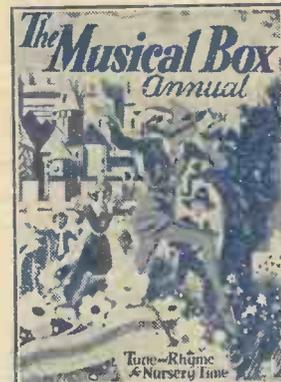
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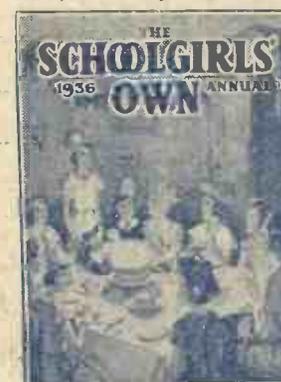
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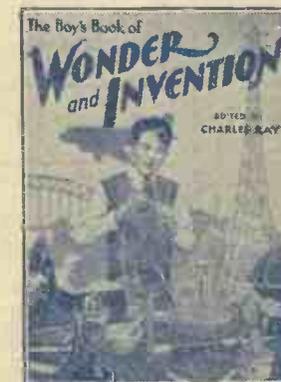
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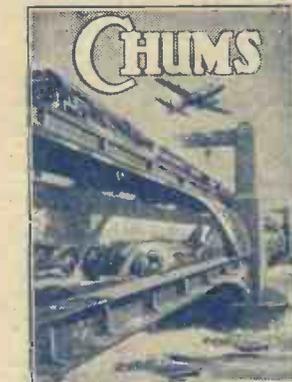
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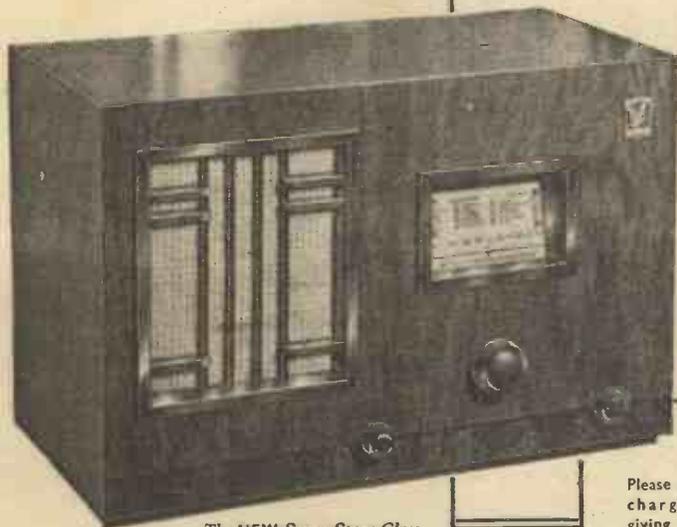
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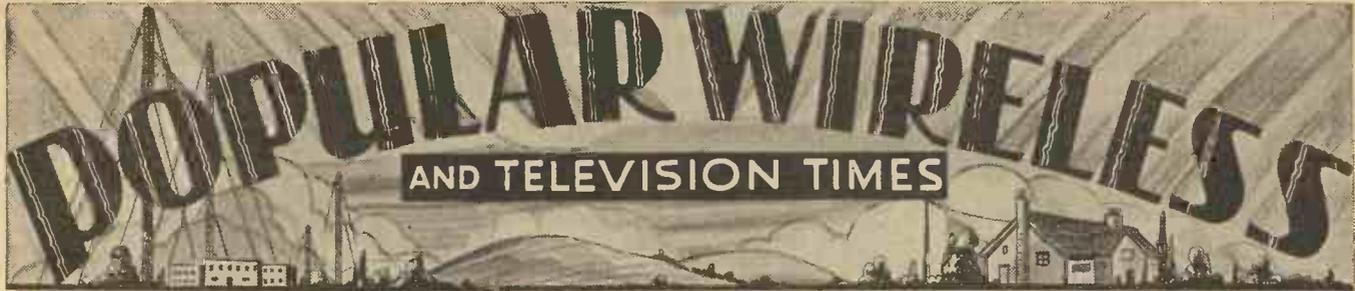
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P.W. 28/12/35



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QUEEN BEE
CONVICT RADIO
MORE MONEY

RADIO NOTES & NEWS

YOUNGEST HAM
"OLD JUNK"
THE BIG NOISE

Sinews of War.

WHATEVER you may think about the way the Abyssinians make war, you've got to admit that they understand the sinews of same. Finding themselves with about seventy-five foreign journalists in Addis Ababa, all news-hungry for their respective papers, the Abyssinians let them send as much by wireless as they like to pay for—at war-time rates.

The consequence is that one month's takings at the little radio station recently rocketed up from pocket-money figures to the handsome sum of £12,000.

The Yellow Peril.

A REMINDER of the recent sensation when the British Government disclosed that the R.A.F. were using completely wireless-controlled aeroplanes, is afforded by a new Air Ministry warning. It cautions all joy-stick jugglers to avoid flying anywhere near Queen Bee radio-controlled planes.

The Bees have distinctive yellow markings, as an indication to all and sundry that they are liable to sting.

"It's an Ill Wind . . ."

A BIZARRE radio attraction for U.S. listeners has been provided by the warden of the Illinois State Prison at Joliet, Ill. The warden believes that if his charges have too little to do a certain long-tailed gentleman will hand them out some mischief; so all the convicts who can sing, play jazz instruments, recite, or croon are to broadcast in programmes from the prison.

The idea is that there shall be at least one prison programme broadcast every week, and the convicts concerned have pronounced that this arrangement is oky-doke with them!

The most surprising thing about the whole affair is that it originated because one convict stabbed another, thus convincing the authorities that new interests would be beneficial!

Pay As You Go.

UNLIKE the political parties in this country, the Republicans and Democrats of the U.S.A. expect to spend between them a matter of some £200,000 on broadcasting in the next Presidential election, this being the cost of microphone time.

One would naturally imagine that the various broadcasting networks would be delighted to put on political speakers at such a price. But, in point of fact, there is a bit of a hitch at the moment. It seems that the parties still owe the networks a little matter of about £40,000, incurred during the campaign of 1932.

It seems very odd to us that a politician's performance should not exactly conform to his promises. Or doesn't it?

Where the Sun Never Sets.

SOME readers of "P.W." get their copies three or four weeks later than the rest of us, not because of the confounded newsagent's boy, but because the ocean is wide and they live on the other side of it. All such far-away fellows will be glad to know that it is expected that when the Ullswater Report is made public it will be found to recommend that a larger sum shall be set aside for Empire Broadcasting.

Lack of funds hampers the present service all the time, but it manages to diffuse a lot

to the participants, so it is with pleasure that I record the following:

Mr. C. Zwanzig, 3rd, 1404, West Madison Street, Ottawa, Illinois, U.S.A., is representing a group of American amateurs who wish to correspond with other radio enthusiasts overseas, and especially in Britain. The object is to interchange circuits, ideas, and so forth, and though I know nothing of Mr. Zwanzig, personally, I can vouch that such schemes may be well worth investigation.

Midland Regional Reaches Out.

LISTENERS in the Midlands who do not always find sufficient punch behind their regional station will be interested to hear of the experience of an Australian listener, who has written to the B.B.C. about the surprise of his life.

It seems that he was sitting out there in Toowoomba, or Kalgoorlie, or wherever it was, tuning in to the various Australian stations on medium wavelengths, when he came across a new and "different" sort of programme. And he really fell off his perch when the announcer said it was Midland Regional.

A close check-up has shown that it was not one of those "freaks" which prove to be merely relays by another station, or retransmission on short waves. It was a genuine Droitwich - to - Australia - in - one - hop transmission, on the medium waves. Congratulations, Droitwich.

Colonial Wireless.

ACCORDING to Mr. J. H. Thomas, Secretary of State for the Colonies (and he ought to know!), the establishment of broad-

casting services in one form or another in all British Colonies can only be "a matter of time, and, I hope, a short time."

He was inaugurating a relay service to Nigeria, and referred to the success already achieved in several other colonies, including Sierra Leone, and to the recently established service on the Gold Coast.

Mr. Thomas mentioned also the potentialities of broadcasting for education, public health, agriculture, and so forth. But this was the official view, and he knows as well as I do that what the Colonies would really like is a plentiful

(Continued on next page.)

THE TRUTH ABOUT FRANKIE WILSON

¶ A few weeks ago Henry Hall's "ace" trumpeter, a man holding one of the most coveted dance-band jobs in the whole world, of his own free will left Broadcasting House for ever.

¶ He had been earning a four-figure salary and, being still comparatively young, the world of rhythm was at his feet.

¶ If he had desired he could undoubtedly have formed his own unit, toured the music halls, added to his fame as a dance-band musician and increased his income.

¶ Instead, he has completely renounced his profession. For what? Various reports have appeared in the newspapers, but in general this "news" seems to have been regarded as so staggering, so fantastic, that journalists were unable to get to grips with it.

¶ Believing that all "P.W." readers would welcome full and authoritative details of the inside facts of this extraordinary case of Frankie Wilson, we commissioned Alan Hunter to get in touch with him and fully discuss the whole matter.

¶ This he has now done, and the first of the two articles he has written, understandingly and sympathetically, will appear in "P.W." next week.

THE EDITOR.

of enjoyment on the 10/15-kilowatt transmitters, so there should be great jubilation when the power is pushed up to 50 kw. by two new transmitters in 1937. As that date is such a long time away the B.B.C. has taken the old Chelmsford 5SW transmitter to Daventry, to augment the others. A good move.

Pen Pals.

OCCASIONALLY I get requests from my readers asking to be put into touch with other radio enthusiasts abroad, with a view to correspondence. Some of these pen-pal-ships have lasted for many years, and have been a source of great fun

B.B.C. PAY A THOUSAND A YEAR FOR FLOWERS!

dose of news, jazz, and variety, with as many matches and sporting events as possible.

"Time, Gentlemen, Please!"

THERE will be less excuse than ever for being late at the office in the mornings when London gets its television service. According to the Press reports, Mr. Gerald Cock—B.B.C. Director of Television—plans to give us intervals, long enough to rest the eye, during which the television screen will be given over to a huge clock face.



It is not certain whether there will be an accompanying tick-tock, but the giant Father Time clock will be a constant warning to all the household clocks that there must be less individuality in time-keeping in future. When Father says turn, they must all turn!

Another point about the forthcoming television broadcasts is that programmes televised from Alexandra Palace grounds must be picked up within 1,000 feet from the transmitter, this being the maximum length of the special cable that can be used.

Say It With Flowers.

ONE of those indefatigable chappies who translates everything into figures has calculated that it must cost the B.B.C. very nearly £1,000 a year for flowers.

Set out in cold figures that sum may give one a bit of a shock, but so far as my own observation goes there is little floral extravagance at Broadcasting House. They certainly have a nice display outside and in the waiting rooms, but only what one would expect from a place where it is essential that people should feel at their ease. And not only is this good for the florists, but some of the flowers—in the chapel, for instance—don't cost the B.B.C. a penny, since they are gifts from appreciative listeners.

On Ten Metres.

THE continuation of long-distance work on ten metres is still affording some remarkable contacts hither and thither. One of the most-sought-for stations is in

New Zealand, at a place with the attractive name of Wynnum.

The station is V K 4 Y L, and the reason that fans all over the world get a special kick from receiving it is that V K 4 Y L's operator is one of

the world's youngest. Her name is Madeline McKenzie, and she is only thirteen years old.

When this fact was disclosed to one U.S. station—operated by Frank Lucas, of W 8 C R A, Cannonsburg, Penn.—he told the other radio communicants in the U.S.A. to keep a look-out for Madeline, so that is



why that young lady's homework is often suspended for a moment while she talks with total strangers in the U.S.A.!

Coming Events.

RESIDENTS of North London should soon be seeing more signs of television progress at the Alexandra Palace. The partly demolished tower on the Wood Green side of the Palace is to provide support for the television mast, which will be a three-hundred-footer.

This mast, constructed in Rugby, should soon be in place, ready for the tests in the spring.

Four floors are being prepared to accommodate artists' rooms, offices, and studios. These latter will be suitable for sound and

RADIO TOPICALITIES

On Old Year's Night Percy Edgar, Midland Regional Director, and H. J. Dunkerley, Programme Director, will exchange reminiscences of the most interesting Midland programmes of the past year. Star events in the Midland broadcasting calendar for 1935 will be illustrated by means of records.

Earlier in the evening, "Tunes of the Year" will be given by Tony's Red Aces Dance Band, and another popular feature of the evening will be an entertainment by Arthur Marshall, who has been in the Nelson Key's revues and is a master at Oundle School.

Under the title "Snacks" a special variety bill will be broadcast from the Manchester studios on January 2. Details are not yet available, but the bill will include a well-known Liverpool mezzo-soprano, who is to sing songs by Alan Low, also of Liverpool, who will accompany her on the piano. The programme is being arranged by Arthur Spencer.

"Aladdin," presented and produced by Prince Littler, will be relayed from the New Theatre, Cardiff, in the Welsh programme, on January 3. The cast includes Eileen Moody as Aladdin, Norman Griffin as the Widow Twankey, Jimmy Britton as Abanaza, Kenneth Carlisle as the Emperor, Leslie Barker as Wishee Washee, and Lena and Follie Terry's Juveniles as Pekee and Saucee.

In a half-hour's relay from the Theatre Royal, Nottingham, on January 3rd, listeners will hear excerpts from the Fred Clements pantomime, "Cinderella." Mr. Clements, who was last represented in Midland programmes by his Arcadian Follies from Skegness, has been producing pantomime for almost thirty years, and has had as many as seven running in one season at leading provincial theatres. Dudley Powell has written the music for this one. Leading parts are taken by Babette O'Deale, Richard Hassett, Mary Honri, and Gladys Watson.

sight programmes, and it is probable that they will be placed on the first floor.

Immediately below, on the ground floor, will be the two transmitters, one for each of the two television systems to be tried.

Truth Will Out.

APPARENTLY "P.W." still circulates in Germany, despite the close censorship exercised there, for I have received a very charming letter from H. S., of Hamburg, whose admirable English makes me ashamed of my knowledge of German (viz., "Achtung" and "Auf Wiedersehen"!).

My correspondent, in commenting upon Germany's rapidly increasing licences—they put on 164,585 in October—says that "England is still the most licentious country in Europe." He meant it as a compliment.

The Old Brigade.

SINCE I told you recently of the resurrection of old-time wireless sets, I have heard of several remarkable veterans. Some of them have been on the shelf for a dozen years or so, but they seem uncommonly sprightly when filled with the old familiar juice from a good accumulator and H.T. battery.

One kindly Dover soul (I nearly wrote sole!) offers to send me a one-valver of 1922 to see if I can make it work. I have had to decline this gambit because of Arieline—her sense of historic appreciation is subordinate to a nausea arising from anything which she can label as "Old Junk."



Awkward Questions.

IN a learned paper recently read before the Institution of Electrical Engineers a description was given of the exhaustive experiments carried out to determine the relative acoustic properties of materials used in the building and furnishing of radio studios.

Reference was made to a specially constructed reverberation chamber which has concrete walls twelve inches thick; it rests upon a thick bed of cork, has tiled walls, and double doors packed with mineral wool—not the sort of place to crack jokes or drink champagne in!

The space between this cheerless chamber and the brick walls in which it is housed has been filled with sand, so that not the chirp of a bird nor the whistle of a butcher-boy shall enter; neither shall there be any whoopee, nor sound of revelry by passing minstrelsy.

Having heard all about the room's damping and decibels, one of the electrical engineers unkindly asked, "But isn't it a fact that the best B.C.C. studio was just an old cellar under a bridge?" Another instance of the discordant fact disturbing the harmony of the flawless theory.

The Big Noise.

HAS anybody heard the much-talked-of Radio Romania on 1,875 metres?

He is said to be testing there, and as the power is 150 kilowatts, it should not be a difficult matter to receive the tests in this country. Yet so far I have not heard of a reader who has noticed the newcomer.

I understand that his hours are very gentlemanly, and there is nothing so democratic as a night-shift about Radio Romania. He only soils his hands with work twice a day—after breakfast, and in the afternoons from about 2.30 to 4 p.m. Has any gentleman adventurer encountered a dude station, strongly got up, about that time?



ARIEL



“THIS GREAT FAMILY”

All about the B.B.C.'s Christmas Day Broadcast.

By HOWARD COOPER

PUNCTUALLY at three o'clock on Christmas afternoon, as the proudest child in the British Empire is broadcasting from New Zealand, the King will quietly leave his family party by the fireside at Sandringham and slip into an adjoining room.

Here, seated at his desk, with three small Australian walnut “boxes” before him, he will await the flashing of the red light indicating that all is ready for him to begin his fourth Christmas message to the Empire.

Thus the climax of the B.B.C.'s annual Empire-wide broadcast will be reached, and in millions of homes throughout the world families of listeners will hear the voice of the beloved head of the great family of British peoples.

Good Cheer and Friendliness.

That, briefly, is the theme of this Christmas broadcast—the spirit of good cheer and friendliness which is found at its best in family life. You may remember that last year the King, in his broadcast, stressed this point, and spoke of “this great and widespread family.” It is these words which have given the B.B.C. the title of Wednesday's programme, “This Great Family.”

Felix Felton, the B.B.C.'s twenty-four-year-old producer, in whose hands the entire programme has been placed, sought the co-operation of all the broadcasting authorities in the Empire, and explained to them the lines on which he proposed to work. The result is that he has been able

his side, like the stop-watches in Australian, Canadian and other studios used in the programme, will have been accurately set to G.M.T., because on them depends the final co-ordination of the various items.

As the time arrives for each contribution to be faded in, he will turn a knob on the panel, confident that the distant actors will take their cues and begin to broadcast.

In the unlikely event of one of them not coming through, Felton will quickly turn another knob and fade in a gramophone record of the item in question. (You see, everything is being recorded at a full rehearsal, just in case anything goes wrong!)

Literally at his fingertips, therefore, Felix Felton will have the broadcasting studios of the whole Empire. A

twist of a knob and Canada is through; another twist and Edinburgh is calling; yet another and he brings in the announcer in the studio

next-door to him, and so on. In short, he has on this panel direct control over the following:

- (1) Line to Faraday Building, the G.P.O.'s international exchange, which is linked with the whole world through the short-wave radio-telephone system.
- (2) The headquarters of the B.B.C.'s own Regions.
- (3) Studios in Broadcasting House where the announcers will speak, and where London's own contribution is to be given.
- (4) The gramophone studio.
- (5) The effects studio.
- (6) The echo-room, where artificial echo is added to the programme at will.

All of these can be merged and “crossed” by the producer, so that what he hears will be the composite whole as heard all over the world.

Mr. Felton assures me that all the incidents he includes in the programme

(Continued on next page).

● AUSTRALIA
Boxing Day. Xmas Parties breaking up

NEW ZEALAND
2 a.m. Boxing Day

INDIA
Evening

SOUTH AFRICA
Tea Time

CANADA
Breakfast Time

SANDRINGHAM HOUSE

whence H.M. The King will speak to his Empire at 3 p.m. on Christmas Day. The boxes indicate the times at which subjects in various parts of the world will hear the message.

to build up a fine programme from a dozen or more different sources, with the actors and actresses scattered about the globe and linked only by telephone.

At zero hour—which is 2.30 p.m.—on Christmas afternoon, Felton will sit at the dramatic control panel with the full script before him. He will “flash” a studio in the building, and the programme begins with carollers singing “God Bless the Ruler of this House.” From that moment onwards he and the Post Office and the distant Empire producers must work to a split second. The stop-watch by



"THIS GREAT FAMILY"

(Continued from previous page.)

are going to be genuine. If, in an emergency, any of the records have to be used, he will let it be known to the public.

"Of course," he said, "the time-difference makes it impossible for us to broadcast real family parties from every part of the Empire. The India relay will be an evening party, the South African one a tea-party, and the Australian one—well, it will actually be Boxing Day there. The child who introduces the King will be allowed to sit up in New Zealand until 3 a.m.!"

Absolutely True-To-Life.

Nevertheless, he made it clear to me that the programme would be one hundred per cent true-to-life, even though the time is to be conveniently ignored. Thus the South African contribution will even include the family dog, which it is hoped will give an added touch of homeliness by barking at the appropriate moment for a piece of cake.

The families taking part in the programme from Scotland, Lancashire and other parts of the Home Country will undoubtedly be interviewed in the newspapers next day, a fact which should effectively squash those silly rumours which went round after last year's broadcast to the effect that the whole thing was "faked."

The B.B.C. may be this, that and the other in the eyes of discontented listeners sometimes, but it never stoops to hoaxing, and certainly not on an occasion like this, when untold millions are listening. Moreover, the King himself will be an interested listener, for he and the Royal Family will have the loudspeaker on all the time. I suppose he will miss a minute or so near the end, as he goes into the next room; but it need not be very much, because Mr. S. J. de Lotbiniere, the B.B.C.'s Outside Broadcast Director, will be able to hand him headphones, if he wishes it. In fact, the King can even hear himself broadcast if he cares to keep the 'phones on all the time he speaks.

Increased Volume Possible.

Needless to say, all the B.B.C.'s transmitters will be radiating the programme, and you may detect an increase in the volume of your set, because on occasions such as this the B.B.C. always boosts up the power and modulation so as to ensure good reception.

The Empire short-wave transmitters at Daventry will also be going at full power, as will certain of the Post Office transmitters which are relaying the programme to parts of the world not reached by the B.B.C.

Exactly how many people will hear the programme it is impossible to estimate, but since the whole Empire will listen, plus the whole of the U.S.A., it is safe to say that the potential audience is at least 300,000,000.

"ALL KINDS OF MUSICK"

An unusual programme to be broadcast from the Northern Ireland Studios.

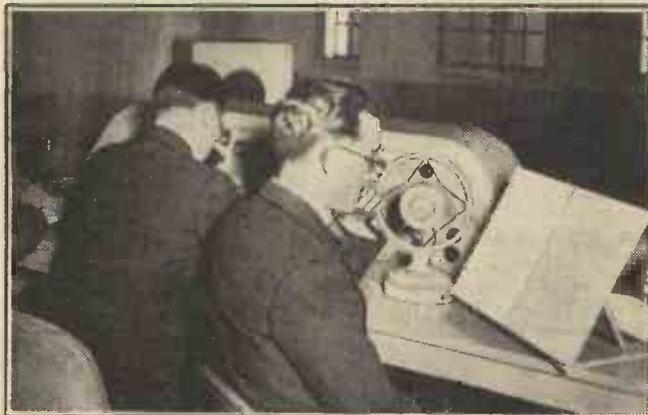
IT is surprising how many unusual instruments there are which scarcely get their fair share of attention. Edward Wilkinson, who is responsible for the Variety programmes in Northern Ireland, having felt a deep sympathy for some of these neglected instruments, has decided to revive a programme which was very successfully produced earlier this year, under the title of "All Kinds of Musick."

This programme, which is to be presented on January 3rd, is one which has involved Mr. Wilkinson in a great deal of research, not so much for the unusual instruments, but for people who can play them, and in his search he has discovered street musicians who are exponents of some of these unusual instruments.

In the short space of half an hour there will be items for mouth organs, accordions, banjos, guitars, mandolins, a ukelele, a musical saw, a Jew's harp, a handbell team—and then, to make weight, a few songs.

In fact, it will undoubtedly be a very interesting programme and well worth listening to.

THE PULSE OF THE PROGRAMME



The dramatic control panel at Broadcasting House where the great link-up with the Empire will be controlled and the items faded in and out to form the complete programme.

WHY WORRY?

Some unexpected trials in the life of a radio service engineer.

IN the course of radio servicing one sometimes meets with the unexpected. Recently I was called in to look at a set in which the trouble proved to be a breakdown in one of the long-wave windings. It was pretty obvious, as the winding had reached an advanced stage of crackling. I told the owner what was wrong. He looked a bit doubtful and, after fishing around in his pocket, poked a small slip of paper at me. "Would that be right?" he inquired? "That" was a reply to a radio query in a daily newspaper.

I read it through with some curiosity.

"Right off the rails," I remarked. "Oh, it's not the same set," was the apparently guileless rejoinder. "I am still wondering exactly what his object was, or if he were merely testing some miraculous pin-stabbing formula with a view to picking winners.

Another man met me at the door waving a tiny accumulator in the air. "Is this full?" he demanded. I put a quick test on it and suggested that it probably was full. He drew himself up. "How can it be full when I spilled the acid out of it this morning?" After telling him to put fresh acid of the correct specific gravity in before using it again, I did a rapid fade. Explanations are wasted on some folk; besides, it might have been a new form of leg-pull. A small girl, anxious-eyed, comes toddling up. "Please would you bring the thing that cures the wireless, it isn't speaking very well." The necessary medicine proved to be an accumulator.

Somewhat Disconcerting.

It was somewhat disconcerting when in the midst of tracking a particularly obscure fault, to hear a doleful feminine voice in the next room: "Aye, he's at it now, but I doubt he'll no make a job o' it. Ye should hae sent it to the works as I telled ye." Then a masculine voice chimed in: "Och, gie the man a chance! Did he no fix yer Uncle John's wireless and naebody kenned what wis wrang wi' it?" Feminine voice (distinctly brighter): "Oh, aye, so he did." As you can imagine, it became a matter of honour to get that set right.

Hospitality is a marked feature of country districts. After a motor-cycle run of ten miles, an ex-police inspector's greeting was: "Man, I'm glad to see ye; I'm off for a bit fishing. You'll join me?" I started to mention wireless, but the look in his eye was sufficient. On returning, after an excellent meal, enlivened with yarns of the days when he was on patrol, I again ventured to bring the subject up. "Sit where you are," was the reply. "What's the hurry? I'll run it over in the car tomorrow, and you can do what you like with it." And he was as good as his word.

On a busy day the amount of tea one consumes would float a toy yacht. To refuse is simply not done, and it is only with great difficulty that one escapes a succession of sit-down meals. One house I visited had a little note pinned on the door. "Gone to post office—walk in." The post office, by the way, was also the general store some two miles off. So I walked in, put the set to rights and disappeared like the goblin in Hans Andersen without seeing a soul.

Communication Difficulties.

Most difficulties arise through faulty means of communication. A brief and often cryptic note, or a verbal message, of which the messenger has mixed up half and forgotten the remainder, informs one that something has gone wrong with the works. Just what, is left mainly to the imagination. Perhaps it is just as well, for it doesn't help matters any when, in response to a tentative suggestion, you take over a nice new set of valves only to find the G.B. or H.T. has run down. However, it all comes right in the end, and one does get a lot of fun out of it—so why worry? E. O'M.

SUPPRESSING INTERFERENCE

THE widespread applications of electricity form the outstanding achievement of the present day, but the growth of the electrical age has been rapid, and has brought with it many attendant problems. Chief among these, so far as the average listener is concerned, is the problem of radio interference and its suppression.

Unfortunately, we live in an age of mechanical noise also, for the noise level of the average city street imposes an exacting strain on the nervous system. Perhaps this explains our apathy both as individuals and as a nation towards the problem of interference suppression. As yet, little legislation has appeared on the subject by the powers-that-be, but the day is not far distant when the question of stringent suppression will be carefully considered.

FIRST STEP

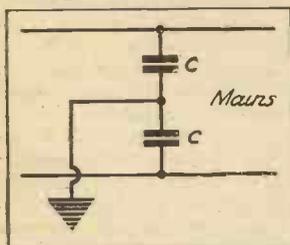


Fig. 1. This is the simplest form of suppressor.

The Two Causes. Radio interference results from two causes—namely, commutation and switching operations. In both cases the normal operating current of the appliance is either varying or interrupted. With such conditions pulsating currents are produced, containing frequencies from the audio- to the radio-frequency range which are capable of interfering with the normal broadcast frequencies and being picked up by the receiver in the form of noise. The interfering frequencies are picked up either by direct radiation from the source, or by radiation after their passage along the mains.

CHOKES ADDED

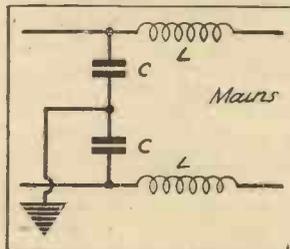


Fig. 2. This circuit is useful in cases of high-impedance electrical plant.

distances from the interfering plant. In general, the interfering frequencies are composed of two components, named respectively the symmetrical and the asymmetrical components. The symmetrical component sets up an E.M.F. across the plant leads, while the asymmetrical com-

If you suffer from mains-borne noise in your radio set try these simple cures.

By E. W. SEWARD, B.Eng.

ponent occurs between the leads as one pole and the frame of the interfering plant as the other. In the latter case an easy path to earth is provided for the interfering frequencies either by direct earthing or by frame capacitances in the case of an insulated framework. Both these components set up mains-borne radiation, the suppression of which is very desirable.

Successful suppressive devices are built up of combinations of condensers, resistors, and inductances, the various combinations

THE FRAME

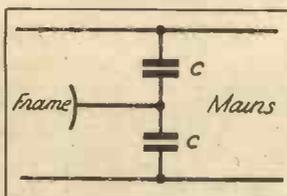


Fig. 3. Earthing unearthed framework in the case of A.C. mains. The condensers should not exceed .01 mfd.

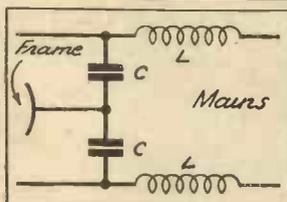


Fig. 4. The addition of inductances as shown here may make the Fig. 3 circuit more effective.

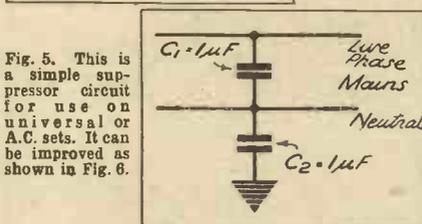


Fig. 5. This is a simple suppressor circuit for use on universal or A.C. sets. It can be improved as shown in Fig. 6.

being determined by the nature of the plant to which they are connected. The effective functions of these components are respectively by-passing of interfering frequencies to earth by the condensers, reduction of magnitude by the inductances, and sparking reduction by the combination of condensers and resistors. In extreme cases plants are fitted in screened enclosures, a measure effectively preventing direct radiation.

The simple condenser type of suppressor and its method of connection is illustrated in Fig. 1. In the case of appliances which necessitate a large capacitance to make the simple condenser circuit effective, the suppressor unit given in Fig. 2 is used.

The circuit shown in Fig. 3 is used

in the case of unearthed frameworks on A.C. supply, and the values of the condensers must be restricted to .01 mfd. The effective suppression so gained is often reduced by high-framework impedance, and in such instances the addition of inductors, as in Fig. 4, is essential.

There are many other types of suppressor units in use depending on the nature of their application, but in all cases it is essential to keep the leads between the plant and unit as short as possible to avoid radiation. In addition, all leads and connections should be kept in good condition. In all cases components used in the units should be of high quality and suitable for the nature and voltage to which they are to be applied.

UNIVERSAL

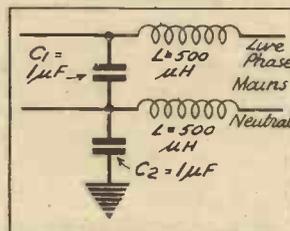


Fig. 6. A development of Fig. 5, wherein chokes are connected in series to make the device more effective.

Mains-Entry Filters.

Treating the problem at its origin as described is, unfortunately, not yet standard practice, but much can be done on the listener's premises in the way of mains-borne interference suppression by subsequent filter circuits. This is effected very conveniently by means of mains-entry filters, which, as the name implies, are placed as near as possible to the mains switch. In the case of universal or A.C. operated sets the circuits given in Figs. 5 and 6, with their associated component values, have been found very convenient and effective.

FOR ALL SETS

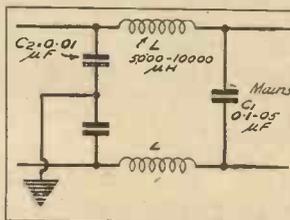


Fig. 7. A good all-round suppressor for connection to the mains input of a set.

With D.C. operated sets the circuits given in Figs. 1 and 2 provide effective suppressors with equal condenser values of 1 mfd. and inductances having values of 500 micro-henries.

Where interfering plant is present on the premises, such as vacuum cleaners, hair dryers, thermostat-controlled water-heaters, etc., a mains-entry filter is insufficient and a further suppressor must be fitted to the mains input of the set. A good all-round filter for A.C., universal, or D.C. operation under such conditions is given in Fig. 7. With such a suppressor fitted, the mains entry filter can often be eliminated.

B.B.C. PROGRAMME PRESENTATION

What would you do if you had £2,000,000 a year to run broadcasting? This is one of the direct and outstanding questions asked in this provocative article.
By THE EDITOR.

AND so we have now got a new Programme Controller at the B.B.C. You have read something about his plans in that article in "P.W." last week entitled "Mr. Graves Marks Time." Well, I wish Mr. Graves the best of good fortune in his task. He will bear a great responsibility, for undoubtedly there is much which can be done to improve our broadcasting in certain directions.

For instance, it would seem to me that the machinery of the B.B.C. is tending to master its men. The coils of red tape would appear to be spreading over Broadcasting House like the strangling weeds of the Sea of Sargossa.

That Snooker Commentary.

It is becoming evident in the smallest programme details. The other night there was a running commentary on a snooker match between Davis and Lindrum. At the end of the scheduled quarter of an hour the game was not quite finished. However, it obviously could not last more than another couple of minutes or so.

Yet it was touch and go as to whether the listening public would be irritated beyond measure by having the axe brought down on it. The order was actually given to the commentator, Willie Smith, to apply the closure, and it was a very impatient announcer (or so it sounded) who finally gave him permission to give the final few phases of play.

The moment the "last ball had been potted" (or whatever it was—I am afraid I am no snooker expert) the result was breathlessly given and the item switched off like lightning—as though to make way for an announcement of national importance.

And yet what was it that the B.B.C. thought we were waiting for so anxiously? No less than Section E of the B.B.C. Orchestra!

The Highbrow Element.

I feel quite at sea in this matter. What is the sense of values of people who will ruthlessly snip off the last few seconds of a sporting commentary or cut off Will Hay right in the middle of a wisecrack, and yet who will allow a symphony concert to run as much as a quarter of an hour or even longer over time?

Perhaps it is that the forces which support the highbrow element in the programmes have sufficient power to overcome the stranglehold of rigid schedule.

But I am certain that the interests of a far greater number of listeners lie in the direction of just those items which are sometimes treated with the greatest apparent indifference.

As for the programmes themselves, there are many of the opinion that they have depreciated very considerably during the past year or two. Personally, I do not wholly share that view. That they could be very much better in quality is certain enough. Nevertheless, I consider that they compare very favourably indeed with those broadcast by most other countries. And that is an opinion arrived at after a careful period of listening on an international basis.

More "Pep" Wanted.

It is in presentation that I feel something is lacking. There isn't enough life, not enough "pep," not sufficient showmanship. Our daily radio fare is served up with the subdued, dignified air of a butler bringing in the letters at one of those clubs where waiters must wear rubber-soled shoes lest they wake the members.

There should be more vitality, more

"WHAT'S ON TO-NIGHT?"



Mr. Harry Hemsley, famous on stage and air as a child impersonator, is also a keen radio enthusiast. Here he is searching the ether for broadcast entertainment with his McMichael 15-guinea superheterodyne.

enterprise. The new Programme Chief gives us to understand that "rush tactics are not in his mind," that there must be a "feeling of the way." One would think that there would be no need for a feeling of the way to-day, for broadcasting is hardly a new thing.

After all, it is the listener who is the

final arbiter of programme achievement—or he ought to be, and I am sure that he would forgive a lot for the sake of a great deal more experiment and adventure in the devising of his radio fare.

That the B.B.C. programmes are not going over quite as well as they should and could is clear from the fact that the licence figures are falling off. Eventually there will be a reaction on the great radio industry if something is not done soon, and that is a matter of some considerable national importance.

Undoubtedly the best possible thing which could happen would be for a certain amount of competitive broadcasting to be allowed in this country. That would ginger things up at once. There would then be a real incentive to provide the listening public with more of what it wants.

The Demands of Progress.

To operate on the principle that the public should be given what it *ought to want* is a grand ideal, and great credit is due to the one man, Sir John Reith, who has built broadcasting on such noble foundations.

But nobility of purpose should be tempered with the demands of progress. The tempo of British Broadcasting has not quickened with the quickening years. There must be considerable revitalising of its content and its presentation if the licence figures are to continue expanding and not begin to contract.

There is one clear ray of hope to be seen in the not far-distant future. Television! Apparently this is to be handled by a separate administrative and programme body freed from the restraint of the "Big House" machine.

The right man, Gerald Cock, is to be at the helm. Here, then, is competition of sorts—the necessary ingredient to promote enterprise. The only snag is that it will not at first function nationally, but apply only to London.

I hope that by the time it extends over the whole country, there will not have grown up another more or less rigid machine fixedly geared to that which is already existent.

Send in Your Views.

Of course, there is no subject like the radio programmes to cause argument and diversity of opinion. Subsequent to writing the above I had a conversation with a man whose opinions of people and things I value very much.

He said he thought that the B.B.C. programmes had improved of late; had livened up considerably, in fact.

Some will agree with him and others will not, but from the views of a number of thinking people common bases of argument almost invariably emerge.

Therefore I am going to approach a number of eminent persons and ask them these questions:

"If you had £2,000,000 or so per year to spend on a broadcasting service, do you think you could equal the results given by the B.B.C.? Do you think you could improve on them? Answers to these questions, together with

some general statements of opinion, should provide some constructive criticism of value to those in whose hands is the broadcasting of this country.

Readers, too, are invited to send us their views on the subject in the form of letters for publication in POPULAR WIRELESS. But they should note that we shan't get far if everyone confines himself to diatribes against particular items in the programmes?

ON THE SHORT WAVES



A HETERODYNE WAVEMETER

This week W.L.S. gives details of a very useful piece of apparatus and one that every short-wave enthusiast should possess.

VERY few short-wave listeners seem to possess a respectable wavemeter of any kind; and the proportion that own that admirable piece of apparatus, a heterodyne wavemeter, must be infinitesimal. Yet it is one of the most useful things one can possibly have in the "shack," and one that you simply cannot be without, after you have once become accustomed to using it.

A heterodyne wavemeter is simply a small calibrated oscillator, preferably self-contained with its own H.T. and L.T.

THE LAYOUT SUGGESTED

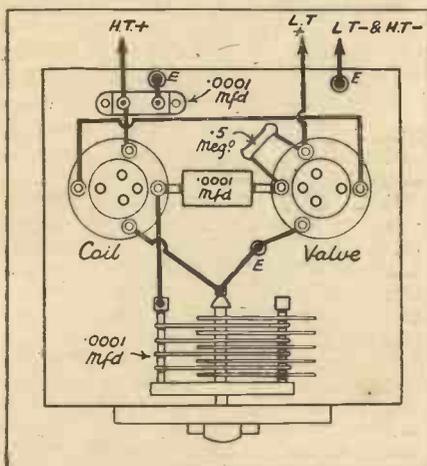


Fig. 1.—The layout of the calibrated oscillator described by W. L. S. The wavemeter is housed in a simple aluminium box.

supplies. Think of an ordinary oscillating detector, minus its reaction control, and there you have it.

Fortunately for us, the ordinary reaction circuit generates a fine crop of harmonics, and so one coil may be made to cover several wavelength ranges. There is definitely no need to use a full set of coils for the heterodyne wavemeter.

Fig. 1 shows a suitable layout, and Fig. 2 the circuit diagram. From both of these it will be seen at a glance that there are no fearsome complications to worry about.

The box in which my own is housed is a simple aluminium affair in the form of a 6-inch cube. Many of you must have some of the old-fashioned screening-boxes in your junk department, and these will do admirably.

The one essential throughout is that everything shall be rigid and shall stay put. A really good slow-motion dial is the crux of the whole thing, and it must be one that can be accurately read.

As far as detail work goes there is nothing in the least likely to worry you. The circuit simply can't help oscillating; there is a .0001 mfd. fixed condenser in place of the usual variable control of reaction. The more likely possibility is that it will oscillate too hard and "scream"; for this reason the grid leak has been cut down to .5 megohm, and may in some cases have to be taken even lower.

The lowest possible value of H.T. should be used. Cut it right down until you cannot go lower without stopping the valve from oscillating at some part of the range. Incidentally, any 2-volt valve of the "H.L." class should work throughout the range with a 16-volt grid-bias battery as H.T.

I suggest that the coil used should have 24 turns in the grid circuit and 12 for reaction. This will give a range, with a .0001 mfd. condenser, of about 45-96 metres. The range on the second harmonic—22½-48 metres—will be more useful still, and the third harmonic will give 15-32 metres. Thus the one coil will tell you all that you want to know.

Plotting the Graph.

Operation is simplicity itself. Tune to a station that you can positively identify, say, Daventry, G S D, on 25.53 metres. Listen to it normally—that is to say, without the receiver oscillating—and rotate the dial of the wavemeter until the familiar heterodyne beat-note (*à la* Ham-Handed Henry three doors away) swishes across your station. Tune carefully to zero-beat, mark the point on your graph-paper in wavelength and scale divisions, and you've started.

If you can't hear a beat anywhere on the scale, bring the wavemeter closer to the receiver; if you still can't find one, tune just off the station, make your receiver oscillate and then listen for one. If you hear one now, but couldn't hear it on the station, then you probably need a little more H.T. on the oscillator.

If the harmonic ranges are exactly as suggested above (which, of course, they won't be), you will find two points that give a chirp on 25.53 metres. One will come from the bottom of the 22½-48 metre range, and the other will be about in the middle of the 15-32 metre range. You can mark them both—on separate curves.

There won't be any question, after you have spotted a few stations, about which harmonic is which. If you were inadvertently to use the wrong harmonic for beating with one particular station, your curve would instantly assume such a strange shape that you wouldn't be in doubt for one moment as to what you had done!

The broadcast bands are not in harmonic relation, but the amateur bands are. If, therefore, you are in any doubt about them, set the wavemeter so that it is producing a beat somewhere in the middle of the 80-metre band. Then change your receiver coils and search downwards from the 49-metre broadcast band until you hear the wavemeter's harmonic. You can confirm that it is the wavemeter by tapping it gently and listening for the "pong" or slight wobble.

Using One Curve.

You can then go down and spot the 20-metre band. Actually, of course, if you are quite good at dividing by 2 or 3, you will only need one calibration curve. Then, when you hear a beat-note, you have only to look and see which coil is in your receiver to be quite certain, at once, whether you are on, say, 84, 42, or 28 metres.

Furthermore, this one curve can be checked against itself, so to speak. Suppose you have your 84-metre point accurately marked on the wavemeter curve. You

A SIMPLE CIRCUIT

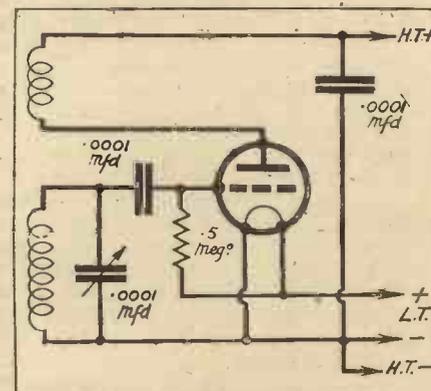


Fig. 2.—The circuit is really that of an ordinary oscillating detector minus its reaction control.

know roughly where 28 metres is on your receiver, so find it exactly by tuning to the harmonic. Now leave your receiver exactly where it is, and rotate the wavemeter dial downwards until you hear another beat on 28 metres. That will give you a point for 56 metres on the wavemeter—for it must be the second harmonic you are now listening to, instead of the third.

Suppose you re-set the wavemeter on 84 and take your receiver down to 21 metres, listening for the fourth harmonic, which will be a little weaker. Now bring the wavemeter dial down again, and if you hear a

(Continued on next page.)

★ ON THE SHORT WAVES—2. ★

EASIER OPERATING

A HUGE proportion of the queries that I receive each week come from readers whose trouble lies in the operation of their sets. Their sets "work" all right—in the sense that they bring in stations at reasonable strength—but something always spoils the picture. Either hand capacity chases their hard-won stations off the map again, or they can't shake their head without causing a miniature earthquake in the 'phones, or something dreadful happens in one way or another.

Try This Dodge.

All these things are sent to try us short-wave folk, and they are rarely anything to do with the actual receiver. Usually it is the externals—unless, of course, the layout and wiring of the set are *hopelessly* bad.

The two diagrams on this page contain a number of suggestions. Fig. 3, for instance, minus the dotted lines, shows an arrangement that many readers must be using. Set on table, batteries down below, two separate twisted-flex pairs conveying H.T. and L.T. upstairs to the set. Probably H.T.— and L.T.— are "commoned" at the back of the set.

Would it surprise you to know that by

"commoning" them down on the floor you may easily make quite a difference to the operation of the set? And yet it is so. Also, try connecting your earth, if you use one, to the common negative on the batteries instead of taking it up to the set by another special lead.

Mind you, all these things stand about an equal chance of making things better or worse, according to the various circumstances under which you work; but they are decidedly worth trying.

In Fig. 4 I have gone ahead another step and suggested a screened battery cable.

A COMMON ARRANGEMENT

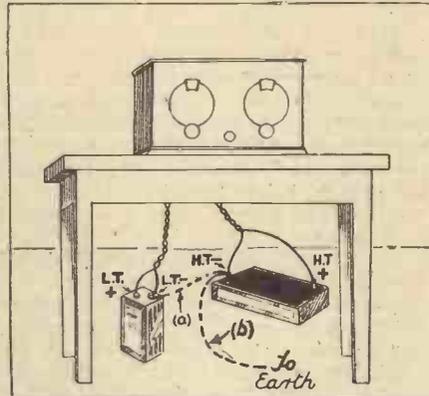


Fig. 3.—This scheme is a very common one. Many short-wave enthusiasts placing their batteries on the floor beneath the set as shown.

Three- or four-wire braided flex, with a metallic outer covering, is neat; but two lots of ordinary electrician's lead-covered wire makes just as efficient a job of it, provided that the wire is heavy enough to carry your L.T. current. You may be using indirectly-heated valves, in which case the cable must carry 2 amps. or more without dropping .2 of a volt.

H.F. Chokes in 'Phone Leads.

The H.F. chokes in the 'phone leads are also worth trying, with or without by-pass condensers at the ends. Headphone cords that are alive present a queer problem. I have been tinkering with a set that suffered from hand capacity, made a slight alteration, and suddenly found the dials quite "dead," but all the trouble rushing up and down the 'phone cords! Put in chokes and kick it out of that particular haunt, and it will go back to the dials again!

My present set likes an H.F. choke in one 'phone lead, but jibs in no uncertain fashion if I try to work it with one in each.

Try all these dodges, and any more that you can think of, until your short-waver is as "tame" to handle as a commercial broadcast receiver. Until you get to that stage you will not experience the real joys of short-wave listening.

Aerial coupling, length of earth lead, length of battery wires, position of set on table—all these things have a bearing on comfortable operating. Don't give up until you have got something that is a real joy to handle.

WHAT READERS ARE SAYING

READERS' letters are getting so numerous that I have decided that it will be necessary to alter my plans in dealing with them in future. Under the above heading, or "Points from the Post-Bag," I will deal very shortly with those that really require a definite answer, if they are likely to be of more than individual interest.

Those that bring up really interesting points and problems will be filed and answered, as far as possible, collectively, in the form of an article covering the subject. This will generally appear on the first page of this section.

Only a Slight Change.

In other words, the only change you will notice will be that replies are rather briefer, and that those that provoke discussion will be dealt with anonymously—but, I hope, satisfactorily—in articles which do not specifically refer to the reader concerned.

(In passing, may I say that those beginning "Dear W. L. S." and ending "and oblige," the intervening space being filled with seven pages of queries that I have to dig out from the general chit-chat, will simply have to be passed over, as I can't possibly squeeze any more reading into twenty-four hours!)

A Short-Wave Club has been formed in Swindon. The chairman is Mr. E. W. Mortimer and the secretary Mr. W. C. Barnes, 7, Surrey Road, Swindon. Members are very keen and a good programme is

being arranged. The secretary will be delighted to hear from you.

C. F. (West Bromwich), in company with one or two others, thirsts for an extra L.F. stage on the end of the "B.C.L." Two. I hope that the diagram that I recently showed for the "Simplex" will be sufficient to help them out of their troubles.

C. H. M. (Marazion) forwards details of an ingenious scheme of aerial coupling which has killed his "dead spot" bogey for good. I am trying it myself and hope to talk about it next week.

C. T. (Grimsby) sends a *résumé* of conditions up there. He finds 25 and 31 metres very erratic but 49 extremely good. Best stations, W 3 X A L, W 8 X A L and C R C X. Nairobi (V Q 7 L O) has improved.

H. J. B. (Manchester) adds W 8 X K and W 9 X F to the list of good stations on 49, and also finds 19 and 25 metres very

good. He has caught the 10-metre fever, and sends in a big list of Americans heard there.

S. E. F. (Woolwich) asks for my comments on a circuit that he has forwarded. Candidly, I don't think it's going to work, but I don't suggest that *that* should prevent him from trying it out! Try all shapes and sizes of coils, S. E. F., and see what you can get out of it.

In a long letter, R. J. B. (Southsea) suggests that "P.W." ought to be turned into a short-wave paper! Try that on the non-short-wave readers, R. J. B., and you won't survive another week. But thanks for all your suggestions.

A HETERODYNE WAVEMETER

(Continued from previous page.)

stronger harmonic at some point a little bit above the 56-metre point you have just plotted, then there's your point for 63 metres, since you are now on the *third* harmonic again!

All this may sound very complicated, but you will find it simplicity itself when you come to try it out. The harmonics are a definite advantage. Not only do they save coil-changing, but they make accurate readings easier to get, since the fundamental is often too strong to be comfortable, and blots the receiver out.

It has another use, too. When you are reading a weak Morse signal, and there is a lot of background noise, it is a huge advantage to stop the receiver from oscillating and to provide your beat-note with the wavemeter. I have often copied, in this way, signals that were unreadable with an oscillating detector. W. L. S.

SHIELDED LEADS

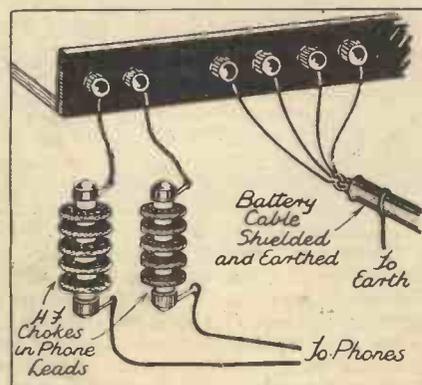


Fig. 4.—In this case the battery leads are taken through a shielded cable, the shield being earthed.



George Scott, a member of the Wireless Chorus, who takes several of the famous Walt Disney parts.

MICKEY MOUSE CALLING!

This bright and breezy article by Alan Hunter gives one a most illuminating insight into the tremendous amount of work that goes to the making of the famous B.B.C. Walt Disney broadcasts.

MICKEY MOUSE has quite rightly been described as synthetic cinema—for this oddly lovable creation of the brain of Walt Disney is of the very stuff of films. To Walt Disney millions of children of all ages—up to octogenarians!—owe a deep debt of gratitude for many moments of sheer joy. And what shall we say of John Watt, the B.B.C. producer, who has had the imagination to put Mickey Mouse on the air?

By translating the spirit of the Mickey Mouse pictures—not to mention the Silly Symphonies—into the radio medium, John Watt has given us a feature of great charm. Its universal appeal is most strikingly shown by the fact that one night it will be a National programme offering in the middle of the evening, while another afternoon it will be given in the Children's Hour.

Mickey and all his phantasmagoria appeal to the child in all of us. And yet, paradoxically enough, the stories are not childish. Indeed, many of them are clever satires upon life as it is known peculiarly to adults.

A Difficult Production.

To the millions of film fans who love Mickey the radio version must seem a perfectly simple translation. Actually it is by far the most difficult production John Watt has ever undertaken. I know. He told me so! In fact, he told me so many striking things about these Mickey Mouse productions that I feel sure they are worth repeating.

"In these days we have the advantage of being able to work upon the original piano parts sent to us from Hollywood," said John. "But my friend Wally Wallond has still got an enormous amount of work to do making up the orchestration, cutting the original score in places where it is unsuitable for radio, and generally trans-

lating the spirit of the show in a way that will be intelligible even to those who have not seen the original film.

"Then I have to fill in all the narration linking the various scenes together. You see, we have to tie the whole thing up so that it will go smoothly over the air. There is no chance of what the film man calls a 're-take'—which puts us at a disadvantage.

"Very few people probably realise that when the original Mickey Mouse films are made, the Hollywood producers, under Walt Disney, make separate sound tracks for the vocal, the orchestral, the dialogue, and the effects ingredients. Then they merge the whole thing together just as they like.

"If you listen to the band part of a Mickey film, for instance, you will hear that although it is perhaps playing as a background to some vocal or dialogue interlude it is going full out. The band does not have to play softly as in the studio here, because in the final piecing together

pages of piano score, seventy pages of full score, ninety-six pages of parts of various kind, and thirty pages of purely vocal parts!

"As we always give at least two shows at a time, that works out, I find, to seven hundred sheets for a broadcast. Believe me, Alan, that's an awful lot of manuscript!

Those Who Take Part.

"Yes, the cast for these shows is known now. My hand was rather forced there—but that's another story. Mickey is, well, John Watt. Let's say no more about that! Most of the other parts are taken by members of the Chorus. For instance, there is Elsie Hay, who takes the Donald Duck episodes. James Bond is the Big Bad Wolf. Wynne Ajello, who is so well known as a straight soprano, takes all the 'squeaky' parts—Minnie Mouse, Robber Kitten, and so on.

"Wynne is something of a veteran in broadcasting, you know. She started when very young, and I believe up to date she has done well over 400 broadcasts.

(Continued on next page.)

WORLD FAMOUS

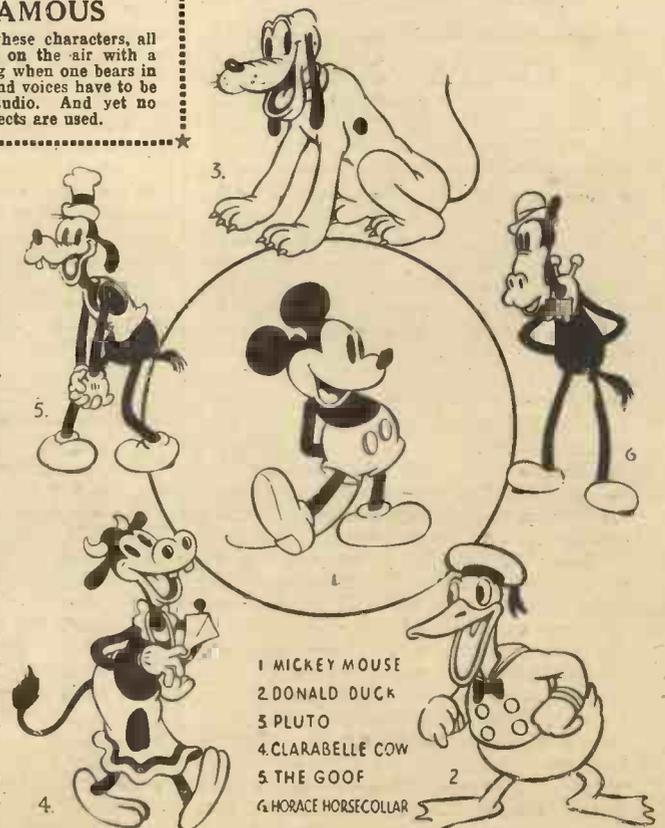
You will easily recognise these characters, all of whom have been heard on the air with a realism that is outstanding when one bears in mind that all the noises and voices have to be done by people in the studio. And yet no Hollywood film effects are used.

of the film that can be 'controlled down' on its own track.

"Because I want all the people taking part in these shows to enter into the spirit of the thing, I always see that they come with me to two or three shows of the film we are dealing with. United Artists kindly allow us private views in their own theatre for this purpose.

"The average length of a radio Mickey Mouse or Silly Symphony is seven minutes, which is fifteen to twenty seconds less time than the original picture takes to show. Here—wait a moment—are some figures that will stagger you, I think.

"For one of these seven-minute broadcasts we have to use thirty



- 1 MICKEY MOUSE
- 2 DONALD DUCK
- 3 PLUTO
- 4 CLARABELLE COW
- 5 THE GOOF
- 6 HORACE HORSECOLLAR

ETCHING VALVES

How to mark them permanently.

OFTEN enough it is desirable to have some means of marking information or data on valves. Usually amateurs, when they wish to identify a valve, content themselves with sticking on it a piece of gummed paper containing the abbreviated information relating to the valve. Or, alternatively, such information may be scratched with a sharp point on the sides of the valve base.

A more permanent method of so "labeling" valves is to etch them. This is not a difficult process for anyone who maintains or has access to a small chemical laboratory.

In order to etch a valve, obtain some paraffin wax and gently melt it in a suitable container. Do not have the wax too hot. It should just be sufficiently molten to "run" easily.

Now dip the bulb of the valve in the molten wax and immediately withdraw it, giving it a twisting movement as the withdrawal is made, in order that the wax may be deposited in a layer of fairly even thickness on the bulb.

When the layer of wax on the bulb is perfectly cold, take a coarse needle and write on the wax the characters which it is desired to inscribe on the glass of the bulb. Take care that this writing penetrates through the wax down to the glass of the bulb.

Now mix in an old cup or similar vessel a quantity of powdered fluorspar and strong

sulphuric acid. The actual proportions of this mixture are immaterial. Place the cup or vessel into an outer vessel containing hot water. Dip the waxed end of the valve into the fluorspar-sulphuric acid mixture and let it remain in contact with the mixture for several minutes. During this time, fumes of hydrofluoric acid will be given off by the mixture. These, incidentally, are corrosive and should not be breathed. Hydrofluoric acid possesses the property of attacking glass, and it will attack the glass of the valve where it has been laid bare by the written inscription in the wax.

Simple and Satisfactory.

After, say, five minutes' etching in the fluorspar-sulphuric acid mixture the valve should be removed, thoroughly washed and then the wax scraped away. Written on the glass in clear permanent characters will now be found the inscription which was scribed on the wax. **J. F. S.**



A layer of wax, a coarse needle, some fluorspar and sulphuric acid are all that you need.

TOO CONFIDENT

The brief story of a portable.

I HAD just finished a particularly satisfactory job. In spite of its battery being down to some 70 volts, a four-valve portable, which had gone to a whisper, was now giving out Droitwich at excellent strength on its frame aerial. As it was reasonably portable, and the owner's house only a couple of hundred yards or so away, I decided to walk it across. To ease the burden I removed the H.T. battery from the case, and you can tell how confident I felt when I didn't even bother to slip a meter into my pocket.

Imagine my horror when, on fixing the battery up, a silly muffled sound came from the speaker. And it was taking it all its time to deliver even that. It is impossible to explain these little hitches adequately, and I didn't waste much time before deciding to hump the outfit home again. As I mentioned, the battery had dropped to about 70 volts, and in my greed to get the last ounce out of it I had stuck the G.B. plugs in the topmost socket, with H.T. — immediately below.

Here I had reckoned without the manufacturer, who had laid a little trap for the unwary. Up to 6 volts the G.B. section advanced sedately by the usual 1½-volt tappings. Then, perhaps to economise space, it skipped a cell, and 6 to 9 volts was a single step. The S.G. valve (not variable- μ) and economy pentode were overbiased with only 70-odd plate volts, and some of this probably going to waste through a resistance or two. **W. N.**

MICKEY MOUSE CALLING!

(Continued from previous page.)

Then there is Anona Winn, who does Clara Cluck. Once she did Minnie, too.

"George Scott, another member of the Wireless Chorus, has a lot to do in these shows. He takes the amusing part of the Grasshopper. He is also the Third Pig, the Tortoise, and that very peculiar person, the Goof!

"The other Two Pigs? Oh, their parts are taken by girls—Linda Parker and Marie Cohen. Yes, these are members of the Chorus, too.

"But we mustn't forget 'Sticks' Gibling, the drummer of the Variety Orchestra. He creates all the extraordinary effects needed for these shows—and very ingeniously he does it. Later I will show you his contraptions. They are a staggering sight. He ravages his wife's kitchen for all kinds of things to make odd noises—egg whisks and all kinds of utensils I am sure his wife must miss.

"The other day we held an audition for a salad bowl! I'm not joking. We needed something to make a sort of 'pinging' noise in the 'Golden Touch' show, where Midas turned everything to gold as he touched it. The salad bowl was perfect. But I don't know how 'Sticks'

squared his long-suffering wife over that. Anyway, he is a remarkably clever chap. Especially when you realise that all on his own he creates the sound effects that probably a whole team of experts are engaged upon in the Hollywood productions.

"Stanford Robinson, the conductor of the Theatre Orchestra, is absolutely invaluable in getting the musical scores just right. He is tireless during the very tedious rehearsals that precede every broadcast. These rehearsals are always done in studio BA, down in the bowels of the "Big House." I'll give you an idea—it takes two and a half hours of band rehearsals for just seven minutes' broadcasting!

At the Rehearsal.

"As a rule we are at it for about nine hours with orchestral rehearsals to make up a full thirty-minute show for the air. Then there are nine hours' work on the piano score before the band even begins to play. I have worked it out roughly that we take half an hour rehearsing for every minute of broadcasting.

"How long are we going on? Well, until the week of January 5th, anyway. And some time in the New Year I shall give a special request show. Meanwhile, perhaps you'd like to come along to see a rehearsal?"

I said I would be charmed. And for over an hour I sat in BA while the imperturbable Stanford Robinson went through the bands parts with the Variety Orchestra.

There they all were, in that bizarre looking studio, piecing together the bits of the Chinese puzzle. George Scott standing near a ribbon mike behind the conductor of the orchestra, making deep guttural noises as the Big Bad Wolf. The girls giggling by his side as they imitated the Pigs. John Watt dashing in and out of his little cubicle to confer with Stanford Robinson. "Sticks" Gibling muttering to himself as he kept rearranging his bits and pieces—sorry, his Effects department.

At one point there was a diversion. "Sticks" was stumped. A gadget he wanted had not turned up. Almost immediately afterwards his comic clapper machine refused to clap. Stanford Robinson seemed to look down his nose, tapped the lectern with his baton and said: "Gentlemen, we will proceed with the next number—while we still have some effects left!"

But the whole bunch of them worked together wonderfully well. The genial John, flashing his famous smile upon the slightly harassed assembly, kept everyone in the best of tempers through the long and wearisome repetition of nearly every line in the show.

Everyone seemed so intent on his work that I literally crept away, hardly daring to hold up the proceedings even for a moment. But it gave me a salutary insight into the enormous amount of effort that lies behind these seemingly simple—and always delightful—Mickey Mouse broadcasts.

"DIRECTED" BROADCASTING

World-wide efforts are being made by radio engineers to cut down mutual interference between transmitters and at the same time provide reliable service to the various groups of listeners. One method that is being tried is the suppression of radiation from a transmitter over an unwanted area, the power being focused towards the thickly populated districts. How this is done is explained on this page.

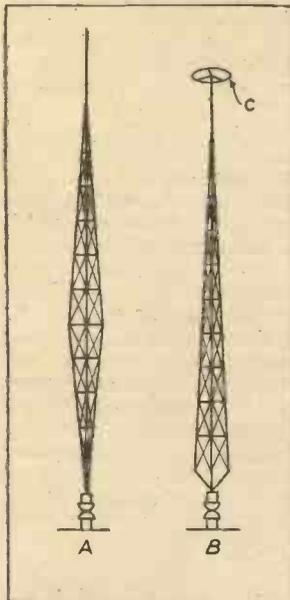
By J. C. JEVONS

At first sight there would seem to be little advantage in applying directional methods to broadcast transmission, because the main purpose is to cater for as many listeners as possible, and in densely populated areas this object is best attained by radiating the signals uniformly in all directions.

But in some countries it is not possible to locate the National transmitter as close to the geographic centre, say, as Droitwich

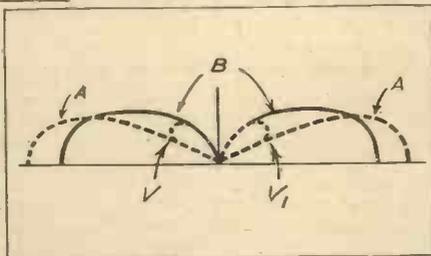
is, and then it is definitely helpful to be able to direct the radiation so as to favour the districts where most of the listeners happen to live. The same applies whenever a circle drawn about the transmitter includes, say, a large area of the sea, or a wide stretch of uninhabited ground, or the territory of another country.

MAST RADIATORS



Above is Fig. 1, showing two aerial radiator designs, A and B, the latter having a special "capacity ring," C, on top of it. To the right (Fig. 2) we see the effect of the mast A, in converting the radiation curve A (of an ordinary aerial) to the curve B. When the mast A is used (Fig. 1), the direct ray A in Fig. 2 and its sky-wave V, V₁, are combined to form the more powerful ground-wave B. Below Fig. 2 is Fig. 3, showing the current distribution along the ordinary earthed quarter-wave aerial (A) and that along the capacity-topped aerial (B in Fig. 1).

TWO WAVE TYPES



The curve A shows the radiation field from the ordinary quarter-wave aerial. It has two distinct vertical lobes, V, V₁, which shoot upwards towards the Heaviside layer and create unwelcome disturbance far afield. In the full-line curve B both sky-waves have gone to swell the ground-wave, which now covers a much wider service area for what may be called "local listeners."

Another method of tackling the same problem is to insert a "capacity ring" C at the top of an insulated half-wave transmitter, as shown in Fig. 1, B. This has the effect of changing the normal current distribution along the aerial so

ground-wave from the same transmitter; whilst at still greater distance it goes to swell the general "mush" of background noise.

In short, the sky-wave helps to clobber up the ether, and most modern stations are anxious to be free of it. Here, too, the problem is really one of directional transmission. The signals should be radiated so that the favoured direction is horizontally along the ground, whilst the direction to be cut out is that which points skywards.

A Satisfactory Method.

One method of securing this result is to replace the usual quarter-wave aerial by one roughly two-thirds of a wavelength high, and insulated at the base. In Fig. 1, for instance, A shows a high-powered medium-wave transmitter of this type in which a single lattice-tower supported on an insulated block is made to serve as the actual radiator. Its effect is to convert the dotted-line radiation curve A shown in Fig. 2 into the full-line curve B.

that it develops more of a "bulge" in the middle.

In Fig. 3 the curve A indicates the current distribution along the ordinary "earthed" quarter-wave aerial; whilst the curve B illustrates the current developed along the capacity-topped aerial shown in Fig. 1, B. The latter curve is more symmetrical about the length of the aerial, and for this reason it radiates almost entirely in the horizontal plane, as shown by the

NIGHT AND DAY

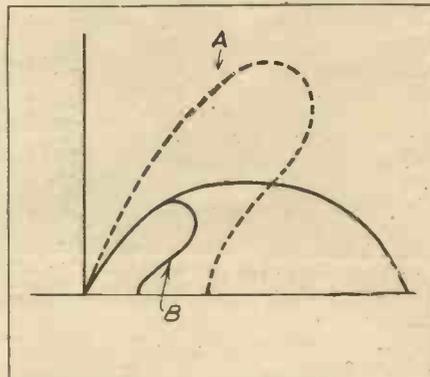


Fig. 4. Here we see how the sky-wave (A) is radiated at night for the benefit of distant listeners, and how in the daytime the normal sky-wave B is completely suppressed, the energy being added to the ground-wave, shown as a solid line.

arrow. On the other hand, the distribution of current in A is such that it gives rise to a definite vertical component or sky-wave.

As we all know, distant reception is always more difficult during the daylight hours than at night. This is mainly due to the fact that the Heaviside layer loses much of its power as a reflector when exposed to the action of the sun's rays. Accordingly one has to rely chiefly upon the ground-wave, so long as the sun remains above the horizon. On the other hand, for long-distance reception at night, the sky-wave becomes the more important factor.

An Alternative Scheme.

Of course, the obvious way to extend the range of any transmitter is simply to boost up the total power radiated. But this produces an unnecessary increase in the local signal-strength, making it almost impossible for listeners who live "in the shadow" of the transmitter to enjoy any alternative programmes.

A way out of this particular difficulty can be found by making use of the reverse "directional" effect to the one previously described. In other words, the transmitter is given an extra reach, at night, by deliberately increasing the intensity of the sky-wave radiated, without at the same time "blanketing" local listeners with too strong a ground-wave.

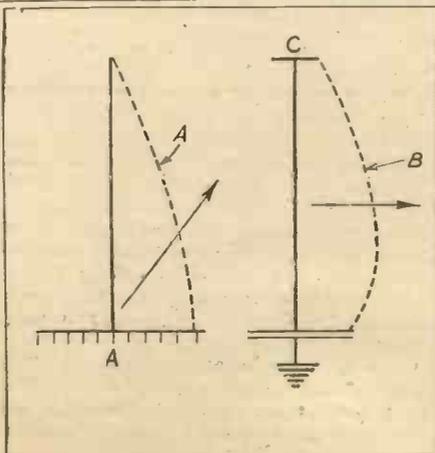
The ideal transmitter is one in which the sky-wave can be got rid of during the

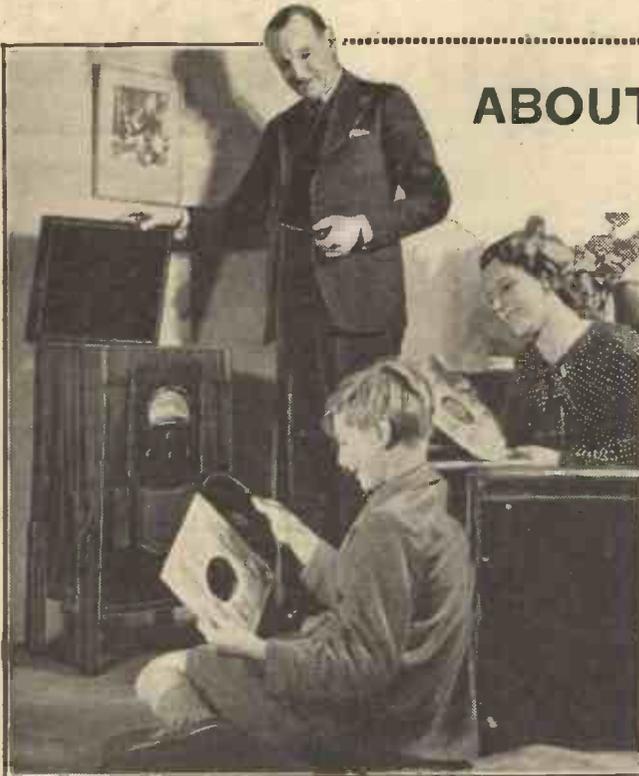
(Continued on page 492.)

In cases of this sort the transmitter can be designed so as to suppress the radiation in directions where it is not wanted, and to favour the particular districts which are thickly populated.

Cutting Out the Sky-Wave.

Again, from another point of view, it is very desirable to be able to cut out the so-called sky-wave from the transmitter. This vertical component adds nothing to the signal strength within the ordinary service range, but becomes a nuisance when it is reflected back from the Heaviside layer, a hundred miles or so away. At this distance it causes fading, by interfering with the





With a radiogram you are independent of the radio programmes, and can turn to records should broadcasting pall. Here is a happy family group with their new 16-guinea H.M.V. instrument.

ABOUT THESE PROGRAMMES

By Higham Burlac

by some interesting person because the event was, apparently, not arranged in time to be announced in the evening papers? We do not all, always, keep the loudspeaker alive until the end of the final news bulletin, especially if we have previously read the evening newspaper. So would it not be kind of the B.B.C. to slip in a "flash" announcement, once or twice, say, during the bell-ringing spasms? A "Stop Press" service.

As a musical comedy item the "Waltz Dream" ranked high; but the waltz was better than the comedy, which, though passable enough in spots, was rather a "humorous interlude" than an integral part of the plot, if plot there were. But perhaps the structure of a musical comedy was, after all, ordained to be a thin string of wisecracks and lovers' babblings, upon which lyrics are strung. The Princess Helene appears to think that she was in the Whispering Gallery of St. Paul's; I nearly cupped my ear with my hand, and said, "Eh?" Music and songs, satisfying in a Viennese sort of way, like champagne—bubbles, and then what?

This evening's six o'clock Time Signal was ten seconds slow—by young Bill's new Christmas wrist-watch. And half a tone flat—by little Pamela's cuckoo clock. These old-fashioned Astronomers Royal are losing their grip!

Stainless maintains his high average of wittiness, but I wish that he would give a free advertisement to the particular brand of lozenge by means of which he maintains that nutmeg-grater voice at crow-scaring pitch. Further, now that he has relinquished his school-teaching, I would like to tell him that it would be appropriate were he to drop that punctuation gag (semi-putrid). It was funny for the first five years.

Les Allen and his Canadian Bachelors sound like coming "bill-toppers." On this particular evening their big clap was earned by a song about a lullaby and a kid who was mighty like a rose! That's a good one for bachelors, that was.

The Kentucky Minstrels.

Confession, in moment of weakness. I should like to have a Kentucky Minstrels performance every week between November and March. But I would not refuse one a month. Reason: The Male Voice Chorus. Is there a better one on B.B.C. air?

One of the B.B.C.'s winning ways which might with advantage be reconsidered is its knack of topping off the arid 7.45 p.m. to 9 p.m. period on a Sunday with twenty minutes of poetry, appropriately called "Pilgrim's Way." I wish that the B.B.C. could be persuaded to construct its programmes with an eye to common sense, and to pay less attention to system. Enough poetry to last for six months can be exhaled in twenty minutes—and it was offered immediately after a religious service, a "good cause" and a stale news bulletin!

We may be interested in, but not hopeful of, the outcome of Mr. F. Bolton's new trip in search of "stars." You see, during his last trip, which took place in the autumn, he had a very poor catch, and of those performers who did manage to pass the meshes of the Bolton sieve, only 2 per cent were deemed worthy to be tested in London.

Insufficient Artists.

Much obliged to the B.B.C. for taking such pains to protect us from non-stellar artists, I'm sure; but at this rate we shall be compelled to fall back on Blattnerphone records of early editions of Grandma Buggins and Mrs. Waters' Daughters. Astonishing, is it not, how the real "variety" magnates contrive to find new talent. One begins to suspect that they must have some system of payment which attracts artists.

THE most amusing incident in recent radio annals was the B.B.C.'s Great Boot Boom, when Capt. V. A. Cazalet, M.P., by courtesy of the B.B.C., quite unintentionally gave a boot manufacturer an advertisement worth about £1,000, judged by American standards. How the B.B.C. made such a slip—for slip it was, despite the subsequent "explanation"—is difficult to conceive.

I commend to your kind consideration the "Young Ideas" series, which is a sort of junior edition of "In Town To-night," and very little inferior to it. Its "talks" are generally well worth dropping one's book or knitting for, because they are delivered by "one who knows" or "one who did it." No professorial ponderosity, but a free-and-easy, camp fire atmosphere pervades the programme. The young ideas step fearlessly up to the microphone, discharge their pieces, and leave us wishing either that we could have the last ten years over again, or that we might be adventurers too.

An Impressive Thought.

I have been much impressed, after having listened to "talks" for a good many years, by the thought that at any given time, while I am peacefully smoking my pipe or reading Big Bad Wolf to a tiny tot, some ordinary man, possibly a native of Brixton or Cleethorpes, is having the Adventure of His Life. Just think! At this very moment somebody is preparing a "talk" by laboriously, and perhaps painfully, plodding through a jungle or a desert, sailing from Bristol to Sydney in a cockleshell, climbing a mountain or fighting cannibals. And he will tell us about it next year.

Have you ever missed a speech or "talk"

With this sparkling commentary on the radio programmes, we welcome back to the pages of "P.W." one who will be remembered by many readers as a regular contributor to earlier issues. Mr. Burlac has a unique style. Combining a seasoning of delightful and friendly humour with a wide and sincere appreciation of all that makes for good broadcasting entertainment, he is able to assess the programmes just as would, we believe, the "average listener" were he possessed of the gifts of a Burlac. Mr. Higham Burlac's programme commentary will appear every week in "P.W."

"Death on the Range," the wild and woolly West serial of the "Saturday Magazine," is true to its name. It is deadly. Even if a magazine must have a story, and even if that story must be in serial form (a mistake!), there is nothing which we have ever done to the B.B.C. which justly renders us liable to suffer a "penny dreadful." The horse-hoof noises, the prodigality of shots, the lowing of the steers—we heard all these thirty years ago from behind the silent movie screen. Let those rough-tongued cattle-minders shoot their way into the Children's Hour, or for ever after hold their horses.

THE "P.W." UNIVERSAL CONVERTER

(Continued from previous page.)

medium and long waves are required. In the event of the latter, then the on-off switch on the converter is placed in the off position and the whole thing is then disconnected from the mains and the aerial is over to broadcast.

With the aerial over to converter and the on-off switch at "on" the converter is in use.

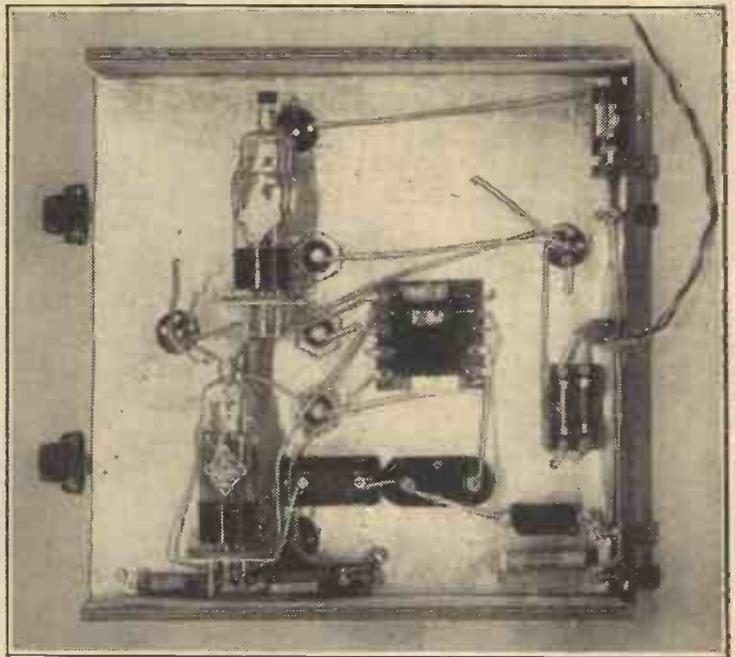
Ganged Tuning.

The aerial then feeds to the primary of the first coil, the secondary of which is in the grid circuit of the pentode H.F. amplifier. The anode of this valve is connected to the primary of the H.F. transformer coil, and the secondary of that coil is connected to the grid of the heptode mixer valve.

These two tuning coil secondaries are tuned by the two sections of the gang

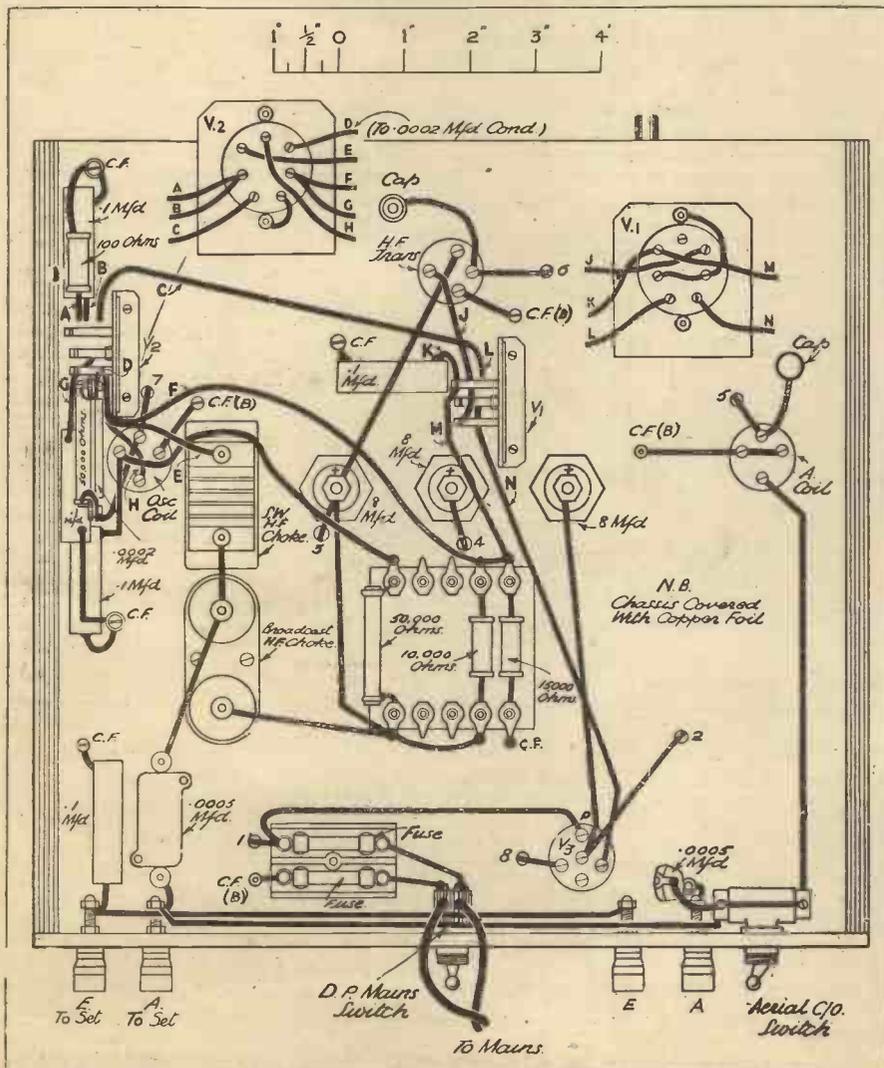
.00016-mfd. condenser and are quite sufficiently matched to allow the tuning to be carried out without any need for trimmers of any sort.

The oscillator of the heptode is actuated by another coil unit with the secondary used as the tuned grid winding and the primary as the anode winding. Thus, throughout the whole design quite standard short-wave plug-in coils of the four-pin type are used.



The Cossor valves are here shown in position under the baseboard. The heptode is the lower one and the screen pentode is above it.

NOT DIFFICULT TO BUILD



The great majority of the wiring is carried out on the under-side of the chassis, which is made of plywood covered with metal foil.

In series with the grid and the coil in the oscillator circuit is a resistance and a parallel condenser. These are to flatten out the oscillation curve so that the valve will not oscillate too violently at the lower end of the short-wave band and cause what is known as "squegging."

The rest of the circuit is self-explanatory. The incoming mains are broken down to the correct voltage by means of the Bulgin mains resistor, and the rectifying valve is kept in position whether A.C. or D.C. mains are used. The smoothing is very efficient, for two chokes are used together with an 8-mfd. electrolytic condenser. The whole unit is built on a simple copper-covered chassis.

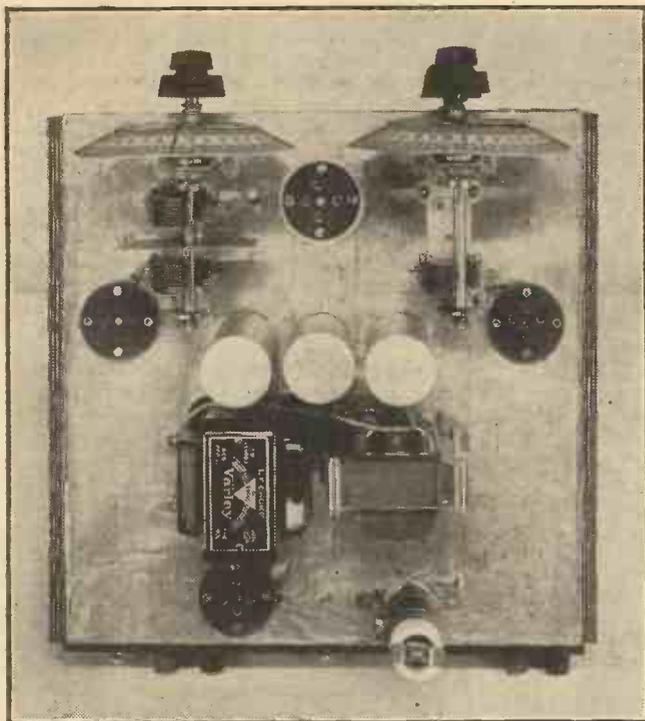
This chassis is made of ordinary plywood, such as is used for baseboards, and the foil covers both sides, a number of bolts and nuts being used here and there to bond the two surfaces of the foil together at frequent intervals. Such bolts are distinguished from the ordinary foil connections on the wiring diagram by the letter B in brackets after the letters CF, denoting copper foil connections by means of a bolt and not the usual wood screw or soldered contact.

Brackets for Valves.

Metal brackets are made out of aluminium for the holding of the two seven-pin valve holders for the heptode and pentode valves, and these brackets can either be made at home to any suitable design or obtained from the kit suppliers in the usual way.

The construction of the unit is so simple that there is no need for me to say any more about that except to impress all builders of the unit that the leads should be as securely anchored at the various points as possible. Any suggestion of a loose contact will play havoc with the operation of the set, and I myself found that a terrible noise was set up because one of the earth joints was not all it should have been. Remember, however, to put the runners on the chassis last of all, after the wiring has been completed.

(Continued on next page.)



The connections to the mains resistance are : right-hand flex (see diagram below) to the terminal marked the same voltage as the mains, and left-hand flex to the terminal marked 4 V.

blue coils, and the 19-metre band round about 100. The whole range of the set is from 13 metres to about 94 in three steps. These are 13 to 26, 22 to 47, and 41 to 94 metres.

But remember that you will easily miss 50 per cent and more of the transmissions to be tuned in if you tune the dials too fast. This is particularly true of the left hand oscillator tuning dial.

One more word or two. The volume control of the unit is carried out on the broadcast receiver just as if this were being used for the reception of ordinary wavelengths. If the set has A.V.C. this will operate in the usual way, too.

If you have reaction on your set you can use it to advantage in searching for stations

by means of their carriers, for the converter will not give you the carriers, but will quite suddenly provide the music or speech of the station in the same way as the ordinary broadcast superhet does.

The use of the converter with a set that has A.V.C. is rather difficult to get used to owing to the fact that when you tune in a powerful signal the A.V.C. in the set is liable to fade it out momentarily immediately you have tuned it in, with a peculiarly disconcerting effect.

When an A.V.C. set is used, therefore, it is necessary to tune even more slowly on the converter, so that the true value of any station that you tune in can be judged, time being allowed for the A.V.C. to settle down after the station wave has been tuned in.

At first the rush of signal strength caused by the sudden arrival of the wave when the converter is tuned to the correct wavelength causes the A.V.C. to go suddenly "all out" and a complete fade-out often exists for a second or so. Afterwards, of course, the A.V.C. is a most useful aid to satisfactory short-wave reception.

But it is by no means essential, for a very good selection of stations can be obtained that do not require A.V.C.—Zeessen is one, and Rome is another, while the strength of Moscow on its 50-metre wavelength, late at night, is sufficient to satisfy anyone.

You will find that in use with D.C. mains there is the usual right and wrong way of inserting the mains plug, so if you do not find any indication of liveness after a minute or two, try reversing the plug—and putting it in the mains socket again.

The tuning of the unit is quite simple. The two tuning dials go pretty closely in step, all the way up, but as the right-hand dial tuning is flat, the main attention must be paid to the left-hand one. Move this some ten degrees very slowly, from zero, and then bring up the right-hand dial, starting this latter at, say, 5 degrees to, say, 15. Then move the left-hand one another 10 and advance the right-hand one to 25, and so on.

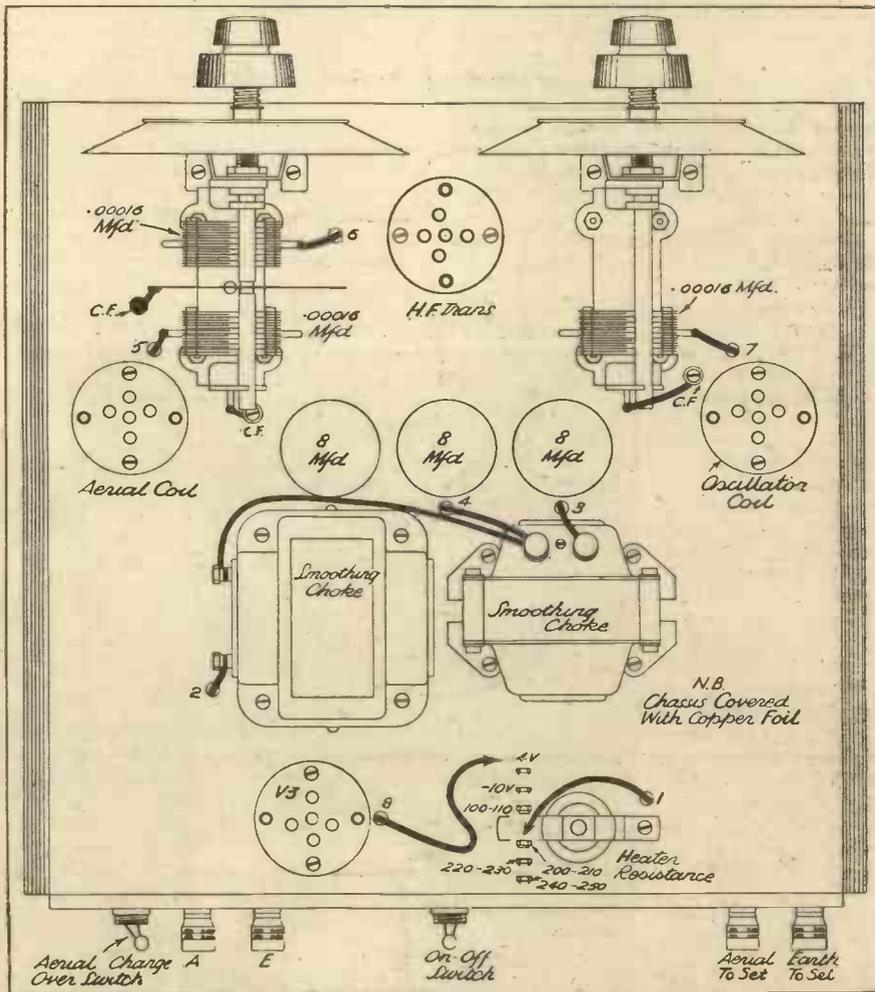
Move it Slowly.

Always move the left-hand dial very slowly indeed, using the smaller of the two knobs for operating it. This will enable you to hear every station as you pass over it, and you will probably be surprised not only at the number of stations that you hear, both C.W. and telephony, but also the small amount of dial space they cover. When you have found a transmission with the left-hand dial, turn the right-hand one till it gives the loudest results, and the converter is then tuned.

The telephony stations you will find are grouped about on the dials, not spread over them like the C.W. transmissions. Thus you will have the 19, 25, 31 and 48-metre bands of broadcasting stations to hear, and the various amateur transmitter wavebands as well. A good one to try out the unit on first is the 40-metre amateur band on a Saturday or Sunday morning.

You will find them somewhere between 150 and 180 on the dials using the yellow spot coils. The 48-metre band you will find on the red spot coils down towards the lower end of the scale; the 31-metre band on the yellow spots round about 100. The 25-metre band is near the top of the light

THE TOP OF THE CHASSIS



The top deck of the unit is particularly clean. Very few wires come up to it, and a symmetrical layout has been achieved.

ALTHOUGH the listener to the B.B.C. and Continental medium-wave broadcasts during the coming holidays will find more programmes on the air than he can cope with, it is the possessor of a short-wave wireless receiver who, through the higher frequency channels, will be given the best opportunities of hearing how the peoples in more distant lands celebrate the Christmas and New Year festivities.

This year it would appear that most nations will be putting radio to greater use than hitherto, in particular with a view to reaching their nationals dwelling at great distances from the Motherland.

Although on previous occasions many European studios have put their microphones at the disposal of the general public for the purpose of sending personal greetings overseas, it has been left this Christmas to Denmark to make of this feature a special programme.

For Arctic Friends.

On December 25th, Copenhagen proposes to broadcast an entertainment mainly destined to Greenland and to Danes dwelling in the Arctic Circle, and to which a choir of Eskimo children will contribute native songs. It is in the course of this transmission that listeners will be permitted to send their greetings to relatives and acquaintances living within the shadow of the icy Pole.

Oslo, on the other hand, anxious that its nationals engaged in whaling in Arctic and Antarctic circles should receive a Christmas programme from the homeland, in addition to the use of the short-wave station at Jeløy on 31.48 metres, is making arrangements for sending the broadcast out through one of the high-power Kootwijk (Holland) transmitters. The entertainment will last three hours, and will be simultaneously receivable from the Norwegian medium-wave stations.

For the same occasion the National Broadcasting Company of America has prepared a star programme which should easily be captured through its short-wave outlets—W 8 X K, Pittsburgh, W 2 X A F, Schenectady, and the Boundbrook stations.

After the relay of the Bethlehem (Palestine) carillon—now a regular occurrence in the B.B.C. annual world tour—and the singing of a hymn by a choir of the Franciscan Monks from the Church of the Nativity, we shall hear a talk relating to the historical tree under which Joseph and Mary are said to have sheltered, and which is situated on the edge of the desert in the neighbourhood of Cairo—a relay to be carried out through the Abu-Zabal station for re-broadcast over the United States. In

addition, every effort is to be made to secure a transmission from Addis Ababa (Ethiopia), of which the main feature is to be hymns sung by a Coptic Choir in the Cathedral.

Pursuing its tour of the world on Christmas night, the N.B.C. also plans to let its

SPECIAL CHRISTMAS and NEW YEAR SHORT-WAVE BROADCASTS

This year the radio fare during the festive season is richer than ever, and especially on the short waves does novelty and romance abound during the next week or so. Here are some exclusive details of the programmes.

By J. GODCHAUX ABRAHAMS.

unseen audience hear a portion of a High Mass from St. Peter's (Rome), a service from St. Paul's Cathedral (London), an organ recital from Nôtre Dame or from Ste Sulpice (Paris), and from what is estimated the oldest wooden chapel in the world—an ancient place of worship situated in North Norway. An attempt will also be made to visit a church in Danzig before returning to the United States.

On December 31st, the N.B.C. plans to offer to listeners a further *Round the World* broadcast, in which some fourteen times in the course of thirteen hours we shall be

able to listen to the New Year being celebrated in various quarters of the earth. The first relay will take place at G.M.T. 15.00, as the clocks strike midnight in Tokio; two hours later Manila (P.I.), Batavia (Java), or Bangkok (Siam) in their turn will also peal out their greetings. Bombay at G.M.T. 18.30 will add its Hindu contribution, and at G.M.T. 21.00 the Kremlin Bells at Moscow will be heard to chime; following which at 22.00 our American cousins will call upon the Central European powers, in particular Finland, Germany and Italy, to usher in the New Year.

End of An Amazing Hook-up.

At midnight, New York will stand by to listen to Big Ben, and by the magic of radio listeners will be transported sixty minutes later to the North, whence through the medium of the new Reykjavik short-wave transmitter the New World will ascertain whether on this occasion the local festivities overpower the proverbial depression which emanates from Iceland.

If you are still awake at G.M.T. 02.00 on January 1st, through the Pittsburgh, Boundbrook and Schenectady channels you will pick up a relay from an American liner, in the neighbourhood of the Azores, on its way to a European port, with a switch back at G.M.T. 03.00 to Rio de Janeiro (Brazil).

Finally, at G.M.T. 04.00 the conducted tour will take you to Buenos Aires, to bring you back at G.M.T. 05.00 to the United States in time to listen to God's own country going whoopee!

HARRY HOPEFUL ON THE BORDER

An interesting item in the Northern Programme for December 31st.

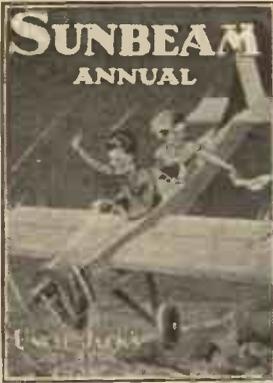
CONTINUING his fruitless search for work, Harry Hopeful, the unemployed Lancashire glass-blower's assistant, has penetrated to the Scottish Border, and on New Year's

Eve he will find himself in the historic town of Jedburgh, from which the fifth of these "rural actuality" programmes will be broadcast. The programme in this instance is to take the form of a kind of court of enquiry, with Harry in the chair. A number of country men from both sides of the Border will be arraigned before him, and Harry will question them closely as to their conduct during the past year. In conclusion, they will return the compliment by putting him in the dock himself, and one of the uncomfortable questions he will have to answer is why he confines his search for work to such remote and unlikely parts of the country. One of his questioners will even go so far as to offer him employment; but whether or not Harry will accept remains to be seen.

RESTING AFTER SOME VERY HARD WORK



Do you recognise him? Of course. He is having a few minutes' relaxation with his Cossor radiogram and some light refreshment.



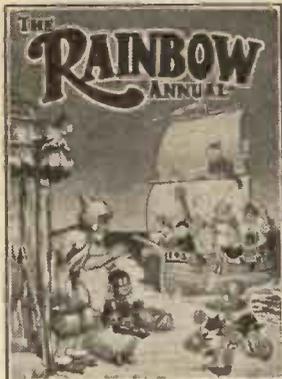
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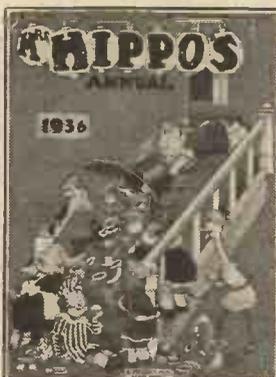
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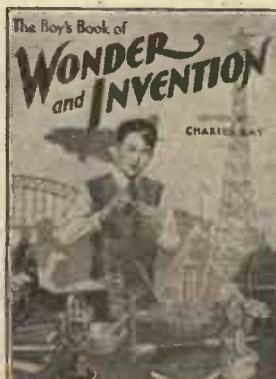
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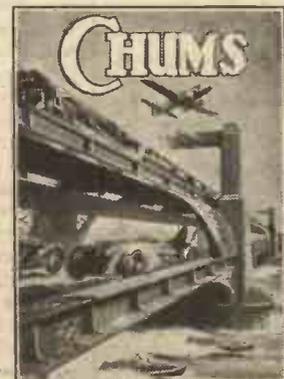
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MORE ARTISTS FOR THE B.B.C.

NEWS AND VIEWS
ABOUT BROADCASTING

By
BARRY KENT

MR. VAL GIELGUD, the Drama Director of the B.B.C., has given instructions for the use of more varied casts in productions in order to give more artists a chance of broadcasting and also to keep the talent-searching net as wide open as possible.

This will be good news for many aspirants hitherto denied access to the microphone because of the congestion of those who were already established as radio artists. But, of course, it will work the other way as well—that is, if more artists are employed the opportunities of each will be less.

Symphony Talk to Go.

Here is an item of news that will cause relief to many listeners. The fifteen-minute talk that has been the prelude to each of the main B.B.C. symphony concerts is to be dropped after next summer. The talk has served no purpose except as an irritant. Music-lovers regard it as too elementary. The general listener wants the music. Also dropping this talk will enable the symphonies to be re-timed a quarter of an hour earlier, to the convenience of everyone.

B.B.C. Goes Polite.

The B.B.C. suddenly threatens to go all polite to foreigners. When there have been relays of programmes from abroad under the auspices of the International Broadcasting Union it has been the invariable custom of the foreigners to give the announcements in English as well as in their own language. But the B.B.C. has gone doggedly along, ignoring the foreign languages.

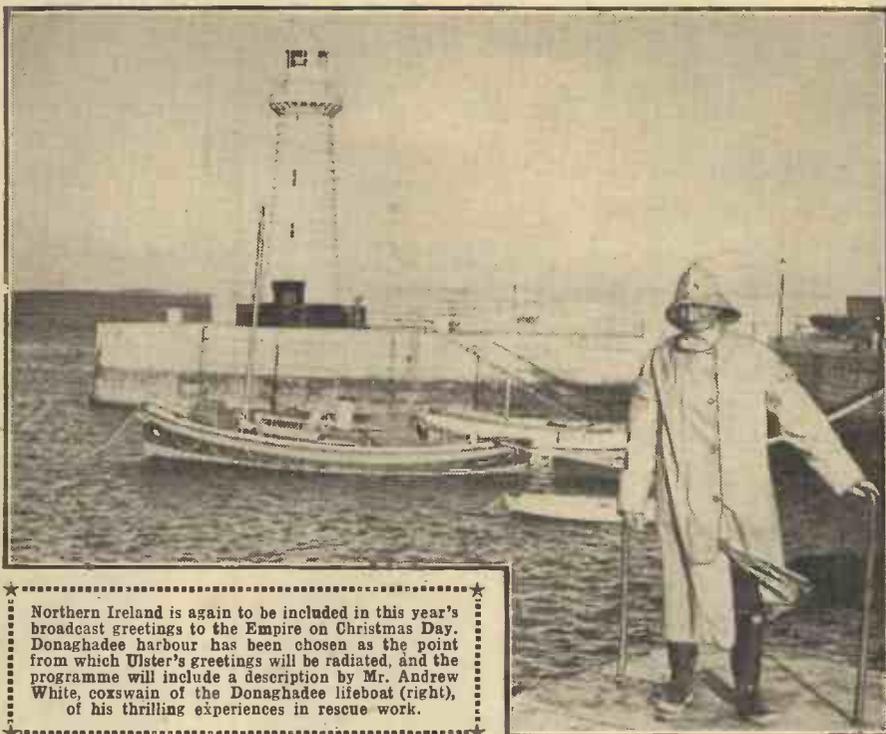
Mr. Graves, the B.B.C. Programme Controller, is changing all this. In future the B.B.C. will give courtesy announcements in the main languages of the Continent whenever programmes are exchanged.

Ending the Year.

As the result of a suggestion from a "South Irish Loyalist" the B.B.C. will give the National Anthem in the main programmes at the conclusion of dance music on New Year's Eve. Thus, "God Save the King" will both end the broadcasting year of 1935 and begin that of 1936.

Replacement for Ambrose in December.

For a late night broadcast feature cancelled by Ambrose this week there is being substituted a light variety presentation



Northern Ireland is again to be included in this year's broadcast greetings to the Empire on Christmas Day. Donaghadee harbour has been chosen as the point from which Ulster's greetings will be radiated, and the programme will include a description by Mr. Andrew White, coxswain of the Donaghadee lifeboat (right), of his thrilling experiences in rescue work.

with three or four acts and a dance band. If the experiment succeeds, this type of programme will be made to alternate on Saturday evenings with Henry Hall's Hour. The date of the experiment will be Saturday, December 28th.

"Cheerful" Audiences.

Some B.B.C. producers have had occasion to complain lately about the undue cheeriness of studio audiences at Variety performances. There was a case of a party of visitors who had dined well and perhaps not too wisely. Their exuberance nearly ruined the show. So now a new rule has been promulgated.

Under this Captain Chilman, the energetic and vigilant House Superintendent of the B.B.C., will accept responsibility for weeding out the "unduly dined" among the studio guests. I can see the prospect of some fun if this rule is applied relentlessly. Anyway, if you want to be sure to be able to use your studio ticket for a B.B.C. show, you had better postpone any celebrations until afterwards.

"Diagonalising" to Go.

The B.B.C. next year will put a stop to its now established practice of "diagonalising" some programmes—that is, giving a second performance at the same time in the other main programme on the following night. This does not mean that there will not be repetition. When programmes are repeated it will be at a different time of day, even if on different wavelengths.

Thus, "Macbeth" might be given on the National on Sunday afternoon and on the Regional the next Thursday night or at mid-day, and so on. This change will make for more satisfactory contrasting of programmes in the main listening periods.

Scrapbook for 1901.

The increasing success of the Scrap-Book Series handled by Charles Brewer and Leslie Baily is reflected in the news that another

of these features, for the year 1901, will be given in the National Programme from 8.30 to 9.30 on Tuesday, January 28th, and in the Regional network at 8 o'clock on the previous evening.

The Watt Centenary.

The James Watt Centenary Programme on Monday, January 20th, will be provided by Scotland. This indeed will be a real test of the programme-building capabilities of the B.B.C. Scottish staff. The Rev. Melville Dinwiddie, Scottish Regional Director, is interesting himself personally in this effort. I trust he will not make it quite as serious and highbrow as the St. Andrew's Day programme this year.

Correspondence Decline.

I have already mentioned several times the falling-off in letters from listeners received by the B.B.C. I have just been shown another of the weekly returns, that for the third week of November. There were nearly twice as many letters in the same week of 1934; also the proportion of adverse criticisms had increased from 13 to 23 per cent. General talks came in for most of the praise that was going. In entertainment, Scrap-Book for 1911 was an easy winner in number of "plaudits."

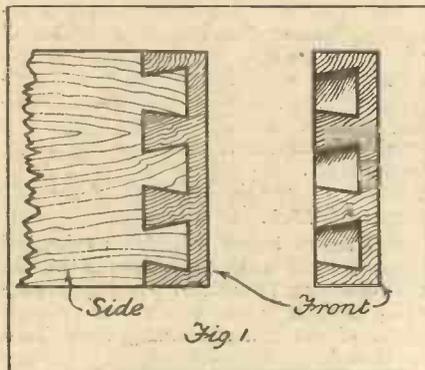
"His Last Day in Business."

George Shiels is one of the foremost contemporary dramatists in Northern Ireland, and he has written specially for the microphone a new play called "His Last Day in Business" which is to be broadcast on January 2. In this play Mr. Shiels has experimented with new forms of technique to great advantage, and Mr. S. A. Bulloch, who is producing the play, is confident that it will be a high light among dramatic productions in the Northern Ireland programme. It is the story of a miser who not only begrudges every penny he spends, but neglects his own health and well-being with dangerous results.

THERE is a vast amount of jointing work to be done in cabinet making, and while screws are to be preferred to nails in the best work—in odd places—there is a small demand for the short, slender panel and veneer pins and the so-called needle points, where it is undesirable to show the head of the nail on the surface of the finished work.

But there should be few screws and fewer nails in the joints of wireless cabinets, for the work calls for the jointing of wood with wood, chiefly in the form of a dowel, a

USING DOVETAILING



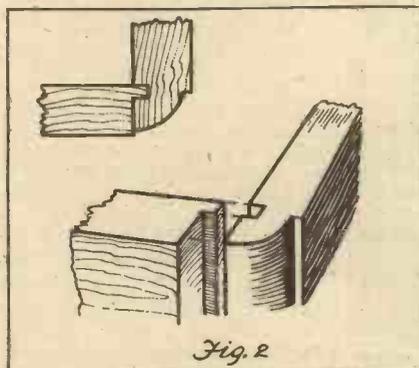
How a stopped-end dovetail is carried out.

mortise and tenon, a mitre, or a dovetailed joint. There are many complicated joints of these classes and some compound joints embracing two classes; all formed with the assistance of glue. A simple angle joint may be made by bringing two sheets of wood closely together and nailing them; it would be a very rough job and would resemble a packing case.

More Artistic Join.

A more artistic and by far a much stronger joint could be made by dovetailing one side into the other, thus forming the angle, and a stopped dovetail is to be pre-

THE REBATE



Fixing a panel by means of a rebate in the cabinet side.

ferred for cabinet fronts, because it does not show the end grain on the front of the cabinet (see Fig. 1).

A mitred dovetail joint is still better because no end grain is shown on either side of the joint. Generally speaking, four stout corner uprights will form the frame of the cabinet, and the cross-rails—top and bottom—will be tenoned into these uprights. Such rails may also be made to fit into grooves in the four uprights, and if the bottom and top rails are also grooved they

may carry the panel—one for each side. If any side frame or door frame is made with a rebate, or open-sided groove on the edge, the panel can be made to fit into this rebate. See complex angle joint and tenoned rail into mortised upright, showing feather slips (Figs. 2 and 3).

The Necessary Tools.

The chief cutting tools used in cabinet work are chisels and plane irons—kept in good condition by sharpening on a grindstone and oilstone; but lately those small hand emery wheels have practically replaced the large grindstone in all small home jobs. Good quality oilstones should be selected, preferably in a wooden case, and the American "Washita" oilstone, the "Carborundum" and the "Aloxite" sharpening stones are usually recommended to give the best service. Such stones may be had in three grades—medium, fine and coarse—and the small "slip" stones used for sharpening fine woodcarving tools may be had in the "extra fine" grade.

For preference, sweet oil should be used for oilstones—for the same reason as water is used on grindstones. The oil acts as a lubricant and prevents the pores of the stone filling up with fine particles of steel,

MAKING YOUR OWN CABINET

Some valuable hints for the amateur woodworker

By

C. J. ELLIOTT.

thus retaining the sharpening value of the stone. The sharpening of gouges—chisels with concave blades—on an oilstone wears it into channels, and this spoils it for the flat chisel which is sharpened in a straight line across its width. Small "slips" of sharpening stone should therefore be used for gouges—as for all woodcarving cutting tools.

Planes and Saws.

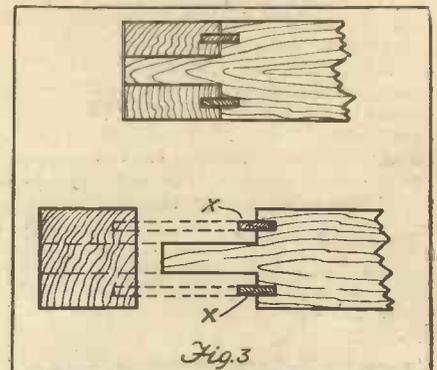
For planing wood three planes are in general use—the trying, the jack, and the smoothing plane, the first named being the largest and the last named the smallest. The cutting irons are from 2 inches wide in the smoothing plane, up to 2½ inches wide in the trying plane. The cutting edge of a jack-plane iron is not absolutely straight, but resembles the curvature of the circumference of a very large circle. A trying-plane iron is about the same, except that in its centre portion it is perfectly straight.

Three types of saws are in general use—the rip saw for sawing along the grain of the wood, the cross-cut saw for sawing across the grain of the wood, and the tenon saw with very fine teeth and a strengthened metal back. The last named

is widely used for cutting tenons that fit into mortises—joints in woodwork that have already been mentioned. This is the saw mostly used in fine cabinet work, and gives the thin saw cuts required. In such fine work it is most essential that in sawing to the marked line the saw cut should be made outside the line, or in other words, in the piece of wood that is to be cut off or wasted. This ensures the tight fitting of the parts.

Boring tools are chiefly hand-drills and braces, the former having superseded the

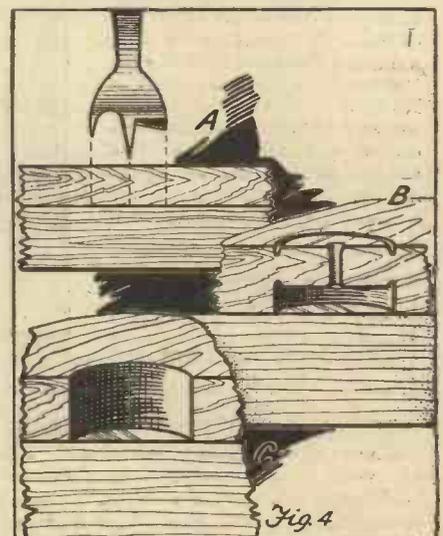
FEATHERED JOINTS



The letters "X" denote the feather slips in this diagram of a mortised and tenoned joint.

latter for all small work. Into these tools are fitted bits—twist-bits or centre-bits, the former being used for narrow, deep holes and the latter for large holes in thin wood, as in cabinet making. In the boring of holes in thin wood, as will often be the case in cabinet making, a centre bit is usually used, and the thin cabinet wood is supported on a solid piece of waste wood. The boring begins on one side of the wood until the point of the bit cuts the opposite side, then the thin wood is reversed, and the point of the centre bit placed in the hole already made on the other side. Simply

HOW TO DRILL



Cutting a hole in a piece of wood in order to prevent breaking through on the reverse side.

cut round the hole with the "nicker," but take off no shavings, then reverse to the first position and continue to bore straight through (see Fig. 4).

(Continued on next page.)

TELEVISION JOTTINGS

The latest news of television progress in various parts of the globe, and some remarks on the probable future of the new science.

By L. H. THOMAS.

ALTHOUGH it is not very heartening to us, personally, to watch other countries going steadily ahead with ambitious television schemes, it is interesting to watch the various lines along which progress is being made.

We, in this country, are in a relatively good position for television by virtue of our small size—not in stature, but in geographical terms! It will be a fairly straightforward matter to link up the principle towns of the country when television really does go ahead.

Australia Gets Ready.

The U.S.A. has a tremendous problem to solve in that way; and the latest entrant into the field—Australia—is even worse. Plans are being made for the establishment of television transmitters in Melbourne and Sydney, and doubtless the other great centres of population will be served in due course. Any land-line work, however, would appear to be right out of the question on account of the huge cost of the cables and the vast length that they would have to be.

The Australian amateurs have been quietly working away on 5 metres over quite long distances, and there is a rumour that the wavelengths used for television in that continent will be shorter than those that we expect to see used here.

On Ten Metres.

Incidentally, the behaviour of ultra-short waves seems quite different in the Northern and Southern hemispheres. Australians were covering thousands of miles on 10 metres for some months before the 10-metre band "opened up" in this country. Now, after about eight months, we seem to be experiencing conditions similar to those that arrived in Australia during the Spring.

Transatlantic television would

appear to be more than a remote possibility, if the ultra-short waves continue to behave as they are doing at present. American stations working on 10, 9 and 8.5 metres are being heard here quite regularly, and conditions are due to improve for the next two or three years.

I wonder whether readers have ever pondered upon the possible uses of television, apart from the broadcasting of entertainment? Of course, we have all had startling visions of a land-telephone system on which we see our friend as well as converse with him—but that can safely be postponed for a few years! But there are innumerable commercial uses for simple television schemes, such as could be carried out even with low-definition apparatus.

Alarmists have already talked about fleets of bombing aeroplanes, controlled by radio and carrying television cameras. These, presumably, will enable their proud owners to sit comfortably in their headquarters, pressing "button A" and releasing a bomb from time to time as a suitable objective appears on their screen. A pretty picture, no doubt, but a little far-

fetched in the present stage of development. The more likely uses for television in the immediate future seem to be bound up with large offices and factories, in which radio need not enter the picture at all, the whole thing being handled by land-lines.

An amateur enthusiast in the Midlands has rigged up the simplest possible form of intermediate-film transmitter, so I am told, and sits in his radio-room watching the passing traffic—some minutes after it has actually passed! But even this simple form of amusement requires the expenditure of far more hard cash than could be afforded by more than a very few wealthy amateurs.

Some of the commercial television receivers, both in this country and abroad, are being brought down to very simple terms, and are definitely no more complicated to handle than the modern broadcast receiver. It will be a long time before amateur home-constructed gear is reduced to this state.

Progress in U.S.A.

It is interesting to note that mechanical scanning still has its adherents in the United States, in spite of the high degree of perfection into which the various forms of electronic scanning have been developed.

Details were recently published of a disc system giving highly satisfactory results with 120-line definition, its sponsors claiming that the whole apparatus was far more simple than that required for cathode-ray operation.

Comparing receivers used for the two systems, the C.R. affair used six more valves, each of which needed its own condensers, chokes, oscillator coils, and so on, as well as an extra power-pack of fairly large dimensions to feed the necessary current to them.

The receiver shows a picture on a fourteen-inch screen—larger, be it noted, than that of the cathode-ray type—and operates at twenty-four frames per second.

It appears that results from this system have been so surprisingly good that an official test of two receivers, side by side, is to be made, and the result of the expert's deliberations will be an extremely important matter for the future of television in the U.S.A.

THE EIFFEL TOWER STARTS



The French Television Service is now experimentally in progress. The Eiffel Tower is the site of the transmitter, and here we see one of the scanning cameras in action in the studio.

MAKING YOUR OWN CABINET

(Continued from previous page)

Unless this procedure is followed with thin wood, the chances are that the ordinary boring will splinter the wood on the other side—greatly to the disfigurement of the surface.

A Few Hints on Glue.

Glue is so well known that it requires no description here, but when buying glue it is advisable to look through it towards the light; if it is clear and bright it is most likely of good quality, but if muddy or

cloudy, it is probably poor, cheap stuff. The glue pot is also known well enough; it is a kind of water-bath where the glue does not become hotter than the boiling water. The glue is broken up into small pieces, placed in the inner pan with sufficient water to cover it, and allowed to soak for the day. Then put water in the outer "kettle" and boil until the glue has melted and has the right consistency; to get this consistency it may be necessary to add more water.

Glued joints in woodwork should be such that they fit very closely, the glue acting as a lubricant when hot. The wood surfaces should be smooth, and the glue-coated surfaces—tongues and grooves—should be rubbed together.

In good-class work the glue is not used to fill up the defects of the joints, for in good joints the strength is given by exposing as large a surface as possible to the action of the glue, the particular joint being designed at the same time to give a maximum resistance to pressure from all angles. It is no uncommon thing to find that when a perfectly made joint is glued, and subjected to great pressure, the wood itself will break, but never at the glued joint.

TECHNICAL NOTES

Items of interest to every enthusiast.

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

Some Detector Hints.

NOT so very long ago it used to be common practice to adjust the detector according to different conditions but in these days it is the fashion to have everything fixed as far as possible, and there has been a tendency to give the detector less attention than it used to get formerly. Once upon a time no set was complete without a variable grid leak, for example, and some very ingenious variable grid leaks appeared on the market.

Notwithstanding the present-day habit of treating the detector more or less as a fixture, it is often worth while to make adjustments in the detector to suit particular conditions.

The Grid Condenser.

For one thing the grid condenser, which usually has a value of, say, .0001 to .0003 mfd., can be varied without much effect on the sensitivity but with some effect on the tone of reproduction, and this is a point worth trying.

As regards sensitivity, the grid leak is more important, and here you have possible variations in value, say, from $\frac{1}{2}$ megohm to 3 megohms.

Advantages of the Potentiometer.

A good plan is to connect a potentiometer across the low-tension battery and to connect the leak between the grid and the slider of this potentiometer. As you turn the slider through the entire range—that is, from low-tension negative to low-tension positive, you will find that the performance of the set will vary quite appreciably. The great advantage of this potentiometer arrangement is that it enables you to get exactly the right amount of bias on to the grid, and this is important not only from the point of view of the sensitivity but also from that of the smoothness of the reaction.

As regards the potentiometer, this should have an overall resistance of, say, 300 ohms. It is better that it should be of the slider type, but you can get an approximation to this by a series of, say, six tappings. A tapped potentiometer sometimes costs a little less than a continuous one, since there are no working parts, but personally I recommend the slider. Incidentally, the total resistance value of the potentiometer should not be too low because, as you see, this is connected across the L.T. battery all the time and will run things down if it has not sufficient resistance.

Improvement 100 Per Cent.

Before leaving this point I should mention the bypass condenser connected across the anode of the valve and low-tension negative. Many people just take a fixed value for this and never think of altering it, but it is always worth while to try different values.

By adjusting and tuning up the detector stage in this manner you can sometimes

improve the overall performance of the set by 50 or 100 per cent. Remember, also, that when a valve goes phut and you have to put a new one in, these various adjustments should be gone over again. People often forget that there are quite large

RAD-PIN

VICTOR KING'S RADIO NOVELTY

THE Editor of "Popular Wireless" recently spent a social evening at the home of Victor King, the well-known radio engineer and set designer. During the course of the evening Victor tentatively suggested that the Editor might like to try a new game, and he thereupon produced a queer, simple piece of apparatus, which he laid on the table.

It transpired that it was a radio game invented by Mr. King for his own amusement.

He and the Editor played this game for over an hour. Then there arrived two mutual friends, who joined in with equal enthusiasm.

Later the following conversation took place:

Editor of "P.W.": "Congratulations, Victor, your game is one of the most amusing combinations of luck and easily acquired skill I have ever played."

Victor King (carelessly): "Glad you liked it."

Ed. "P.W.": "I should think I did! It's a hundred per cent fun and excitement. First really radio game I have ever played. It ought to be on the market. Ever thought of that?"

Victor King (laughing): "There's not really much to it."

Ed. "P.W.": "Nor is there to most games if you analyse them in a coldly scientific manner. But the fact remains that we have spent a jolly evening playing it, and I for one hope to have some more games in the future. Maybe I'll beat you next time. You know, I believe everyone would fall for your game if they had it on the table in front of them. And they'd want to keep on playing it, too. Why not write a constructional article for 'Pop' about it?"

Victor King: "Here, I say!"

Ed. "P.W.": "I'll wager twenty times as many would build—let me see—what's a good name for it? Obvious! RAD-PIN, of course! As I was saying, I'll wager twenty times more people would build RAD-PIN than ever built your most popular set."

Victor King: "Well, it wouldn't cost 'em much."

Ed. "P.W.": "As far as I can see it wouldn't cost them anything."

Victor King (laughing loudly): "And therefore it wouldn't be appreciated."

Ed. "P.W.": (with low cunning): "I suppose it would be beneath your dignity, Victor?"

Eventually Victor King promised that he would give an exclusive description of his novel game for the benefit of "P.W." readers. In fact, he has now completed his descriptive article and the illustrations are in the hands of the Art Editor.

"Popular Wireless" readers will therefore be in a position to make RAD-PINS within a week or two—just as soon as we can get Mr. King's article into print.

RAD-PIN is a radio game, but anyone can play it—and like it. In our opinion, it is the most amusing game to date. Mr. King may have written some fine articles and designed some first-class pieces of radio engineering, but (and this is what we believe he himself fears!) we are inclined to believe that he will be known to posterity as the originator of RAD-PIN—the Radio Fun-Game for Players of All Ages!

LOOK OUT FOR RAD-PIN— EXCLUSIVE TO "P.W."

differences in valves, even sometimes in valves of the same make and specification, and you cannot just assume that the new valve which replaces the old one will give identical results without minor adjustments in other parts of the circuit.

Voltage Loss.

In a case where you have a resistance in the anode circuit of the detector valve it is usually best to apply the full voltage available, because of the drop in voltage and the resistance; obviously the voltage applied to the detector anode (when current is passing) will be appreciably less than the voltage applied to the whole combination. As a case in point, if the anode resistance is 25,000 ohms and the current is 2 milliamps there will be a difference of potential of 50 volts across the ends of the resistance. This 50 volts is lost so far as the anode of the valve is concerned, and if you want, say, 65 volts on the anode of the detector, it means that (if this is the amount of current passing) you will need to apply 115 volts to the anode resistance.

Critical Detector Voltages.

I mentioned a detector voltage of 65, but you should not take it for granted that this is necessarily the best value. Sometimes you will find that the detector works better with even a lower voltage, and in some circuits the detector anode voltage is quite critical, a small change in the voltage making a big difference to the working of the stage. If the detector anode voltage is too high, of course, the set will almost certainly become unstable.

Resistance-Fed Transformer.

Where you are using a resistance-fed transformer circuit it will be necessary to add to the anode resistance the value of the decoupling resistance. I have said that the voltage applied to the detector anode should not be too high, but, on the other hand, if it is too small you will reduce the output of the receiver and the detector valve will not be able to handle signals of normal strength without distortion. Increasing the voltage, within the proper limits, will increase the ability of the stage to deal with a larger input.

Development of Screening.

It is true to say that the modern high-efficiency radio receiver, in which the components are so closely and compactly arranged, would not have been possible without the use of screening. In fact, the development of screening as a practice is one of the most notable features of the trend of radio design during the past few years.

In the old days it used to be the fashion to space the components all out at a respectable distance apart. This made for very much greater bulk in even a comparatively simple radio set. Moreover, the power and efficiency of the components and the circuits used in those days were not to be compared with those of present-day circuits; so that, by the same token, if screening were not used it would be necessary to spread out the present-day sets even more.

High-Frequency Interaction.

All this has been done away with by the use of metal screens for limiting high-frequency interaction between adjacent components. This has had two effects. First of all, as I have just mentioned, it has enabled sets to be built in very compact formation; and, secondly, what is perhaps even more important, it has enabled the efficiency of circuits to be raised by

(Continued on next page.)

EASY WIRING



Perfect contact and ease in wiring are outstanding features in the design of all Clix components.

In Clix Chassis Mounting Valveholders the centre socket of the 5-pin and two sockets of the 7-pin type are made longer than the others: this reduces the possibility of short-circuits and adds to the ease of wiring.

The following Clix products are Specified for the

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- Type B .. 4d.

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TECHNICAL NOTES

(Continued from previous page.)

hundreds per cent, because it has prevented the instability which would otherwise have resulted from interaction.

The great enemy of high sensitivity in a circuit is *instability*. As you increase the sensitivity of the circuit, so you make it more delicately "balanced," as it were, and more liable to fall into an unstable condition. The more you can guard against instability the more you are able, under cover of your safeguards, to push further with the sensitivity and efficiency of the circuit.

Profit and Loss.

In view of the extreme usefulness of screens, some constructors, however, are apt to rely too greatly upon screening. This is a mistake in design, and you should appreciate that the screen only acts by absorbing energy; so that, although the overall result of the use of screens (in the proper way) is to give you greater efficiency of the circuit, at the same time it is a question of balancing "profit and loss." If the loss of efficiency which is incurred in the use of the screens is less than the gain of efficiency overall, obviously there is a net gain.

the screens are really necessary, and use them as sparingly as possible.

Wavechange Switching.

I do not know what your views are upon wavechange switching, but I am one of those who has never really got over my dislike of wavechange switches. I remember the time, only a very few years ago, when this type of switch was far more trouble than it was worth; in fact, whenever you came across a set with a wavechange switch in it and the set was giving trouble (which it almost invariably was), you could be pretty sure that the wavechange switch was one of the causes, if not the only cause, of the trouble.

Danger of Bad Contacts.

In fact, I might go further and say that I am one of those people who, from experience, mistrust *all* switches! I like to see the number of switches in any circuit, whether it be a radio circuit or any other, cut down to the very minimum. I am sure you will agree with me that wherever there is a switch there is danger of bad contacts, and there are quite enough things in a radio circuit which want careful watching without having any unnecessary additional ones.

I know that some of you will object to these remarks, and say that if a switch is properly made and properly operated it need give no trouble. With this I quite agree, but how often can you pick out a

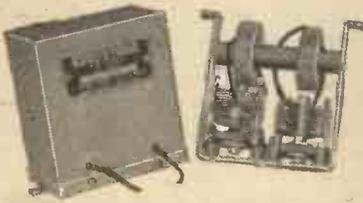
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EDDYSTONE

SHORT WAVE COMPONENTS

Don't Use Indiscriminately.

The point of all this is that screening should not be just thrown about indiscriminately, but should be used with great care, because you may quite likely be using far more screening than is necessary. If so, you are paying too dearly for the advantages which you get, and the *net gain* is not as large as it might be. If you are using a circuit which is of a fairly simple type, for example, where the likelihood of trouble due to interaction between components is not very serious, it may be that screening is unnecessary or that only very *little* screening is needed. If in such a case you go pushing in screens all over the place you are doing more harm than good.

You will see then that before using screens you should make certain by actual test that

really good switch that will give you no trouble over a long period of use?

A Neat Fitting.

Anyway, to return to the question of wavechange switching, this has been a good deal improved during the past few years and, if you have no fundamental objection to switches in general, there is no reason why you should not be satisfied with a switch of this type, of a good make.

Broadly speaking, you can use the push-pull or the rotary type, but a good deal depends on what kind of a coil you are using and also upon the general layout of the set. Upon this also depends whether the switches should be built-in and so on. The push-pull type of switch often makes a very neat fitting, but in some cases it may be more convenient to use the rotary type.

RADIO TUTORIAL

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

TRANSFORMER CONNECTIONS.

N. D. H. (Rotterdam).—"From friend I get the diagram set S.T.700 Circuit, strictly copyright. I am sent for kit components, but have notice transformer Niclet 1:3.5 is faceabout on primary connections.

"In diagram H.T. + terminal of primary wires to P. of valve, instead. Was this terminal misprint?"

No. It is right as shown on the diagrams. The S.T.700 is different from all other sets, so follow the wiring instructions carefully in every way.

A SWITCH TO CHANGE FROM NATIONAL TO REGIONAL.

W. S. M. (Enfield, Middlesex).—"The one-valve set you recommended went well from the first. It was over six months ago that you sent the blueprint, so my thanks are a bit late but nevertheless sincere. The set has been a constant pleasure to my father and mother, and it was very easy to build.

"I had a little difficulty in getting a plug-in coil of the right size, but apart from that it has been no trouble at all. All the same, there is one thing I should like to try, if you think it is possible. It is this simplified tuning idea.

"I have been told that with a simple set it is often possible to switch from National to Regional and vice versa, instead of having to retune the condenser. If so, it would be an improvement in this set, because my father's sight is rather bad, and he could manage a switch where the condenser is difficult for him.

"If you think it is worth trying, please say how it can be done."

The alteration is very easy in a one-tuning-circuit set like the one you refer to, and we advise you to try it. All you need is an on-off switch (similar to the one you already have in use for switching the L.T. and a small semi-variable condenser of 0003-mfd. maximum capacity.

Fix the new condenser down as near to the old one as can be done conveniently, and mount the new switch on the panel, as near both condensers as possible. There are only three wires to put in, as follows:

(a) From one of the filament terminals on the valve holder to one side of the new switch.

(b) From the other side of the switch to one side of the new condenser.

(c) From the remaining condenser terminal to the fixed vanes terminal of the old tuning condenser.

When the wiring has been done you will have to set the tuning once and for all on the two condensers, after which there will be no need to alter them, as the switch will change over from one programme to the other. This is what you have to do to set the tuning permanently.

First, switch the set on in the ordinary way, but put the new switch off. (You will find that the set then behaves exactly as it did before the alteration was made.)

Tune in the National programme (the one with the lower wavelength and condenser reading). Leave the tuning condenser in this position permanently—

in fact, lock it there with a little wedge of wood or other insulator if you can.

Now switch "on" with the new switch, and you will find that the National programme disappears. So re-tune carefully on the new condenser until you get the Regional programme coming in.

Tune it carefully, and when you are sure it is perfect, lock that condenser also, if you can. It will not need touching again.

The set is then ready for automatic or switch changeover in future. The L.T. switch puts it on or off as before. And the new switch changes from one programme to the other as desired.

A.C. HEATER WIRING.

B. W. C. (Mitcham, Surrey).—"Having been a reader of POPULAR WIRELESS for some time, I venture to approach you for information upon a point of set construction that is not made clear in the books I have, or in the constructional articles that I have read.

"It concerns filament (A.C.) wiring, and is briefly this: which is the better A.C. filament wiring—twin mains flex or ordinary twisted connecting wire?"

"Also, is it better to have one length of wire from first valve to transformer, or, say, three lengths of wire from valve to valve?"

"No doubt these points are not made clear owing to the belief that they are understood; unfortunately they are not understood by many, some advising mains flex and one length, others equally certain that twisting ordinary connecting wire into, say, three pieces is better."

Mains flex is better than twisted wire provided it is capable of carrying the current passing without undue heating or drop of voltage. These two considerations—the heating and the drop of voltage—are the deciding factors in selecting the wire to use.

To take the heating effect first, this will be negligible if suitable wire is used, but considerable if the wire is too thin to start with, or (in the case of stranded wire) if some of the strands break.

The requirements are that the wire should be thick enough to carry the current without undue heating; that it should be well insulated, with a covering that is not liable to crack or open; and that the two main strands should either be twisted around one another, or be screened by a metallic outer covering so that there is no possibility of the currents flowing to the heaters setting hum in any neighbouring wires.

A good mains flex is designed with all these points in mind, so it can be used with confidence.

Ordinary wire, twisted, is generally O.K. for current-carrying, but is liable to fall down on the insulation requirement after it has been twisted by anyone not used to such work. Even if it is properly twisted and safely installed there is no metallic screen round it, as is the case with the better mains flex.

It is, therefore, better to use the specially-designed wire.

As regards the method of wiring, there is only one consideration to bear in mind, and that is that the supply to the heaters should be taken by the shortest practicable route. Otherwise there is more live wiring than is necessary, with risk of hum which such wiring always involves.

If you have three valves to consider, A, B, and C, the pair of wires from the transformer's 4-volt output must go the respective heater terminals on each valve. Suppose valves A and B are standing close together, while valve C is at a little distance from them, say, on the other side of the baseboard.

(Continued on next page.)

"This programme's appalling!" cried Dunn.
 "Dull music, stale news and no fun."
 A good chance to-night, To put the Set right...
 So he got out the FLUXITE and GUN.



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RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

The procedure would be to wire from the transformer to A by a route well spaced from other wiring; and then join the corresponding valve B terminals to valve A's heater terminals.

Provided that the wire will carry the current to both valves without overheating—and it will, if it is the right type of wire—there is no point whatever in taking a lead from valve B all the way back to the transformer, if the valve A's terminals are nearer. Once A is connected to the transformer, the required current can be drawn off from A's terminals just as well as from the transformer's.

The correct method to adopt, therefore, would be as stated—to run a short extension from the valve A terminals to the corresponding valve B terminals. This would place the two adjacent valves on the one lead from the transformer.

Then valve C's heater wiring would have to be considered. Since this valve stands apart from the other pair, the problem will be to connect it by a short direct lead to the 4-volt supply. Should that lead come direct from the transformer, or from some other point of the heater circuit?

From the heater's point of view it does not matter in the slightest, since the voltage (and current) obtainable is the same at one end of the circuit as at the other. So the original rule holds good—join up by the shortest length of wire that is practicable.

Valve C, therefore, should be joined across the other wiring, either at the transformer end, at the valves' end, or at some intermediate point which is nearer than the foregoing.

Whatever point is chosen the current will divide there, some going to valve C, and the remainder to valves A and B. Up to the junction point, therefore, the main wiring will carry the current for three valves, after which the respective currents will flow in the respective wiring to valve C and to valves A and B. Of course, it is vital to use wire that will stand up to the requisite standard of current carrying.

AMPLION RESISTANCES



All Amplion components are subjected to rigorous tests before they are distributed to the trade, thus ensuring that the public receive them in perfect condition for carrying out their functions in an entirely satisfactory manner.

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TESTED BY "P.W."

Details of the latest items submitted by the radio manufacturers.

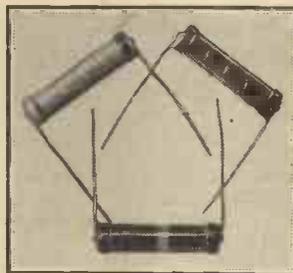
NEW FERRANTI RESISTANCES.

IT might be thought by those who have not studied the problems involved, that the manufacture of reliable resistances would be one of the simplest of radio processes. That all that had to be done was to take a material of known specific resistance and fashion lengths of it appropriate to the various required values. But that this is not the case will be quite obvious to all those constructors who have an experience of set-building dating back a few years.

Resistances have been one of the most unreliable of components. They still need to be purchased with discrimination. Fortunately, however, we have passed the days when to ensure reliability it was essential to resort to expensive wire-wound varieties. Nevertheless, there is still a vague suspicion in the minds of many regarding what have been styled "composition" as opposed to wire-wound resistances, and this suspicion is based on the fact that for a very long time it was a risky procedure to resort to the type.

But owing to the capacity and inductance present in the average wire-wound, quite apart from its price, it was often necessary to take the chance.

However, to-day the situation is very different. We have, for example, the Ferranti Carbon Resistance which has negligible self-capacity and self-inductance, and which is mass-produced for sale at an extremely reasonable figure, and which has an accuracy to within 5 per cent of its stated value.



FERRANTI'S LATEST

These new carbon resistances are of the 2-watt type, and are available in a wide range of values.

And the average change in value which occurs between rated loading and no-load conditions is a mere 3 per cent. These Ferranti Carbon Resistances have proved very reliable indeed in practice, and we ourselves have not encountered a single case of trouble with them, and that is saying a great deal, even to-day.

A new range of them has recently been introduced. Known as the type G2, they are listed at 1s. 6d each, in a wide range of values. They are 2-watt resistances, and it is to be noted that they are supplied with wire ends only. We can recommend them to all constructors for battery and mains sets, and for all other purposes within the limitations of their rating.

PHILIPS' EXTENSION SPEAKERS.

PHILIPS must surely be one of a very few manufacturers in the whole world who employ permanent-magnet moving-coil loudspeakers in their mains sets. Not that this fact would be self-evident from the output of a Philips mains set in so far as the volume or quality are concerned. We say this because there are apparently still many who believe that the P.M. type must always be considerably less sensitive and capable of handling considerably less volume than an equivalent mains energised type.

But although the P.M. speaker in the Philips fine 575A A.C. Super, for instance, is most compact in its dimensions, it is able to handle the grand output of that outstanding instrument in a most effective manner. Once you have heard this set you will agree that it is far from being inadequately "speaked."

And that Messrs. Philips are justified in their particular approach to mains set design will also be evident, for this 575A is exceedingly free from mains noises—freer, we think, than any other mains set of equal sensitivity. This is particularly noticeable on the short-wave range, that Waterloo of so many mains designs.

There is this incidental advantage, too. Whereas when an extension speaker is fitted to one of many other types of sets there is a tendency to feel that, lacking the mains field, this extension speaker, whatever its make or design, must be that much less efficient than the one in the set. Of course, it might really be superior, but the psychological assumes such an importance in listening that we are sure that this point, absurdly trivial though it may at first seem, has to some extent militated against the extension speaker movement. There are three lines of attack to which attention might well be given by those who want to increase the number of loudspeakers per household.

The first two are the inexpensive and simple way in which an extension speaker can be installed, and the third is that there are no technical reasons whatever why the full efficiency of the set should not be carried to the distant points.

The Extension Loudspeakers marketed by Philips have the essentials to fall right into line with these principles, as will be gathered from the following details.

They are cabinet models, in which are found the well-known Philips cylindrical permanent magnets—true extensions of the speaker principles embodied in their sets! They are very reasonably priced, the models 4516 and 4519 costing 37s. 6d. and 45s. respectively.

Each embodies an efficient volume control having the useful "off" position. Although designed especially for use with Philips sets, these speakers can, of course, be employed with others if desired. We have very carefully tested them under varying conditions, and find them to be both sensitive and clean in their responses. The "Senior" is able to handle a

FOR EXTENSION WORK



One of the attractive permanent-magnet moving-coil speakers marketed by Philips.

greater input than the "Junior," and that, in our opinion, is the one marked distinction between their performances. They are good speakers, and we commend them to the notice of both Philips' fans and the others of our readers.

"DIRECTED" BROADCASTING

(Continued from page 479.)

daytime and the whole radiation centred on the ground-wave, so as to keep the effective daylight range at a maximum. After sunset, conditions would be re-adjusted, so as to reduce the ground-wave to adequate, but not too great, strength; whilst simultaneously the sky-wave is boosted up, so as to cater more effectively for the needs of distant listeners.

Using Several Aerials.

Attempts are at present being made to secure this very desirable result by using a number of transmitting aerials, arranged either in the form of a square or a circle, the spacing being a definite fraction of the working wavelength. For night working the aerials are all energised in the same phase. Then, owing to the spacing between the aerials, the waves radiated from opposite pairs interfere with each other in the horizontal plane, thus reducing the intensity of the ground-wave. The sky-wave, however, is radiated at maximum strength, as shown at A, Fig. 4, for the benefit of distant listeners.

The Day-time Scheme.

In the day-time the pairs of aerials at opposite diameters of the circle (or at opposite corners of the square) are energised with currents which are 180° out of phase. The horizontal waves now add together, instead of interfering, thus increasing the ground-wave and enlarging the daylight range. The normal sky-wave B is now completely extinguished by the effect of mutual interference between the vertically radiated waves.

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Postal orders, in payment for advertisements, should be made payable to the Amalgamated Press, Ltd., and crossed.

All communications should be addressed to Advertisement Department, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

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TRADE enquiries invited. Enclose trade heading and stamp.

WOBNURN RADIO CO., 9, Sandland Street, Holborn, W.C.1 (Letters only), callers at shop, 2a, Hand Court, Holborn, W.C.1.

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WARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

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RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, Second-Hand, &c.
(Continued)

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ACE L.F. TRANSFORMERS.—5/1, 2/9; Binocular H.F. Chokes, 2/-; Standard Screened H.F. Chokes, 2/-; Ace Microphones (P.O.) with transformers, 5/- each. This Microphone can be used with any radio set, and is a very efficient article.

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NEW RECEIVERS, COMPONENTS, ACCESSORIES, &c.

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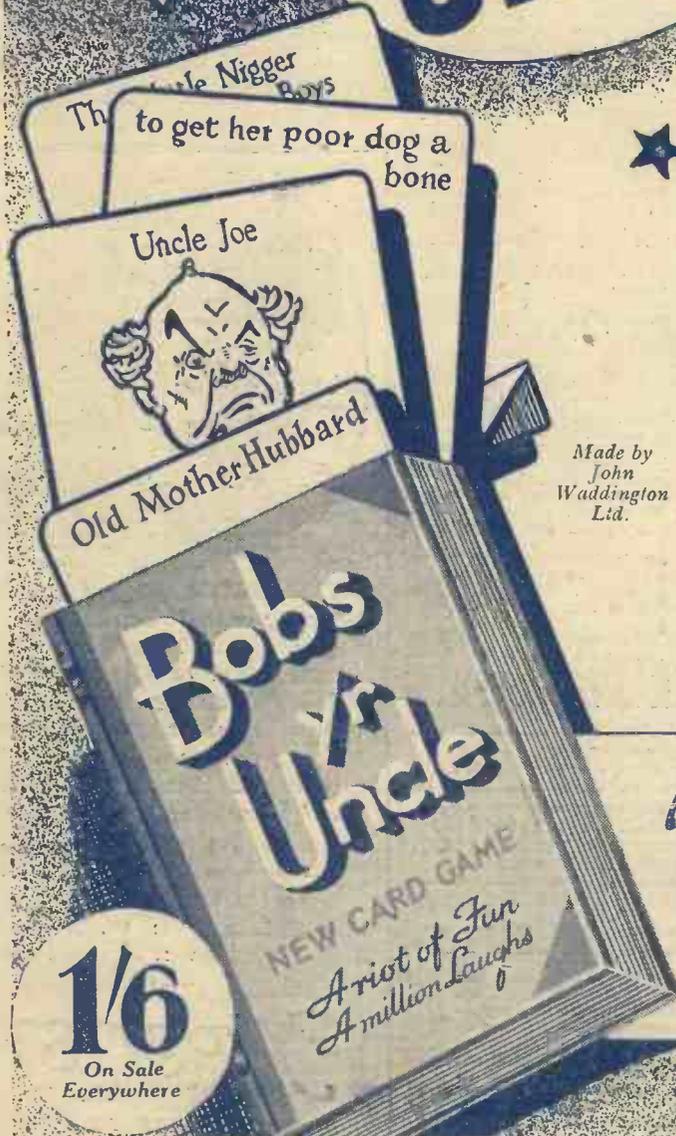
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