

OUR UNIQUE EXHIBIT AT OLYMPIA (SEE PAGE 572)

Popular Wireless

JOHN SCOTT-TAGGART,
GARRY ALLIGHAN,
AND
ALAN HUNTER
write in this issue.

EVERY
WEDNESDAY PRICE 3^d

AND TELEVISION TIMES

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Secrets of the Show

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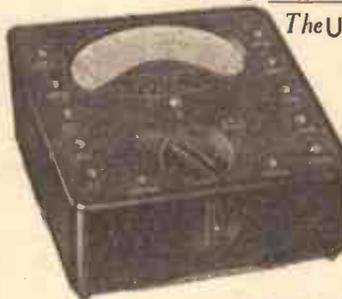
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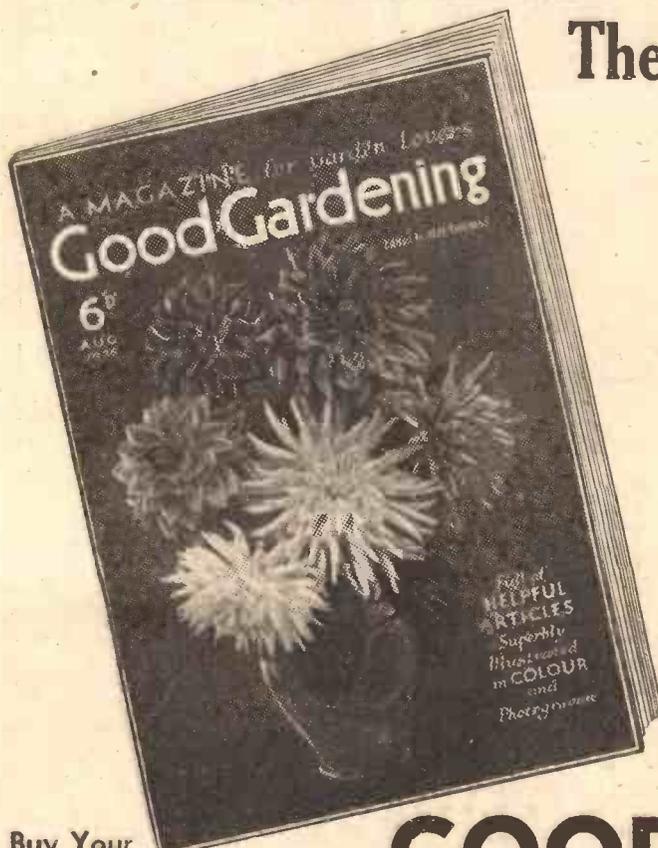
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AUGUST Issue on Sale at all Newsagents **6d.**



MANAGING EDITOR: N. F. EDWARDS.

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

**A MARTYR
THOSE DON'TS
DANDELIONS
YOUR OLD SET**

RADIO NOTES & NEWS

**RADIO TADPOLES
THE "PROMS"
A FAN TEST
IN MALTA**

Olympian Sidelight.

THE coming of August is a powerful reminder that King Radio—who like most people snatches a summer holiday—is soon returning in style. The official welcome will take place at Olympia, London, on August 14th, when the radio trade will lay their cards face upwards and a canny public will again sort out the aces and the trumps.

At the last Radio Exhibition I shared a tea-table with a Yorkshireman who confided to me that he always arranged a holiday and brought his wife to London for the show—had done so for 10 years, he said. And when I asked "Is she here to-day, then?" he explained, rather self-consciously, "Well no, not to-day. She's been with me four times this week, but to-day she wanted to go shopping with a friend."

Another martyr to the Radio Bug. I'll bet the good lady told that friend an earful about wireless!

Heil, Heilsberg!

SHOULD Heilsberg programme begin to smite your ear with unwonted vigour, do not assume that this is an early sign of an autumn come-back. The truth is that Heilsberg's engineers have just been putting the finishing touches to a rejuvenation operation there.

The power has been nearly doubled—100 kilowatts instead of the former 60—and a new aerial has been designed and fitted to give the East Prussian listener an extensive non-fade area, such as is provided at some of the other German stations.

India Awakes to Wireless.

THE record of radio development in India during the past year is an impressive one, and convinces me that many estimates of wireless growth in that great country will have to be revised. Schemes now in hand that will be working by this time next year include medium-wave programmes from Delhi, Calcutta, Bombay and Madras; a powerful station at Hyderabad; and services of different kinds in several of the independent states.

The Government of India has come down handsomely with a present to radio development of twenty lacs of rupees. If I remember rightly a lac is worth £7,500—we'd all lac a few of those, wouldn't we?

Freedom's Aftermath.

FOLLOWING the talks on Freedom, the B.B.C. has drawn up a list of "Don't-mention-its" to be presented to artists for their guidance in the preparation of microphone copy.

The things that must not be spoken of include proprietary articles, business names, religion (including spiritualism), public personalities, blindness, dumbness, stammering, cross-eyes, and niggers. (How they will run a coon's concert party without some of the above, I don't know!)

Doubtless there are sensitive and flower-like souls who will benefit from all this prohibition; to make sure, however, the thing should have been done thoroughly—no mention of birth, of burial, or of happenings in between.

Radio Medicine.

AN interesting story is told by Eric Dunstan of an old woman employed for many years by a friend of his. A year or so ago she retired on the old age pension, and became a cripple from rheumatism. Wireless was her chief consolation, and she listened to everything. One day she heard a talk on Romany

customs by Gipsy Petulengro, in which he recommended dandelion leaves for rheumatism. The old lady determined to try the remedy, and the latest report is that she is now putting in a full day's work in the field with the other girls!

Was this due to dandelions, Dr. Radio or gipsy charm? Nobody knows—and the old lady doesn't care now that those twinges have gone!

A Questionable Radio Experiment.

AMONG the letters I received last week was one from a lady living in Sussex.

She wrote haltingly, and with difficulty, for she is aged and bedridden. But she had been upset by a newspaper report of some experiments in which wireless played a part, and she had erroneously concluded that they had taken place in this country.

The experiments took the form of an operation on a monkey, which had a small coil of wire inserted into its head and left there to heal. When the monkey was afterwards exposed to radio impulses, this coil caused convulsions. It was to protest against this state of affairs that my correspondent wrote.

The experiment in question was not carried out in this country, according to the report that I saw some months ago. So far as I can find out nothing of the kind has ever been attempted by British scientists. And I confess I am glad, for it is difficult for the ordinary man to see any justification for a test of this nature.

That Old Set of Yours.

SALFORD and Manchester readers who have outwitted the world depression to the extent of thinking about getting a new set, may not be quite sure of how best to dispose of the old one. Here's a hint. Some of the people who equip local hospitals with radio—Manchester and Salford Society for the Provision of Wireless Sets to the Bedridden Poor—are hampered in their well-doing by a lack of the needful gear. So if you want to find a good home for the old box of tricks, where it will be appreciated, write to the Hon. Secretary, Mr. J. A. Boyle, 17, Alton Street, Queen's Park, Manchester.

(Continued on next page.)

SIR STEPHEN TALLENTS



The future Director of Public Relations at the B.B.C. Sir Stephen has held the posts of Public Relations Officer to the Post Office, and Secretary of the Empire Marketing Board.

TWICE ACROSS ATLANTIC FOR A CUP OF TEA!

Society Note.

THE London Branch of the Anglo-American and Radio and Television Society has organised a Ladies' Section, of which full particulars may be obtained from Mr. Ernest Norman, 20, Varley Road, West Ham, E.16. And, incidentally, Mr. Norman should be approached immediately by any "P.W." reader who wishes to join in the Society's Ruislip picnic on August 11th.

Atmospheric Duplicity.

WE have all said a few words in our time about atmospheric, so it is interesting to learn what the superintendent of the Radio Department of the N.P.L. (National Physical Laboratory) says of them.



"An atmospheric is rather like a tadpole," he contends. "The fore part is a relatively high-frequency wave of 5,000 or 10,000 oscillations a second. Behind is a tail of

low frequency. When the tadpole has travelled hundreds of miles the tail breaks off and lags behind; so when hearing atmospheric from a long way off you get twice as many of them as the man on the spot."

Now we can see why the listener to a weak programme always curses atmospheric so heartily—heads they win, tails he loses!

Tea-Time Transmission.

WIRELESS gets put to some queer uses now and again, and here is an instance that will want some beating. It was told me by a one-time operator at the Carnarvon wireless station.



Carnarvon maintained a transatlantic wireless service with Canada, and for this purpose had separate transmitting and receiving stations, normally linked by telephone. One day, however, the chap at the

transmitting station found this short-distance phone was out of action. So he called up Canada and said, "Hi! tell our receiving-room that Old Bill's cup of tea is ready for him now if he'll come over for it."

Canada complied at once like a sport; and a few minutes later Old Bill came over and drank his tea, quite unconscious of the fact that he had been called to it right across the Atlantic Ocean and back again!

The Promenades.

WHEN I say "The Promenades" do not think, for a moment, that I refer to those windswept and sandy walks overlooking the sea, where gulls swoop erratically, and chilly bathers hasten to their hot coffees.

No, I mean the Promenade Concerts, with Conchita Supervia, Oda Slobodskaya, Moiseiwitsch, and all that lot!

As in the past I say again that the Londoner who misses the "Proms" is denying himself a rare and refreshing experience.

There will be an eight weeks' season—August 10th to October 5th.

And need I say who is conducting? No. But I will, for it is Sir Henry Wood's forty-first year in succession, and I'd like to wish him yet another nonsuch season!

The Price We Pay.

GROUSERS and grumblers who have an idea that the B.B.C. charges them too much for their listening ought to be interested in the news from Kenya. This is to the effect that the administration has knocked twenty shillings off the licence fee!

NEXT WEEK'S

issue of "Popular Wireless" will be a

SPECIAL SHOW NUMBER

Containing full details of the latest sets and components which will be on view at Olympia. All the outstanding features of this Great Jubilee Radio Show will be interestingly and minutely described.

Also in this splendid number will be

THE "PORTADAPTOR"

an amazing new development in short-wave design by G. T. Kelsey, the originator of the adaptor principle.

DON'T MISS YOUR COPY

On Sale August 14th. Price 3d. as usual.

True, there is still the small sum of thirty shillings a year to pay for the licence, but compared with the old rate, £2 10s., this is a mere laughing matter.

Consider for a moment the number, strength and variety of the B.B.C.'s programmes, as compared with those available in East Africa. And then ask yourself "How'm I doing?" Hey? Hey?

"Fives" for Fires.

ANOTHER interesting possibility of 5-metre-wavelength working was recently demonstrated at Surbiton, Surrey.

One of the fire-engines there was fitted with a self-contained 5-metre set, measuring 6 x 4 x 8 ins., and an 8-ft. length of copper tubing was strapped to one of the escape ladders. At the fire-station an ordinary wire aerial was used, and during a carnival procession in which the engine was participating with 300 other vehicles an emergency test call was made.

Communication was perfectly satisfactory, and officials were satisfied that if their engines were equipped in this manner they could go to blazes in comfort!

The Non-Radio Fan.

A MAN who has just returned from Nyasaland was telling me the other day that when he proudly switched on a short-wave radio set his fifteen native boys were not a bit impressed by the voice from the loud-speaker, though it was certainly the first in those parts.

Later, however, he switched on a small electric fan, and, to his surprise, he found this was regarded with delighted amazement. Ebonised he-men yowled with rapture when they felt the breeze from it; and one Hercules, poking an exploratory finger through the guard, was transported with pleasure to find he received a nice deep cut from the "buzz-wind"—as he christened it in Zambesi parlance!



Radiolympia Items.

JUST to remind you that the Radio Exhibition opens on August 14th for ten days.

The B.B.C., the P.O. and "P.W." will be represented. The world's greatest cycloramic screen will cover one end of Olympia.

About 200 firms will be showing on 300 stands.

There will be about 5,000 receivers exhibited. Exhibition's floor space, 500,000 sq. ft.

The theatre accommodation will be nearly 5,000. Insurable value of exhibits, £5,000,000. Cost of the show (to erect and equip) £50,000.

A Hot Spot.

THE recently announced decision to establish a relay centre in Malta, for picking up the Empire programmes and distributing them all over the island, seems a sensible way out of a difficult position.

Malta's radio problems are many. Though comparatively near to Britain, the island is much nearer loquacious and multi-lingual neighbours. The African airlines that fly near it and the passing ships all shout on full power, while the naval stations on the island and warships anchored off it jam everything and make the Maltese cross.

A relay service, therefore, promises to be a boon, for no privately owned receiver can be expected to cope with the mid-Mediterranean medley.

ARIEL.





WHAT YOU WILL SEE AT RADIOLYMPIA

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

A foretaste of the good things that will be on view at the Show which opens next Wednesday.

WHEN, next week, the last final touches have been given to all the stands in the great hall at Olympia and the Radio Exhibition opens in a blaze of colour, it will be seen that once again the pessimists have been confounded.

For the last four or five years during the whole period of which the Radio Show has grown larger and larger, there have been a number of dismal prophets who predicted that radio had reached its peak, and that a considerable shrinkage was inevitable.

A Consistent Success.

And as one successful Show was followed by yet another even more successful, all they could do was to mutter "This is the last fling—next year—"

But as is now plain to see Radiolympia is achieving too consistent an upward march of success for there to be even a remote possibility of a sudden collapse. The number of

There is yet a further increase of stands this year, and it remains to be seen if the attendance figures will once again break the record. We believe they will.

After all, it is logical to assume that Radiolympia must still continue to grow for some time yet before it settles down to something of standard in its dimensions. Broadcasting continues to expand, and the Radio Show has always been a kind of barometer reflecting the increasing popu-

possible to continue giving the same extraordinary value for money as at present that time has certainly not yet arrived, and the tendency is in quite the other direction.

There is not a great deal that is absolutely and fundamentally new at the Show in the way of technical developments, but an entirely new note is struck in the inclusion of what have until recently been de luxe refinements, as standard points and fittings of sets listed at popular prices.

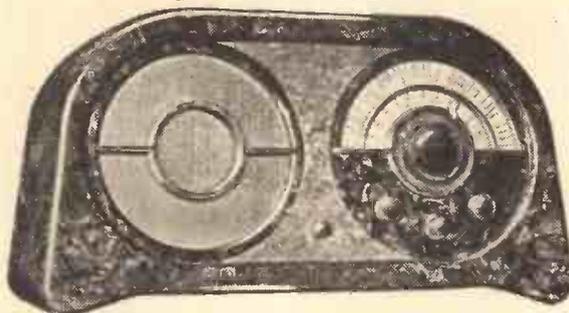
Better Value for Money.

The eleven or twelve guinea sets of this year's Show include items which were to be found only in the most costly models of last year, and some of them did not even exist a couple of years ago.

This is proof that the industry as a whole is out to give the public the full benefit of every advancement.

The reason may not be a purely philanthropic one, no doubt the

THE NEW EKCO



A popular model in 1935-6 garb. The Ekco eight-stage A.C. superhet.

AN OLD FRIEND



This is a current W.B. "Stentorian." Remarkable new models will make their appearance at Olympia.

stands has grown from a couple of score or so to upwards of two hundred, and the attendance figures have risen from fifty or sixty thousand to over two hundred thousand.

larity of radio. The licence figures are mounting steadily, and on the basis of only four people sharing the amenities accompanying each licence there are already twenty-eight millions who are to a greater or lesser extent interested in radio sets, and the figure still mounts up month by month.

Bigger Than Ever.

Regarding this particular year's show, as we have said, in so far as size is concerned, it is larger than last year's, even judged by the list of exhibitors who have booked space at the time of writing. There is a number of last-minute additions, and so it is extremely possible that the list will further expand.

From the point of view of the man in the street the exhibition will be found to be a most attractive one, superior in interest to any which have preceded it.

This for the reason that it will be seen that the sets on show constitute phenomenal value for money. There had been some talk of prices rising, but although the time may come when the industry may find it im-

FOR TESTING



A useful selection of testing prods and leads made by the Automatic Coil Winder Company.

terrific keenness of competition is the major factor, but the result is just as happy a one from the point of view of the set buyer.

(Continued on next page.)

THE RADIO EXHIBITION

(Continued from previous page.)

Just consider some of the things which are to be found in sets priced at ten or eleven guineas, sets, mark you, for all-ways operation and having outputs of as much as 2 or 3 watts.

The circuit will be, perhaps, a modern superheterodyne giving wonderful selectivity and sufficient sensitivity to pull in weak stations from the far corners of the Continent.

And then there undoubtedly will be automatic volume control, but not the somewhat ineffective variety which appeared a year or two ago in many receivers, but delayed and amplified A.V.C. of a highly developed character.

Such valve advancements as the octode frequency changer and H.F. pentodes are also to be seen in this year's popular sets, and moving-coil loud-speakers of an improved full-toned type.

Remarkable Progress.

Indeed, it is only the radio engineer who is fully able to appreciate the remarkable progress that has been made in the mass production of quality radio.

But the least technical of listeners will be able to see that there has been considerable improvement in controls and cabinet work. It is no exaggeration to say that for the most part the sets that will be on view at this year's Radio Show reveal real artistry in line and form.

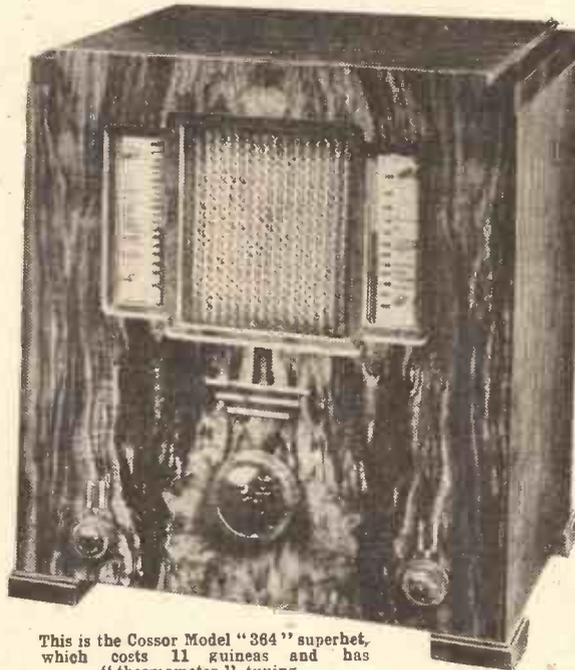
No longer are cabinets regarded as being merely outer skins of sets, and their design, if it could be called that, is no longer the task of ordinary carpenters. Some of the firms pay hundreds of pounds to skilled

control knobs and dials fall in line with the composition of the design, and, further, ease and exactitude of tuning are factors needing the closest consideration.

As will be seen at Olympia, the sets of 1935-36 have gone all out for simplicity of adjustment, and it will also be noted that visual tuning is being widely adopted.

The object of visual tuning is to enable the eye to supplement the ear during tuning. It is necessary to tune a superhet particularly very exactly, or there may be a tendency for distortion to develop. Mind

IN THE COSSOR RANGE



This is the Cossor Model "384" superhet, which costs 11 guineas and has "thermometer" tuning.

you, this is the sort of thing which we did not worry about a year or two ago, and it plainly shows how much radio has advanced that such precision should be regarded as essential to good listening.

Well, as we were saying, it is vital, if quality is to be preserved in accordance with the new standards, that the set should be tuned exactly to the station. It is difficult to do this aurally because the loudness varies all the time during the normal programme item. Remember, you are trying to tune in the station by adjusting the tuning dial until you reach that point where the station sounds loudest.

Visual Tuning Indicators.

But the loudness swings up and down as the band plays louder and softer or the speaker raises and lowers his or her voice. You may eventually arrive at a setting that satisfies you at the moment, but the conditions of broadcast may change later.

The visual tuning indicator shows you the correct tuning point as plainly as a clock shows you the time. It adopts a number of different forms in the various makes of sets. On some it is a needle which moves over a small, plainly lettered dial like the needle of a voltmeter. On others there is a neon light which creeps up and down an aperture to show, by the greatest height, that you are well and truly tuned in.

Visitors to Olympia will see one of the latest applications of visual tuning in the

fluid-light tuning device which is featured in the H.M.V. sets. Which remind us. One of the most ambitious examples of this year's radio engineering to be seen at the Show is the H.M.V. High-Fidelity 15 valve autodiagram. It is true that this costs one hundred and ten guineas, but it is a truly magnificent instrument embodying unique refinements.

Tone compensated volume control is a technical feature of recent development, and it appears in sets at Radiolympia. The purpose of this idea is to maintain correct tonal balance at all degrees of volume. As may be known to all readers of "P.W." tone and volume are inextricably inter-related. You cannot vary the one without affecting the other.

In the Ekco Model AC86, which is a set in which the development figures, the operation of the volume control is automatically attended by a compensation of the tone so that a realistic reproduction is maintained at all intensity levels. This Ekco set, by the way, is of a most advanced design and includes an 8-stage superhet circuit with an octode and a band-pass input, a special Ekco system of H.F. triggered automatic noise suppression and station pre-selection and full delayed and amplified A.V.C.

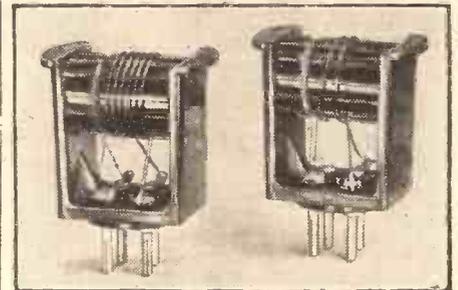
An Ingenious Scheme.

A further technical refinement that is still new is variable selectivity combined with tone control. (Selectivity and tone form another pair of factors which are inter-dependent.) This scheme is to be found in three of the new K.B. sets. Also in these sets is the ingenious K.B. "Fototune" dial.

This is quite a unique tuning device. As each station is tuned in its name is optically projected on to one of two small translucent screens according as to whether it is a medium or long-wave station. Only one name appears at a time and the illumination of a small aperture near either of the two screens at once tells you to which of the wave-ranges the set is adjusted. The change-over from the one band to the other can be accomplished instantly without removing the hand from the tuning control.

Many of the things we have so far mentioned are circuitual, and operating set

COLVERN COILS



Attractive mounts with horizontal formers are a feature of these Colvern short-wave coils.

refinements which have considerable bearing upon the performances of the instruments in which they are embodied. But there are other refinements more in the nature of luxuries pure and simple which have left the preserves of the well-to-do and are coming within reach of many more listeners.

For example, automatic record changers will be seen at Olympia complete with

(Continued on next page.)



★ AN EXIDE MODEL

A special indicator, which shows the state of charge, is incorporated in this Exide accumulator.



designers just for the purpose of producing cabinets of tasteful and artistic appearance, for it is realised by all enterprising sales managers that to be successful a set must attract the eye as much as the ear.

The radio engineer has to make the

THE RADIO EXHIBITION

(Continued from previous page.)

pick-ups and all ready for home constructors to build into their own outfits at a price of ten guineas each.

There are several sets having automatic record changers, and we can instance the Ferranti Gloria A.C. Autogram which lists at fifty-two guineas. This instrument has a six-watt push-pull output stage and is therefore capable of developing considerable distortion-free volume.

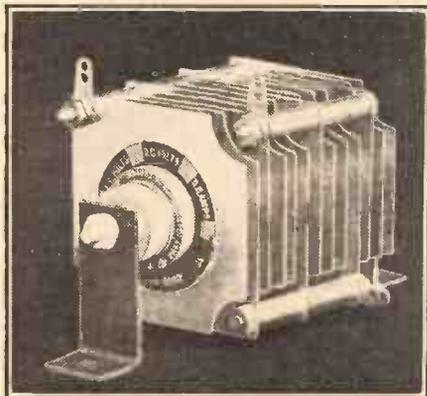
Some two or three months ago the Minister of Transport gave his official approval to car radio. Before that this branch of radio had rather languished owing to the uncertainty which had existed regarding the possibility of restrictive legislation.

Car Radio Equipment.

But as soon as the official blessing had been given to it, it forged ahead with leaps and bounds, and a reflection of its progress will be plainly visible at Olympia in the number of different makes of equipment which are being exhibited.

The G.E.C. are numbered among these, and a novel feature of their equipment is that provision is made for the connecting of an external loudspeaker by means of two sockets. The advantages of this when the car is drawing a caravan or if the set

DRY RECTIFICATION



A typical low-tension Westinghouse metal rectifier, suitable for accumulator charging.

is fixed in a motor-boat or yacht will be obvious.

The G.E.C. car radio outfit is housed in a single case which contains the speaker, rotary transformer for the H.T. supply, and the actual receiver chassis. The set is a five-valve superhet using 13-volt indirectly heated valves with their heaters connected in parallel and fed directly from the car accumulator. The field winding of the loudspeaker is also energised from the battery, but the total current drawn from it is only four and a half amperes.

Reference to car radio brings our attention to the question of interference. Suppressors for cars that are fitted with radio are made by the Erie Resistor Co., and they have this year an entirely new one which fits snugly down on the cylinder block of the engine. It is specially shaped so that it securely retains this position and heat and vibration do not affect it.

Numerous suppressor devices are to be included in the Belling and Lee stand, and this enterprising firm will demonstrate by means of a special working display just how effectively their devices do their jobs.

There appears to be a Belling and Lee suppressor of special design for every conceivable task of electrical interference suppression for, as will be seen, they have still further widened their already most comprehensive range.

There are three new types of valves introduced by Hivac which deserve pro-

A JUBILEE SET



A table model five-valve superhet for A.C. mains which has many refinements including tone-compensated volume control. It is the Marconiophone Model "284."

minent mention. There are the high efficiency Midget valves such as have been used so successfully by the Brighton police in their pocket radio sets. These are claimed to be the only valves of their kind in the world, their uniqueness lying in the fact that they possess characteristics such as had not previously been obtained in valves of such small dimensions.

Hivac also have valves designed especially for ultra-short-wave work, and when we speak of ultra-short waves now we must all immediately turn our thoughts in the direction of television, for, although the ultra-shorts have so far been of interest mainly to keen short-wave fans, they are soon to be the medium by which the B.B.C. will disseminate its television service.

Restores The Balance.

The third new type of valve due to Hivac that we suggest readers should make a point of examining is a valve which is designed to restore the intensity balance of broadcasting and records.

All broadcast items are compressed by the B.B.C. control engineers into a more or less narrow compass. You can often follow the manipulations of the B.B.C. volume controls when orchestral crescendos are repressed and a soft passage

brought up. The new Hivac valve, which is really two valves in one, removes the fetters of B.B.C. control and widens the compass of the intensity variations so that they follow the original sounds up and down the scale over the full limits of their focus.

Referring back to television, it is rather a pity that there will not be individual freedom for firms to display their own television sets. We will not question the policy of the Radio Manufacturers Association in making it a condition of the renting of stands that television sets should not be exhibited, but they have not been fully restrictive, for television is to have its place. The R.M.A. itself has arranged a special television exhibit and we will wager that this will be visited by the majority of those who go to Olympia.

Components suitable for television sets will, however, be prominent on several stands. Graham Parish, for one, are to show ultra-short wave components as well as many other items of direct interest to home constructors.

On The Ediswan Stand.

The Cathode-Ray Tube, that keystone of the all-electric television viewer, has its place, too, but is not being shown as far as we know on any firm's stand in conjunction with television gear as such. But an opportunity will be afforded visitors to see it functioning as an oscillograph at the Ediswan stand.

New short-wave components will be shown by Messrs. Wright and Weaire, and at their stand will also be seen an innovation in coils which all constructors ought to examine. This is an iron-cored coil of a general purposes character which is rather more versatile, we believe, than any of the others. It is also inexpensive and is a perfect home constructor proposition.

We have taken steps to ensure that our own stand will once again prove a leading attraction. As a matter of fact, we think readers will agree that we have an even better display than we had last year.

In other pages you will read all about our main exhibit, the wonderful scale model of Marconi's yacht "Elettra," but there will be other things. "Popular Wireless" and "Wireless" sets will be shown and we have

SMALLER THAN A MATCHBOX



All visitors to the Show should make a point of examining closely the Hivac midget valves.

a surprise in the form of—but you must wait until you go to the Show or buy next week's "Popular Wireless" (we hope you will do both!) for details of that.

BARRY KENT CALLING

News and Views from the "Big House"

The Television Position.

IT is now credibly rumoured that the television service for London, high definition, will be delayed. Unexpected difficulties have been encountered at the Alexandra Palace. Also developments in connection with the E.M.I. system during the past few weeks have radically altered the position.

It is now claimed for E.M.I. that it has gone rapidly ahead of anything that was possible six months ago. If this is borne out and recognised by Lord Selsdon's Television Committee, then there may be changes in the procedure laid down some time ago.

* * *

Big Political Series.

In the Talks Department of the B.B.C. they are all agog with excitement about a big political series of talks planned for the coming autumn and winter. The general title will be "Constitutional Reconstruction."

All the chief points of view of contemporary politics are to be represented. There will be both Communism and Fascism, and it is hoped to secure Mr. John Strachey and Sir Oswald Mosley. If this is uncensored, as it should be, then we are in for some fireworks at last.

Women Announcers.

There has been another spot of bother about women announcers. At the time of the broadcast of the "Golden Voice," that is the winner of the Post Office telephonist competition, it was stated that either she or someone else would be taken on to resume the experiment which was interrupted with the retirement of Mrs. Sheila Borrett, last year.

Well, apparently there has been another full-dress discussion of the subject both in the staff committees and in the Board of Governors of the B.B.C. Mrs. Hamilton, assisted by Mr. Roger Eckersley, fought valiantly for the admission of women. The issue hung in suspense for weeks, but has now been definitely resolved in a sense unfavourable to women announcers, at least for London work.

Romance at the "Big House."

Recently there have been one or two significant exceptions made in the rule that as B.B.C. women staff are married they are automatically disqualified from further employment there. It looks as

though the rule is rapidly becoming a dead letter. Simultaneously, those in charge of staff welfare are adopting an attitude of positive encouragement of marriage among suitable members of the staff.

Sir John's Daily Journey.

Sir John Reith continues to travel from Beaconsfield most mornings by a fast train that reaches Paddington about 9.30. There is the usual thrill of excitement among the passengers as Sir John approaches the platform. A number of his special admirers travel at about the same time and lose no opportunity of paying tribute to the Director-General of the B.B.C. All of which is most unwelcome to Sir John, whose chief desire is to be allowed to come and go without notice.

I am told that so acute has become Sir John's

THE "ALLY PALLY"



BEFORE AND AFTER. One of the towers of the Alexandra Palace showing the dismantling that has taken place in preparation for the erection of a television mast.

irritation at the early morning lionising that he has taken to dodging his regular train sometimes in favour of a much slower one.

The B.B.C. and Sir Walford Davies.

I gather there is a difference of opinion between the B.B.C. and Sir Walford Davies,

Master of the King's Musick, that the latter may considerably curtail his broadcasting after this year. The disagreement arose over the Jubilee Concert for British Music-Makers at the Albert Hall during Jubilee Week. Sir Walford wanted the B.B.C. to make a substantial donation to the charities on whose behalf the concert was being given. The B.B.C. thought they were doing more than enough by supplying orchestra and conductor, and allowing an appeal on the microphone for the cause. The argument developed with great acuteness on both sides, Sir Charles Carpendale handling the B.B.C. case.

That 6.30-to-8 Period.

There is no doubt that this year the B.B.C. has had a lot of evidence of dissatisfaction with the absence of real alternatives during summer evenings between 6.30 and 8 o'clock. Strong representations have been made to put this right for next summer.

More B.B.C. Honours.

Sir Noel Ashbridge, Miss Somerville, Mr. Percy Edgar, Mr. Stuart Hibberd, and Mr. Gerald Cock were honoured recently by His Majesty the King. I understand this is the first of a series, the lists being submitted with the same automatic regularity as that of any Government department. Already the names for the New Year's list have been submitted by Sir John Reith. At the top comes Captain Cecil Graves, the new Controller of Programmes, whose accession to knighthood is imminent. Other names in the next list will be Dr. Adrian Boulton, Mr. B. E. Nicolls, and probably Mr. Jardine Brown, the brilliant young barrister who is marked out for one of the big posts in the future B.B.C.

TOO MANY REPEATS

Our broadcasting critic takes the B.B.C. to task on the present play policy.

I DO wish broadcast programmes didn't contain so many revivals. It is agreed, I am sure, that most of these revivals were phenomenal successes, when they were originally produced. This being so, it is all the more reasonable to expect that they are still remembered. In the case of some, in considerable detail. A play, for instance, whose content is not yet forgotten cannot possibly be as exciting on the second occasion as it was the first. There are no surprises for one thing, and the element of surprise even if the plot of a new play is following orthodox lines there is always the possibility and hope that it may fly off at a tangent somewhere. And while there's hope there's life.

There are many plays that have been worth hearing twice. But even in the case of these it is pretty safe to say that the second broadcast didn't please anything like as much as the first. Yes, I do feel that these revivals are too frequently in our broadcasting. And I am not easily persuaded that there is a paucity of good plays suitable for broadcasting already in existence. In fact, I feel it is high time that this theory was disposed of. One of the B.B.C.'s pet theories was largely disposed of when a whole play was performed on the St. George's stage recently. The art of listening isn't as exacting as it was. It shouldn't be, of course, in view of the big experience behind listeners now. Allowance must be made for this progress.

As with material broadcast so with the people who do the broadcasting. It is the same old crowd week after week—a fairly big crowd I'll admit—to appear before the mike. Fresh blood is comparatively rare. I do not say this to the discredit of the old. On the contrary, I have nothing but admiration for the way in which they manage (some better than others) to amuse or entertain us. Broadcasting is a terribly hard master for these people.

(Continued on page 582.)

Where CONSTRUCTORS Go Wrong

by JOHN SCOTT-TAGGART M.I.E.E., INST. P., FEL. I.R.E.

IF home constructors used the same materials as the designer, failure to obtain similar results could only be due to two reasons. The first would be slackness with regard to testing by manufacturers of their products, and the second one would be sheer stupidity and incompetence on the part of the constructor.

Now the constructor is only very rarely stupid and only occasionally incompetent in connection with the construction of the set. By "construction" I mean the assembly of the various parts in accordance with a blue print and other aids. There is nothing at all formidable or herculean about building any of the sets that I have designed for widespread use. The type of man who takes up home construction is normally a sagacious person who would never dream of making a wireless set unless he had some capacity.

Failure to Follow the Designer.

The great trouble with home constructors is not that they are incompetent but that they doggedly persist in designing the sets themselves, instead of carrying out to the letter the instructions of a designer who knows all the pitfalls and the why and wherefore he has done this or that.

As regards the manufacturers, there is lacking in some cases that scrupulous and punctilious attitude as regards testing which I regard as morally imperative and commercially expedient. Happily, the designer can learn by experience and refrain from specifying apparatus which is prone to inaccuracy or is perfunctorily tested.

If the components and valves have been tested without stint of conscience by the manufacturer and scrupulously assembled by the constructor, there is no reason why gratifying results should not be obtained in every case. The only stumbling blocks that might obstruct the path to success would be in connection with operating skill—and the designer's own incompetence!

Must Be Latitude.

But like the pterodactyl, the brontosaurus, and other prehistoric animals, the designer for the constructor is hurriedly faded out of the picture if he fails to accommodate himself to changing conditions and to the peculiar requirements of the home-constructor field. Technical ability is only one of the weapons in the armoury of the designer for the constructor;

the designs must be such that they can be reproduced in tens of thousands without any supervision from himself. This is a position entirely different from that of a designer in a factory; in the latter case he can control or supervise the finished product. One of the important factors that a designer for the home constructor has to

SUBSTITUTION OF COMPONENTS

This is the third of the special series by our distinguished contributor.

bear in mind is that even well-tested components and valves will vary to some extent, and so there must be latitude in the design.

For example, with a given sample of valve a certain size of reaction condenser might give very good results. But as valves vary quite considerably, a home constructor might find that with that size of condenser a full amount of reaction could not be obtained with his particular valve. The designer therefore has to provide a condenser for reaction of such a size that it will give good results in spite of variation in valve characteristics.

I have said that home constructors are normally perfectly competent to build a set. There are so many hundreds of cases of absolute beginners getting excellent results with my sets that any failures must be attributed to other grounds.

By far and away the greatest number of unsuccessful constructors are themselves to blame. They cook their own geese. They have so little faith in the judgment of the designer that they feel that their own choice of components will do just as well. Year after year I utter the most solemn warnings against a departure from my list of components, and emphasise that the beginner, particularly, cannot do better than reproduce the set exactly as I have designed it. But thousands throw themselves into the soup and then expect me to ladle them out.

What An Architect Does.

If an architect designs a house he does more than merely draw a sketch giving dimensions. He has to specify the materials to be used, and indicate the quality of workmanship. Moreover, he is—in the case of most buildings—responsible for the builder's adherence to his specifications. He examines the work in progress and sees that the builder conforms to his requirements. If this were not so the builder could obviously save a large amount of money by using poor quality materials and inferior workmanship. Now, a designer in a factory can exercise the same supervision, but those of us who offer designs to the home constructor must bank on the latter's integrity and good faith.

Reasonably good workmanship can always be relied upon because home construction in the case of a well-designed receiver is so simple that nothing is to be feared on this score except in very few cases indeed. But what we are all alarmed about—and the greater our experience the greater our terror—is that the constructor will substitute components or valves.

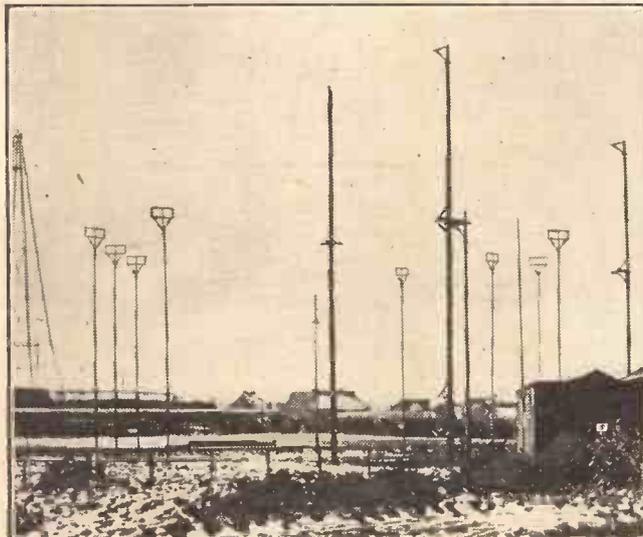
Why does he do it? Sometimes for convenience, sometimes because he already has components, but chiefly because he saves money, and prefers to get bad results—or no results at all—for £3 10s. 0d. rather than excellent results for £4 0s. 0d.

The Three Reasons.

Let us deal with these three reasons in rotation. Convenience generally means ease of obtaining the components or valves. I doubt whether there is a single wireless retailer in this country who would have all the parts for any particular design. He can obtain them in a day or two, but he is

(Continued on next page.)

THE EINDHOVEN AERIAL SYSTEM



This rather curious-looking group of objects is the special aerial system at the well-known Dutch short-wave station at Eindhoven.

WHERE CONSTRUCTORS GO WRONG

(Continued from previous page.)

extremely unlikely to stock them. This is partly because the modern wireless dealer bothers very little with home construction, although there are some keen and notable exceptions. It may be that the wireless retailer persuades his customer to have a certain component which is not specified in the designer's list.

I have known deliberate cases where the dealer having a stock of a particular component will urge the constructor to use it in preference to one that I have recommended. In other words, the dealer, who probably knows nothing whatever of any difficulties I may have encountered in designing a set, is relied upon in preference to myself.

If the retailer is prepared to accept complete responsibility for varying my designs he is quite welcome to what he likes, but experience shows that in such cases both dealer and constructor never blame themselves for a failure.

Whenever there is any query about one of my sets, the first thing that is asked is: "What components and valves have you used?" Many a wily constructor replies glibly that he has kept most conscientiously to the recommended list. I have seen a sufficiency of these "duplicate" sets to know that a large proportion of constructors who will swear blindly that they have used my recommended components have done absolutely nothing of the kind.

When Delay Occurs.

Sometimes kits are sold to the public without regard to technical performance or reliability. These kits contain components which are not in my list and which I often would not dream of using. To find such components in a kit, when I have deliberately excluded them from my own list because of their unreliability or unsuitability, makes me apoplectic. I should like to have the sale or advertisement of such kits stopped. The constructor should not buy one unless he has an absolute—and a well-founded—faith in the supplier.

Sometimes a component cannot be obtained quickly. Such delay occurred in the case of the S.T.600, but on that occasion there were hundreds, probably thousands, of cases where the delay was exaggerated or misrepresented. The fact that there was some delay on some components and valves due to the enormous demand led some dealers to exploit the situation in order to sell off unsuitable apparatus on their shelves, or even to discourage the building of the set so that the customer would buy something else. The customer must take the whole blame for any resultant trouble, and I would infinitely prefer a constructor not to build the set at all rather than build it with apparatus or valves not mentioned in my list. In the case of valves the risk is generally one of lower performance rather than no performance at all. More and more I am coming round to the idea of specifying the valves which give the best results, without

giving alternatives, unless these alternatives give equally good results. The tendency which has held the field for many years is to give suitable valves from all the makers' ranges, but measurements have shown that by using certain combinations of valves a result equal to only one-twelfth of the designer's is obtainable!

Reputation Not a Safeguard.

As regards substitution of components or valves, the reputation of the makers of the substituted component or valves does not justify the substitution. A component or valve may give excellent results in certain sets, but may be totally unsuitable in others, and the chances are that the designer has tried out such components or valves and found them unsuitable.

There are all kinds of disadvantages and defects in components and valves when used for a particular purpose, and it would be unfair and possibly libellous to explain why a designer deliberately rejected certain components or valves. The constructor, therefore, who blunders into a purchase of a substituted article may be acting even in good faith and yet get poor results.

One could write a book to explain why some components will work in a given circuit while others will not. But only a paragraph is required to warn the constructor of the

or how threatening a designer may be, there is always a substantial minority of constructors who ruin their sets, besmirch the design, and vilify the designer.

I myself have gone farther than other designers in the direction of frankly washing my hands of constructors who depart from my recommendations. But even so, members of the trade have on more than one occasion boasted to me of the big business they have done in defiance of my explicit recommendations. They are really gloating over the folly of their customers.

That List of Alternatives.

Anyone who has studied my various sets over a period will find that I have been scrupulously fair and impartial to the various firms in the industry, and that my list of alternatives is, wherever possible, as wide as possible. The main object of this is not only to give other manufacturers an opportunity, but to enable constructors who have already good quality components to use them in the new sets. A certain proportion of components can usually be used time after time in different sets, and provided the components are of unimpeachable quality I have no objection to this. The only proviso is that if you use existing components they should be in my list of alternatives.

But the minority of constructors against whom this article is directed are not satisfied with the wide range already offered, but want to depart from it.

Be Careful.

Whenever a constructor has failed to adhere to the official list he makes a great point that he has some excellent components amongst those he has used. For example, if a special coil unit has been designed for a certain receiver he will buy that unit, but ruin the set by possibly some cheap and so-called insignificant component. Since a single faulty component, however cheap or small, can

ruin the performance of a set, it behoves the constructor to be just as careful about such items as the main component.

The cheapest component in the S.T.600 is the coupling condenser which passes on the low-frequency signals to the grid of the first L.F. valve. Not only is this component the cheapest, but it is the most critical in the whole receiver, in that if it is leaky a positive potential will be applied to the grid of the first L.F. valve, and signals will be ruined.

Remember that there are not only good reasons for using certain components in a set, but there are equally good reasons why other types are specifically excluded from a component list. Some constructors

(Continued on page 580.)

IN THE B.B.C. PROGRAMMES



This is Joe Loss and his popular Astoria Dance Hall Orchestra. They are to broadcast on August 17th and 21st.

vast amount of dud apparatus which is foisted on the public immediately one of my star set designs is published. This junk is sold on the reputation of the set, and therefore on my reputation, and no one could be more indignant than I when I see such a traffic in putrescent and spuriously attractive rubbish.

"Gloating Over Customers' Folly."

It is not pleasant to criticise constructors who, by the mere fact of desiring to make up one of my designs, have paid me the highest compliment they can bestow. It is regrettable that the compliment does not go just a little farther to the extent of carrying out the designer's intentions. But no matter how persuasive, how abusive,

The B.B.C. at the TRIBUNAL By **GARRY ALLIGHAN**

The Root of all B.B.C. Evil

JUST as farmers always blame the weather, it is the fashion to complain about the B.B.C.—with just as much justification. Ranged before this Tribunal of Listeners the B.B.C. are having their operations probed, and in the process every possible defence established. In this particular article it is proposed to examine the financial factors that enter the question of programme quality. It is not unusual to hear people speak of the B.B.C. as “a wealthy monopoly,” and no doubt its income of over £2,000,000 looks large enough. But with B.B.C. budgetary affairs, as with any domestic budget, it is not the amount of money that comes in that is important so much as what has to be done with it.

Where the Money Goes.

B.B.C. budgeting is very interesting. It shows that out of an income of £2,058,983 last year, £915,025 was spent on providing programmes. Unfortunately the public are not permitted to know the details of that expenditure, but when I explain what even that comparatively small sum has to cover, listeners will begin to see the remarkable success with which the B.B.C. cut their programme coat according to their financial cloth. That sum has to pay artists, orchestras, news royalties, performing rights, hire of telephone lines for simultaneous broadcasts, salaries and expenses of the programme staff!

It is, as I have said, impossible to analyse those figures more closely, but as the B.B.C. provide about 18,000 hours of different programme material per year, it is easy to discover how little money they are able to use for providing broadcast entertainment.

Less than Quarter for Programmes.

It works out at an average of less than £60 per hour, and as the B.B.C. orchestra alone costs £150,000 a year and the same amount is paid for Empire broadcasts, it is obvious that there must be a great number of broadcasts that cost much less. The scandal of this situation is that listeners paid more than £3,500,000 in radio licences last year. They think the B.B.C. got it to spend on programmes because it was for radio entertainment that seven million listeners pay their annual ten shillings. Instead of which, not even a quarter of it—not 2s. 6d. out of every ten shillings—was spent on the actual programmes. In fact, more than twice as much as was spent on the programmes went into Government coffers.

It is my firm belief, based on a most exhaustive study of B.B.C. affairs, that listeners cannot expect to receive better programmes until the B.B.C. are allowed more money to spend on them. I entirely agree with the payment of one shilling out

and by only passing over to the B.B.C. the equivalent of 4s. 2d. out of every licence the Government is inflicting a 60 per cent entertainment tax on the consumer. The highest tax on any other entertainment is 25 per cent.

It is obvious, therefore, that the Government must allow the B.B.C. a larger proportion of the money listeners pay for programmes in order that the B.B.C. can give listeners what they pay for. Until that is done the B.B.C. will continue to have to deny listeners the services of the best artists. They paid Toscanini £2,000 for his four concerts and he was worth ten times as much, but the B.B.C. would not have been able to afford to give him to listeners out of their ordinary revenue. His concerts, however, filled Queen's Hall four times with a paying public, and the box-office returns must have been much more than sufficient to pay the cost of Toscanini and the orchestra members' salaries.

LISTENERS PAY 60% ENTERTAINMENT TAX!

SO CAN YOU WONDER PROGRAMMES ARE NOT ALL THEY SHOULD BE?

of every licence to the Post Office, as is the case, because the Post Office more than earns it by their numerous and invaluable services to listeners. I entirely disagree with the Treasury taking, in the first place, 4s. 6d. out of each licence and then, on what is left, taking another £113,000 from the B.B.C. by way of income tax.

Listeners pay their annual ten shillings in order to secure broadcast entertainment—the fact that the Government calls it “operating a receiving station” does not affect the actual reason why listeners pay—

Items Not on the Balance Sheet.

I wish here to raise an important point in this connection. The balance sheets of the B.B.C. make no return on the public concerts the B.B.C. give, nor is there any head under which their profit and loss could be included. This serious fact emerges: every year the B.B.C., in their capacity of concert promoters, give well over 60 public concerts—including two months of nightly “Proms”—which are crowded by thousands of people who have paid for admission. There is no entry in the B.B.C. published balance sheets of the revenue and expenditure these concerts involve, nor is either the loss or profit they produce shown in the accounts.

If any public company submitted accounts in the form the B.B.C. do, there would be an immediate investigation and the Public Prosecutor would have something to say in the matter.

Impoverished by Government.

This is not said in order to be condemnatory of the B.B.C., but to be condemnatory to a Government that has so impoverished the B.B.C. that they have to augment their income by such dubious side-lines as competing with professional concert-promoters and publishing books.

This question of finance is at the root of the B.B.C. problem. It is my belief that the majority of listeners would like at least three good variety shows weekly. John Sharman has to produce one each week, employing eight turns and

(Continued on page 581.)

WORLD FAMOUS



“They paid Toscanini £2,000 for his four concerts, and he was worth ten times as much. But the B.B.C. would not have been able to afford to give him to listeners out of their ordinary revenue,” says the author. Here is a photograph of the famous conductor taken during a rehearsal.

COSSOR 1935-



A.C. MAINS MODEL 364

(illustrated above)

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 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 20/- deposit and 12 monthly payments of 20/-.

11 GNS.

BATTERY MODEL 366A

A Battery operated Superhet with Pentagrid Frequency Changer, H.F. Screened Pentode I.F. Amplifier, Double Diode Detector and Economy Pentode Output. 8" Moving Coil Speaker. Cabinet generally similar to above with accommodation for suitable Accumulator and Batteries.

Hire Purchase Terms: 17/6 deposit and 11 monthly payments of 17/6.

9 GNS.

(Exclusive of Batteries.)

DE LUXE A.C. MAINS MODEL 365

(illustrated on right)

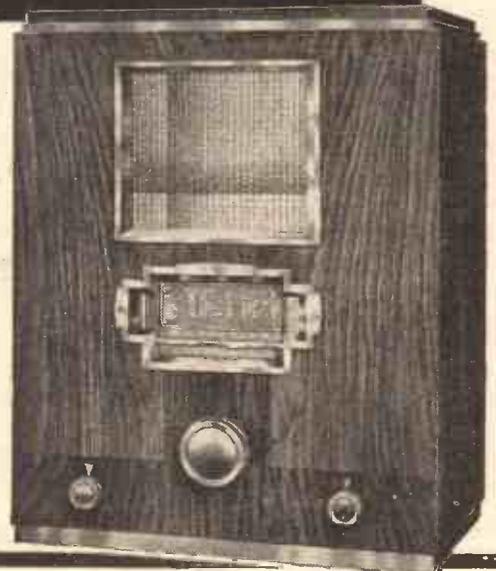
With a performance unsurpassed by any receiver regardless of price, this model incorporates every possible refinement that gives greater efficiency, simplicity and dependability. With Pentagrid Frequency Changer, H.F. Pentode I.F. Amplifier, Double Diode Triode Detector/Amplifier, Super Power Triode Output, Full-Wave Rect. Improved Superhet compensated Anti-Fading circuit with NEON Visual Tuning. Twin illuminated and detachable Scales. Combined On/Off Wavechange and Pick-up Switch. Volume Control. 10" Concert Grand Mains energised M.C. Speaker. Variable Tone control. Provision for extension speaker. Connections for pick-up. A.C. Mains only 200/250 volts (adjust.) 40/100 cycles.

Hire Purchase Terms: 25/- deposit and 12 monthly payments of 25/-.

14 GNS.

Here are typical examples of Cossor 1935-36 Radio—modern quality receivers for every purpose and pocket. Backed by the country's finest research laboratories—by a big staff of highly qualified engineers, and produced by an organization which is the largest of its kind in the Empire—Cossor Radio is above all reliable. Ask to see (and hear) any one of these Receivers at your usual wireless shop—or send for free literature. Please use coupon.

COSSOR SUPERHET RADIO



1936 *Quality* Radio



Illustration shows Models 368 & 436B. Models 360 and 363 are generally similar.

COSSOR *SUPER-FERRODYNE* RADIO

These receivers incorporate the famous Cossor "Super-Ferrodyne" developments in conjunction with the most modern of Variable-Mu Screened Pentode circuits, valve combinations and Super Selective Iron Cored Coils. The result is a degree of selectivity and range usually associated with Receivers much more costly. With any one you can enjoy the best of Europe's Wireless Fare—free from interference.

See them all at
**RADIOLYMPIA
STAND 70**

or send coupon for free literature giving fullest particulars.

BATTERY MODELS

Model 360 (Power Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Triode Power Output. Sensitive Moving Iron Speaker. Cabinet accommodates Batteries.

£5.15.0

(Exclusive of Batteries)

Hire Purchase Terms : 12/6 deposit and 12 monthly payments of 10/-.

Model 363 (Pentode Output)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det. and Economy Pentode Output. Sensitive 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries.

£6.15.0

(Exclusive of Batteries)

Hire Purchase Terms : 13/- deposit and 11 monthly payments of 13/-.

Model 436B (Class B Amplification)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., High Slope Power Driver and Class 'B' Output. Special 8" Permanent Magnet Moving Coil Speaker. Cabinet accommodates batteries.

£8.8.0

(Exclusive of Batteries)

Hire Purchase Terms : 16/- deposit and 11 monthly payments of 16/-.

ALL-ELECTRIC MODELS

Model 368 (A.C. Mains)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Triode Power Output, Heavy Duty Rect. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250 v. (adjust.) 40/100 cycles.

£8.18.6

Hire Purchase Terms : 15/6 deposit and 12 monthly payments of 15/6.

Model 369 (D.C./A.C. Mains)

Universal Receiver similar to illustration but without Bakelite Speaker fret. Specification as model 368 but with 8" Permanent Magnet Moving Coil Speaker. For D.C. 200/250 v. (adjust.) and A.C. 200/250 v. (adjust.) 50/100 cycles.

£8.18.6

Hire Purchase Terms : 20/- deposit and 11 monthly payments of 16/6.

De Luxe Model 367 (A.C. Mains)

(not illustrated)

With Variable-Mu Screened Grid H.F. Pentode, H.F. Pentode Det., Directly Heated Power Pentode Output, Heavy Duty Rect. "Thermometer Tuning" with illuminated wavelength scale. 8" Energised Moving Coil Speaker. For A.C. Mains only 200/250v. (adjust.) 40/100 cycles.

£9.19.6

Hire Purchase Terms : 17/- deposit and 12 monthly payments of 17/-.

Prices do not apply in I.F.S.

C O U P O N

To A. C. Cossor Ltd.,
Highbury Grove, London, N.5.

Please send me free of charge, literature giving full particulars of the *Model.....

* Please state Model required.

Name

Address.....

P.W. 10/8/35.....

7270



One of the two micro-wave aerials which are used to operate the galvanometer.

WHAT will undoubtedly prove to be one of the biggest centres of attraction at the great Radio Exhibition which opens at Olympia next week will be the magnificent scale model of the Marchese Marconi's famous yacht "Elettra," which, we are proud to announce, is to be exhibited throughout the period of the Show, on the "P.W." stand.

This remarkable true-to-scale model, which was made from the original blueprints of the actual vessel to a scale of one quarter of an inch to a foot, is complete and entirely accurate in every detail, and it took as long as six months to build. It is over five feet in length, and to provide some idea of the enormous detail that has been put into its construction, it may be mentioned that the model employs no fewer than 22,466 separate parts.

A Floating Laboratory.

The great interest to listeners in this wonderful model lies, of course, in the fact that the original from which it has been created has been used as a floating laboratory by Marchese Marconi for the past sixteen years, and has played an important part in practically all of his inventions and discoveries during this time.

The history of the "Elettra"—a handsome yacht of 700 tons—goes back many years before 1919, the year in which she was purchased by Marchese Marconi. She was originally built in 1904 at Leith, Scotland, for the Archduchess Maria Theresa of Austria and was in those days known as the "Revenska."

Little is known of the history of the yacht during the first ten years of her life, but she came back into the limelight again at the beginning of the Great War, when she was used by the British Admiralty for naval purposes. Then she was used for mine-sweeping operations in the North Sea, and for the duration of the war her history was one long chapter of thrilling experiences.

"P.W.'s" UNIQUE RADIO Giant True-to-Scale Model of M

Every visitor to Olympia should make a point of seeing at close quarters the floating laboratory on which Marchese Marconi has carried out wonderful piece of craftsmanship containing no less than 22,466 separate parts. It will be the Mecca of thousands of radio enthusiasts.

It was not until 1919 that the yacht was purchased by Marchese Marconi, and it was then that she was re-named "Elettra."

The "Elettra," which is over 200 feet long, has a normal cruising speed of ten knots, and under these conditions the consumption of fuel averages out at about 12 tons a day. For normal steaming a sufficient quantity of fuel can be carried for about 12 days at sea, but provision is also made for the use of sails when the wind is favourable, a facility which increases not only the speed but the stability of the yacht.

The Standard Equipment.

As may well be imagined, the furnishing and equipment of the "Elettra" is superb, but the chief interest undoubtedly lies in the wireless cabin in which so many inventions and discoveries have taken place. But like any other laboratory, it is extremely difficult to provide a description of the "Elettra's" wireless cabin because the equipment in it is subject to continual change. As one series of investigations is concluded, so another is begun, and what might be true of it one week might be totally erroneous the next.

But there is on board a certain amount of standard wireless equipment as distinct from the experimental apparatus, and this, as may be expected, is in itself very complete. The permanent equipment includes several

Of the remaining permanent equipment on board, perhaps the most interesting items are a powerful valve transmitter which is normally used for telegraph operation, and a two-kilowatt short-wave telephony-transmitter.

It is to an important series of experiments conducted by Marchese Marconi in the spring of 1930 with this last-mentioned transmitter that we owe the facility with which we can to-day call up on the telephone some of the world's biggest liners at sea.

To-day it is almost commonplace for a passenger on board one of the luxury liners to exchange conversation over many thousands of miles of land and sea with a friend or relation at home, but it was something of a startling innovation five years ago when Marchese Marconi, from his yacht in the Mediterranean, called up telephone subscribers in Sydney, Bombay, Cape Town, London, Montreal, New York, Buenos Aires and Rio de Janeiro, and thus inaugurated a system which has proved invaluable.

Remote Control.

It was, as a matter of interest, with this same apparatus that Marchese Marconi took part in the opening of the Wireless Exhibition at Sydney, Australia, on March 26th, 1930, when he himself was thousands of miles away. As reported in "P.W." at that time, a wireless signal was sent from the "Elettra" to operate a relay at the Sydney City Hall which in turn switched on the lights and thus opened the exhibition.

It is interesting to note that in 1924 Marchese Marconi took with him on one of his voyages a "P.W." set, concerning which he afterwards wrote to the Editor: "During my last experimental cruise on the yacht 'Elettra' I had the opportunity of testing the 'Unidyne' Two Valve set loaned by you for that purpose.

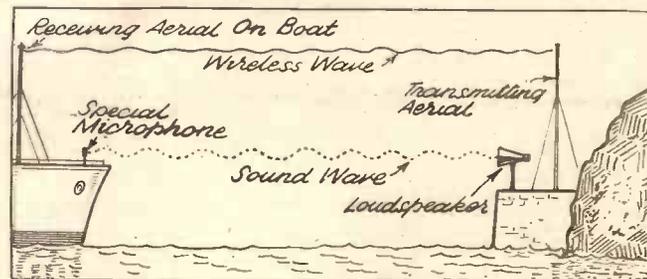
"I am glad to say that the little receiver worked well. It behaved quite normally as regards ease of tuning and selectivity, and I believe that the mechanical device employed to facilitate the fine adjustment of the

IN THE CH



The cabin in which the special blind navigation apparatus can

MEASURING DISTANCE FROM THE SHORE



The sound-and-wireless method of obtaining accurate distance between a ship and the shore. The time between reception of the radio and the sound signal enables the distance from the transmitter to be worked out.

transmitters and receivers, all of which are intended for special purposes.

Emergency Spark Transmitter.

In accordance with requirements of international law, there is on board the "Elettra" an emergency spark transmitter such as is to be found on most sea-going ships, but one can hardly imagine, with so many other and higher-powered transmitters available, that it is ever likely to be pressed into service.

THE DIRECT



The goniometer loops are used in navigation tests that are being

OLYMPIA EXHIBIT

Marconi's Famous Yacht

Here the marvellous five-foot model of the "Elettra," so many epoch-making experiments. The model is a complete parts. The "P.W." Stand (No. 13) is sure to come from all parts of the country.

reaction by means of which the first valve is easily brought almost to the oscillating point, is largely responsible for the sensitiveness observed."

Among the other more or less permanent equipment on board the "Elettra" may be mentioned the numerous receivers covering almost every conceivable waveband, a high-speed recorder for printing messages on tape, and a Marconi direction finder of the latest pattern which forms part of the equipment for the navigation of the "Elettra" by wireless.

One of the most amazing of the recent developments which have taken place on board the "Elettra," and with which, of course, the yacht is now fitted, is the micro-wave beam apparatus for blind navigation.

Some idea of the tremendous importance of this development to world navigation will be appreciated from the diagrams which accompany this article and from the explanatory notes which follow.

Navigation in Fog.

Although for many years radio has been the salvation of ships at sea, it has not been previously possible successfully to guide ships into harbour under conditions of thick fog. That this last remaining obstacle is successfully overcome was obvious from the demonstration which was given comparatively recently by Marchese Marconi to Government officials and shipping authorities from England and Italy.

The demonstration actually took place at Sestri Levante, near Genoa, on July 30th, 1934, and on that memorable occasion the "Elettra" was successfully navigated between two buoys placed 90 yards apart to represent the entrance to a harbour while the blinds in the chart-room were drawn and the navigator had nothing upon which to rely other than the radio indicators.

These consisted of a galvanometer dial, one half of which was red and the other green, and an aural course-indicating signal on headphones.

The diagram on the right shows clearly how the system works. A micro-wave beam transmitter is sent out from the land, and this is received

on board by two micro-wave beacon receivers fitted one on each side of the navigating bridge. As soon as the ship errs slightly off her true course to port the needle on the galvanometer swings over on to the green half of the dial, and the deflection becomes greater as the error is increased.

An Audible Indication

At the same time the audible note in the phones will alter in sound according to whether the ship is off her course to port or to starboard.

In the event of the digression being to starboard, the galvanometer needle swings over on to the red half of the dial.

It will thus be seen that by the use of this system, which is extremely accurate, it is possible to bring a ship into harbour under the worst possible conditions of fog. But the apparatus so far described does not cover the question of determining the distance of the vessel from shore, although, in point of fact, this is an integral part of the Marchese Marconi's blind navigation apparatus.

The Distance.

The ingenious way in which this measurement is carried out is shown in the other diagram. The shore arrangements comprise a beam wireless transmitter and an acoustical sound transmitter in the form of a giant horn loudspeaker.

On the boat is a special microphone on which is received the sound wave, and a reflector, aerial and receiver for the reception of the radio wave.



The "Elettra" lying off the coast of Italy after returning from one of her research trips.

Since the speed of radio waves is 186,000 miles per second, or to all intents and purposes instantaneous, and the average speed of sound waves only 1,100 ft. per second, it will be apparent what happens with the apparatus described.

The radio and sound waves are sent out from shore simultaneously, and as soon as the radio signal is received on board a

calibrated stop-watch is set into operation which stops when the audible signal ultimately arrives. The number of seconds elapsing between the arrival of the two, multiplied by 1,100, provides the required information as to the distance in feet of the boat from the shore.

Micro-Waves.

The micro-wave transmitter which is used for this blind navigation system works on a wavelength of about 60 centimetres—just a little more than half a metre!—and results have shown that this wavelength is free from interference from all external sources.

Sixty centimetres! But what a far cry from the wavelengths in which Marchese Marconi was interested in 1922, when, in the June 3rd issue of POPULAR WIRELESS—the first one published—the following paragraph

appeared:

"Nine months ago Guglielmo Marconi, from his yacht "Elettra," the best-equipped floating radio laboratory in the world, picked up impulses of wavelengths esti-

(Continued on page 582).

CHART ROOM



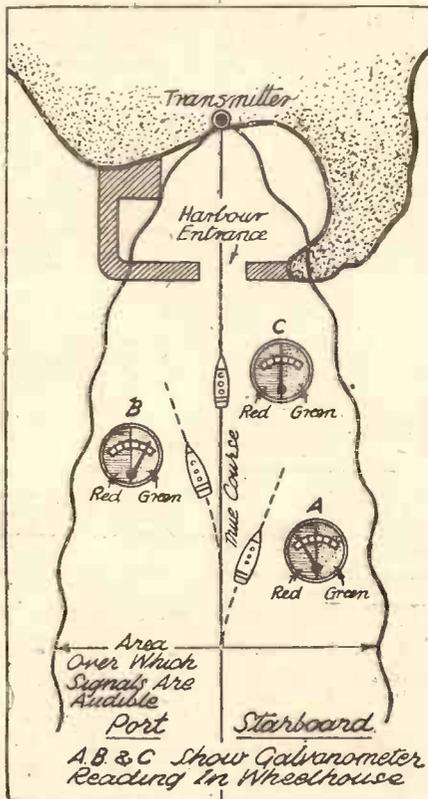
Navigator sat during the experiments. Part of him is seen on the left.

DIRECTION-FINDER



Connection with some of the blind navigation apparatus carried out on the "Elettra."

RADIO FOG PILOT



How the radio beam for guiding a vessel in fog is used, is clearly shown here. Note the galvanometer dials which indicate the course of the ship relative to the direction of the beam.



The completed receiver, showing the controls for the broadcast section. The short-wave controls are immediately below the broadcast panel, underneath the hinged cover.

THE "ALL-WAYS" THREE

Introducing a remarkable double-channel receiver giving simultaneous reception of programmes on the short and ordinary broadcast wavebands.

By the "P.W." RESEARCH DEPT.

"Silver King" (fully described in POPULAR WIRELESS, dated April 6th). This amazing development provides a ready means of amplifying at broadcasting frequencies simultaneously with amplifying and detecting on the short and ultra-short wavelengths.

Hence, it is possible with the "All-Ways" Three for the ordinary broadcast programmes to be received at the same time as programmes from the short-wave stations of the world. The set can be adjusted to, say, the wavelength of the London

National transmission, and while the programme from that station is being listened to in one room, another person can be sitting by the set tuning in programmes from short and ultra-short-wave stations in all parts of the world.

Simultaneous Reception.

It will be seen, therefore, that the "All-Ways" Three is not just two receivers on the one chassis; it is more than that—it is two complete receivers permitting simultaneous reception of programmes on widely separate wavebands.

A design of this type opens up an entirely new field for the enthusiastic home constructor. Those who have had no experience of short-wave reception do not realise what they are missing. Every day there are programmes from North America, South America, Australia, as well as from the various European countries waiting to be picked up on a set suitable for reception on these wavelengths.

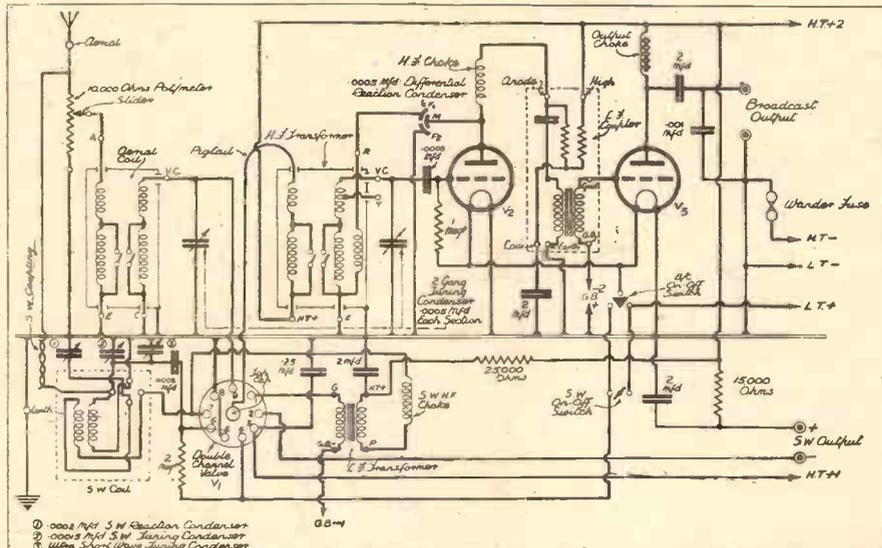
PROGRAMMES FROM ALL OVER THE WORLD

OUR Exhibition set, full constructional details of which will appear next week, is, we feel sure, a design that will make a special appeal to all home constructors.

The "All-Ways" Three is no ordinary set—it is an ingenious double-channel design, in which there are two complete receivers combined together in the same circuit and on the same chassis assembly.

The Secret.

The secret of the circuit lies in the remarkable J. 240 Hivac valve, which was used for the first time in the



How the circuit of the "All-Ways" Three is arranged. V1 is the special J.240 valve which simultaneously carries out the functions of broadcast and short-wave amplifier, and sorts out the different frequencies and applies them to their proper circuits.

A Problem.

But those who do their listening on a double-purpose set adaptable to short waves, are invariably up against the problem of how to avoid interfering with the enjoyment of the rest of the family, who probably prefer to listen to their

(Continued on page 581.)

KEEP TO THIS LIST AND BE SURE OF EXCELLENT RESULTS

- 1 "Polar" 2-gang .0005-mfd. tuning condenser, Midget type.
- 1 "Polar" semi-circular drive for above.
- 1 Pair "Wearite" screened coils, types W.L.Q. and W.L.T.
- 1 "Polar" 10,000-ohm potentiometer.
- 1 J.B. .0003-mfd. differential-reaction condenser.
- 1 "Clix" chassis-mounting 9-pin valve holder, with screw terminals.
- 2 Benjamin "Vibroder" 4-pin valve holders.
- 1 Varley multi-cellular junior H.F. choke.
- 1 Bulgin universal Transcoupler.
- 1 B.T.S. output choke.
- 1 Bulgin 3-point shorting toggle-switch, type S.87.
- 2 T.C.C. 2-mid. fixed condensers, type 50.
- 1 T.M.C.-Hydra 2-mfd. fixed condenser, type 30.
- 1 Dubilier 2-mid. fixed condenser, type B.B.
- 1 T.M.C.-Hydra 25-mid. tubular fixed condenser, 300-v. D.C. working.
- 1 Dubilier .001-mfd. fixed condenser, type 670.
- 1 Dubilier .0003-mfd. fixed condenser, type 670.
- 1 T.C.C. .0003-mid. fixed condenser, type 34.
- 1 "Erie" 2-meg. grid leak, 1-watt type.
- 1 "Erie" 1-meg. grid leak, 1-watt type.
- 1 "Erie" 25,000-ohm. resistance, 1-watt type.
- 1 Grahm Farish 15,000-ohm resistance in vertical holder.
- 1 J.B. .00015-mid. short-wave tuning condenser.
- 1 J.B. double-ratio drive for above.
- 1 Eddystone .0002-mfd. S.W. slow-motion reaction condenser.

- 1 Set Colvern short-wave coils.
- 1 Colvern special ultra-short-wave tuning condenser.
- 1 Eddystone 4-pin S.W. valve holder. Baseboard mounting type.
- 1 Bulgin S.W. H.F. choke, type H.F.3.
- 1 Varley "Nictet" L.F. transformer, 3-5/1.
- 1 Bulgin toggle on-off switch, type S.80.
- 1 Peto-Scott special bracket for S.W. coil holder.
- 1 Peto-Scott "Metaplex" (both sides), baseboard 12 in. x 9 in. x 1/8 in., with support.
- 1 Peto-Scott polished wood panel, 12 in. x 12 in. x 1/8 in.
- 1 Sheet copper foil, 12 in. x 12 in.
- 1 Peto-Scott special cabinet.
- 1 Peto-Scott terminal strip, 2 1/2 in. x 2 in.
- 1 Peto-Scott terminal strip, 2 in. x 1 1/2 in.
- 6 "Clix" terminals, type A.
- 5 "Clix" wander-plugs.
- 1 Belling & Lee wander-fuse.
- 2 Belling & Lee accumulator spades.
- Screws, flex, etc.

VALVES.
Hivac J.240. Cossor 210 H.F.
Cossor 220P.A.

BATTERIES.
H.T.—120 volts: G.E.C.
L.T.—2 volts: Exide.
G.B.—4 1/2 volts: G.E.C.

LOUDSPEAKER.—W.B. "Stentorian."

ON THE SHORT WAVES



ABOUT THE HEPTODE

An explanation of how the electronic superhet mixer works, and some notes on its advantages on short-waves.
By W.L.S.

ALTHOUGH we have not yet reached any sort of agreement about the size of set that is most desirable for short-wave work, I think we all feel, more or less, that where a really big set is contemplated, a superhet is the thing to go for. The superhet, in fact, seems to have settled itself in the position of the big set *par excellence* for all frequencies.

I have never tired of rubbing in the fact that in a straight short-waver the detector is the thing that matters. Now that we are turning our thoughts in the direction of the superhet, I have to re-draft that statement and say that the *frequency-changer* is the thing that matters.

What We Have to Do.

What, exactly, is the function of this so-called "frequency-changer"? It's quite simple, although the very term seems to frighten many people away from it. We must have a jolly good detector for our short-wave signal; an equally good oscillator to supply the required beat-note with it; and the way in which the two work together is the most important part of the whole business.

There's no need for me to deliver a lecture on the principle of the superhet. Take any intermediate frequency you like—let's stick to 450 kc., which is a favourite one. We build up a lusty amplifier tuned to this frequency, with specially designed "fixed-tune" transformers. We then, obviously, have to produce a good 450-kc. signal to inject into it, and this we do by picking up any signal we like and mixing with it another signal which is 450 kc. away from it in frequency.

Suppose we are listening to someone on 7,000 kc.—we must generate, with our local oscillator, a signal of either 7,450 or 6,550 kc. (it doesn't matter which), and mix the two together.

Using Two Triodes.

The most straightforward way of doing this is to use two triodes. One, the detector, is just like any other short-wave detector, except that no reaction is used on it. The other is just an oscillator; and, again, it is very much like any short-wave detector; this time *with* reaction. The output from this oscillator is probably pretty high—certainly much greater in amplitude than the signal that the detector is picking up—so we only want a fairly small degree of coupling between the two.

In practice, when two triodes are used, there is no need to use any artificial coupling if the two sets of coils (oscillator and detector) are fairly close together. The great disadvantage of such an arrangement is the "pulling" effect. The detector may be in tune with the signal when we start, but the powerful local oscillator will have a strong tendency, when we start it up, to pull the detector out of tune, and the reverse effect also occurs.

With the advent of the heptode this trouble was eased quite a lot. Here we have a valve with five grids. Numbers One and Two are used, respectively, as the grid and plate of an ordinary oscillating triode. Number Three serves as a screen. Number Four is the grid of the detector valve, and the anode is the detector anode, but between the two we have grid Number Five—another screen.

sure that their respective leads do not pass close together.

Fig. 1 shows a typical heptode arrangement. L is the untuned aerial coil, coupling into the tuned circuit L_1C_1 , which feeds into grid Number Four—the "detector grid." L_2C_2 is the oscillator grid circuit, feeding into grid Number One. L_3 is the reaction coil for the oscillator, and C_3 is provided, not as a control to be regularly used, but just a rough control of the degree of reaction applied to the oscillator.

The Separate Reactor.

The complete "mixed" output goes off through the anode circuit, and there are two terminals with the cryptic label "L.F. or I.F." If it's a superhet, then an I.F. transformer primary will occupy that position. The short-wave H.F. choke, naturally, doesn't prevent the 450-kc. component from getting through.

The point of hinting at "L.F." in that same position is this—that one can derive great benefit from the use of a heptode, even if the set is a "straight" one. It then takes the shape of a "separate reactor" circuit, famous for the silent background that is obtainable.

The detector doesn't oscillate, but a completely separate circuit provides the necessary beat for C.W. signals, or the necessary reaction for telephony. When receiving the latter the oscillator section will be just *below* the oscillating point, and C_3 will become a real control.

Ganged Tuning Possible.

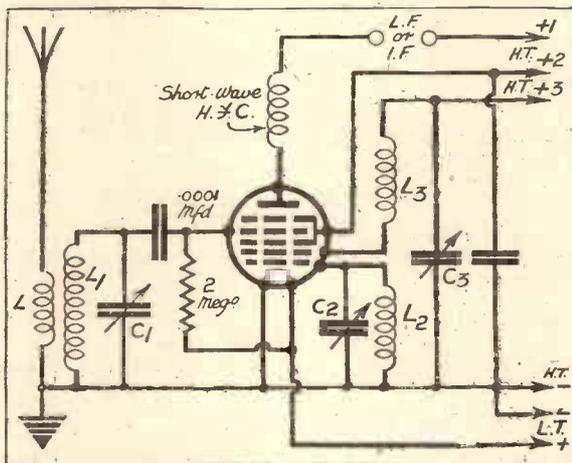
When the heptode, as in Fig. 1, is followed by L.F. amplification, the short-wave H.F. choke in the anode circuit may be omitted—but *not* when a superhet circuit is being used.

Now if L_1 and L_2 are similar coils, and C_1 and C_2 similar condensers, the two circuits may easily be ganged together. One circuit will have to be 450-kc. off tune with the other, but we are dealing with such high frequencies that this difference can usually be arranged by trial and error, without the need for using a trimmer.

The third and fifth grids (both serving as screens) are "commoned" and taken off to H.T.+2, which will be run at a figure equal to about half the anode voltage.

Any "pulling" that may occur between the two circuits (and some does, however efficient the screening) will be hidden when they are ganged together, and need not worry you at all.

AN ELECTRONIC-MIXER CIRCUIT



How a heptode valve is connected up to work as oscillator and mixer in a short-wave superhet.

What we really have, therefore, is a screened-grid detector and an oscillating triode, with a screen between the two, all in one envelope. The "mixing" of the detector signal and the oscillating signal now occurs in the actual electron stream through the valve. Since we have an electrostatic screen, in the shape of grid Number Three, between the two, it follows that we shall lose all the advantages of the arrangement if we allow any external coupling to occur.

It is necessary, therefore, to screen the two sets of coils from one another, or, at any rate, to separate them well and to make

ON THE SHORT WAVES—Page 2

Points from the POST-BAG

MR. LESLIE W. ORTON, of the Anglo-American Radio and Television Society, has sent me a photograph of the society's own dance orchestra, which appears on this page. He tells me that arrangements have been completed whereby this orchestra will shortly be heard during some of the A.-A.R. & T.S. transmissions.

Meetings of the society, which are becoming more "social" and less "radio" during the summer, will, in future, include a series of dances at which members can judge the efficiency of the orchestra for themselves. Who says that radio enthusiasts haven't other irons in the fire? One of the attractions, by the way, takes the form of dancing to music relayed by short waves from America!

A Special Programme.

Caracas, Venezuela (YV2RC) is shortly broadcasting a special programme for the A.-A.R. & T.S. on 49.08 metres. Reports are wanted, although the date is not yet known.

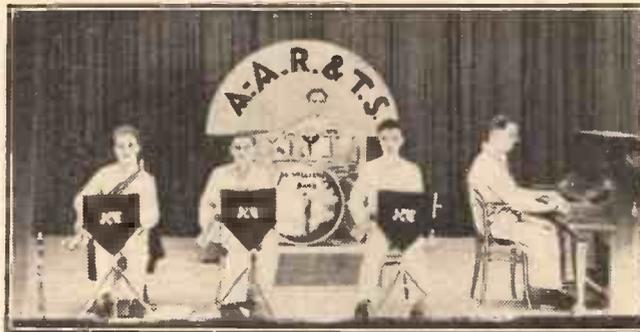
M. G. (Acton) liked the look of the 5-metre receiver recently used as an illustration for one of my "Tidiness" articles. He wants to know where such boxes are obtainable. The one in question was a Magnum product, designed in the days of double-ended screened-grid valves! It had a vertical

screen across the middle, and was intended to house the necessary components for a screened-grid-and-detector set. The dimensions are 12 in. by 6 in. by 6 in., and I expect they are still obtainable.

He wants to know of any 5-metre amateurs in his neighbourhood. I know of only G2JU (Harrow) and G5RD (Abbots Langley), neither of whom is particularly near Acton—but if they are both heard in South London (as they certainly are) I think he should get them.

R. C. S. (Anerley), who seems to read all the multitude of American "popular-technical" papers, sends me a collection of spicy bits culled from them. They make

SOON TO BE HEARD ON THE AIR



The newly formed orchestra of the Anglo-American Radio and Television Society. Arrangements have been made for this orchestra to be heard during some of the society's transmissions.

interesting and varied reading. The present batch includes yet another "cold-cathode" valve, a new World Time-Table for short-wave enthusiasts, and a learned dissertation on short waves from the Milky Way.

The latter were actually received, amplified and re-broadcast by an American station, and one theory is that they consist

of light-waves that have become "tired"! Since it is believed, now, that all radiation gradually increases its wavelength, these radio emanations may be the remains of light-waves that started billions of years ago.

A New Wave Theory.

An article on the uses of ultra-short waves mentions several new-uses for them, one of which is concerned with bridge-building! The little fellows that you see hundreds of feet up, clinging on, apparently, by their toe-nails, are now in touch with the foreman by means of midget ultra-short-wave transmitters concealed somewhere on their persons!

A. T. (Fife) has evolved a substitute for the awful "quasi-optical" theory of ultra-short-wave propagation. He suggests that all radio waves are bent towards the earth by its magnetic field—the long waves considerably, and the short ones hardly at all. All rays, from the very short gamma rays to the longest radio waves, are identical in every way except frequency, and, says A. T., must therefore be subject to the same laws. For this reason it seems ridiculous to suppose that when we get down to 5 metres we come up against something revolutionary.

The Layer Problem.

He is somewhat worried because we are asked to believe that a ray of light that has been travelling in space for hundreds of years can penetrate through all the so-called reflecting layers with the greatest of ease, and yet can be stopped by a cigarette paper held in front of the eye. Then we are told that a long

(Continued on page 584.)

THE B.B.C. announces that the new broadcasting station at Delhi, which is (at first) to operate on medium waves only, will probably commence transmissions late in the Autumn. It is hoped to construct a special receiving station by means of which it will be possible to relay the Empire programmes from the new Delhi station, which is the last word in modernity and should have a reliable range of over 700 miles.

Empire listeners provide the B.B.C. with many amusing anecdotes, some of which show in a surprising way the degree of personal contact that has already been established between the performer and the Exile of Empire! One concerns a Punjab listener who shut the bathroom door hurriedly when his wife switched on the Empire programme, as he "felt the announcer was speaking and looking at me at the same time!"

A New Station in Papua.

Yet another new broadcasting station in the Empire is under construction, this time in Papua. The transmitter will have only a small service range, and will use a power of 100-watts only, but, once more, relays of the Empire programme are contemplated.

Several keen ultra-short-wave listeners have written to ask me if I know anything about the station putting out nearly continuous music just below the amateur

SHORT-WAVE NEWS

5-metre band. The programme is sometimes relayed from London Regional, and at other times it consists of non-stop gramophone records.

I often hear this station myself, but it is so strong that I can't get a bearing on it with the somewhat crude D.F. apparatus at my disposal. Perhaps the owner will read this and come forward?

A London amateur who has recently been on holiday in Cornwall tells me that he took portable 5-metre gear with him in the hope of a chance contact with the Channel Islands or the south part of the Irish Free State. His only contacts, however, appear to have been with large numbers of seagulls, and they flew away when he offered them the "mike."

Other recent 5-metre news includes a general lengthening of the range obtainable from many amateur stations—whether due to "conditions" or not it is impossible to say. Contacts between South London and Essex, and between North Kent and Hertfordshire, have now been established.

Several new stations on the short-wave broadcast bands have been reported by readers. Conditions for the northern part of South America appear to have improved again, judging by the swarms of Colombian call-signs on some of the letters in front of me. An outstanding transmission is that of HJA3, at Barranquilla, who works on 23.38 metres. Although not a broadcast station, HJA3 relays music occasionally, and is quite the strongest South American ever heard.

Sydney's Fresh Wavelength.

W2XAD's new transmission on Sunday afternoon and evening is being received well. The curious thing is that at times he is much stronger than W8XK, while at others "XK" shows him up badly. It is a matter of skip-distance, probably, since W8XK is quite a bit farther inland than W2XAD.

Sydney (VK2ME) may sometimes be heard on weekdays at 7 a.m. on 28.51 metres—not his usual 31-metre wave. Sometimes on this setting he uses the call-sign VLK, but it is the same station that delights us on Sunday afternoons.

Another experimental station worth looking for is W2XBJ at Rocky Point, who works irregularly on 33.52 metres. He has been heard several times at about 11 p.m., usually at very good strength indeed.

W. L. S.

Where do the HIGH NOTES Go?

AND the answer to the question which is asked in the title to this article is that they go to many places. There are so many points in a receiving set where high notes fall by the wayside that it is a wonder that any at all manage to get through to the loudspeaker.

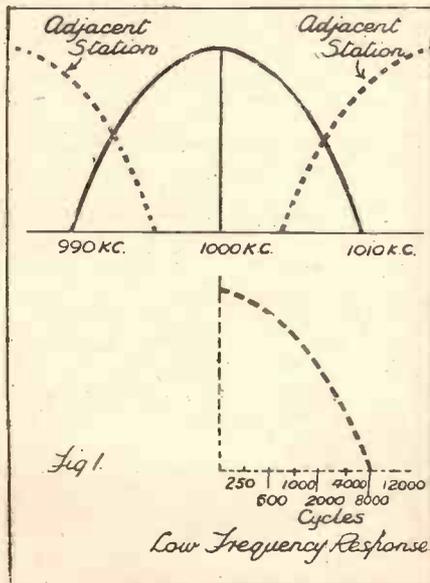
Yet modern sets are greatly superior in their high note responses to those of even only a few years ago. It is the high notes which give character and individuality to human voices, and make violins "sob" in their own properly rich manner.

So great has the improvement been that when you walk past a house in which a receiver is loudly operating, these days, you have probably noticed how realistic the voices of announcers and talkers sound. Again, high notes and transients must be rendered in pretty good style if applause is to get through at all well—hand-clapping, I mean.

Pentodes and Tone Correction.

Next time you listen to the clapping which follows a variety turn, just cast your minds back to the rushing-rustling of thin,

H.F. AND L.F.



Here is shown graphically the relation between a tuning curve and the low frequencies with which the carrier is modulated.

dried leaves which used to result from the transmission of applause.

In many instances the improvement must be credited to the pentode valve. Pentodes are widely used in output circuits, and it is a characteristic of this type of valve that it tends to exaggerate the higher notes, and in this way often applies some much-wanted tone correction.

There is also a degree of tone correction in some kinds of loudspeakers with their reduced bass-response, but such correction

It is wonderful how easy it is to lose those top notes in a radio set. They are sent out by the transmitter, but often some fail to reach the loudspeaker. H. A. R. Baxter tells you why in this most informative article.

is usually haphazard and hardly placed in the right place for it to be particularly effective. In any case, to take away bass to give proportionately greater emphasis to the treble is robbing Peter to pay Paul with a vengeance, for there is little enough of the really low stuff in any average set.

In truth, the advancement that has been made in the tonal response of sets must not mislead us into thinking that we are rapidly approaching perfection. We most decidedly are not. And so long as broadcasting is confined to the medium and long waves an arbitrary limit is imposed on tonal progress.

The nine kilocycles separation between stations restricts the frequencies with which it is possible to modulate the transmitter's carrier at any broadcasting station. It has been said that there is a very real advantage in including audio frequencies up to fifteen or even twenty thousand cycles in order to embody the higher harmonics.

The Sideband Problem.

Not that many of us would be able to hear them as such, but it is undeniable that in combination they must contribute a very real effect to the general mass of sound.

But to transmit on those lines it would be necessary to have much greater separation of stations, and there isn't room on the medium and long waves. That is why it is being advocated that as well as televising on the ultra-shorts there should also be local sound programmes.

Well, there will be the sound which accompanies the television, and it is suggested that this will provide a fine opportunity to show what can be done when the limitation of cramped ether channels is at least to some extent removed.

Now, the fact that the majority of the medium- and long-wave stations are nine kilocycles apart does not mean that they give you the audio frequencies clear and free from interference up to nine thousand cycles. There are the two sidebands to be considered.

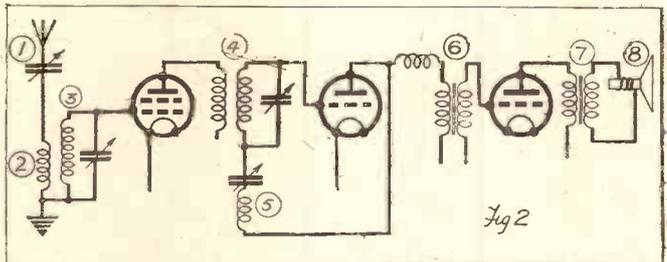
The fundamental wavelength is situated in the centre, and there is one family of

sideband wavelengths at each side of it. Plus and minus, in fact. Each audio frequency at which the carrier or fundamental wavelength is modulated will create two additional wavelengths, one of which will equal the frequency of the carrier plus the audio frequency, and the other the frequency of the carrier minus the audio frequency.

Thus, to take an easy example, an audio frequency of 5,000 cycles modulating a carrier of 1,000 kilocycles will create two additional radio frequencies in the ether, and these would be 995 kc. and 1,005 kc.

So a nine-kilocycles ether channel permits clear space for a modulation of only 4,500

WHERE THEY ARE LOST

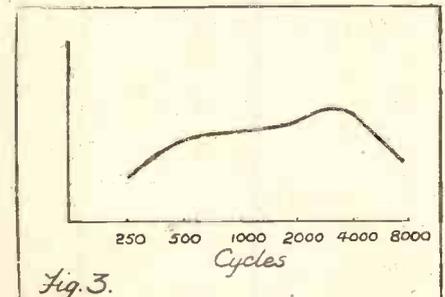


Some of the points where high notes slip away are shown in this typical circuit diagram.

cycles in theory. But in practice that applies only to adjacent powerful stations. Where two or three neighbouring (in the sense of ether channels) stations are of different strengths the situation varies in accordance with the particular circumstances.

Most broadcasting stations transmit frequencies up to nine thousand cycles,

A "TOP-LESS" TRANSFORMER



The curve of a poor L.F. transformer, showing how it falls off badly at both ends of the audio spectrum.

although it doesn't follow that the receiver is able to take them in. But let us examine a few points in the set at which the high frequencies tend to fall by the wayside.

There are first the high-frequency circuits. Any normal method of increasing (Continued on next page.)

CHARGING FROM D.C. MAINS

SOME PRACTICAL DETAILS OF A SIMPLE BUT EXTREMELY USEFUL BATTERY CHARGER

By J. T. HALES

MANY listeners, no doubt, having a D.C. supply in their homes, obtain their low-tension current from accumulators which are charged by being placed in series with the whole or some part of the electrical installation of the house. This scheme—which really demands two accumulators if maximum efficiency is to be attained—has often been advocated, but it is possessed of one annoying disadvantage; the fact that wires have to be removed and replaced, and terminals unscrewed, whenever it is desired to change over the batteries so that the one which has been working the set can be charged and the other discharged. Although this may seem a small point, the operation, especially if it has to be conducted in some dark or out-of-the-way corner, can become very tedious.

How the Unit is Made.

It can, however, be entirely avoided by the apparatus depicted in the accompanying drawing. In a brief description it may be said that the device consists of a hardwood panel—which may be stained and polished if desired—a wooden baseboard, and a screen which is also of wood. The screen divides the space behind the panel into two compartments, the baseboard and adjoining side of the screen in each one being covered with metal foil. For this purpose two pieces of foil are necessary, and care should be taken to ensure that they do not meet at the top of the screen—or, for that matter, anywhere else.

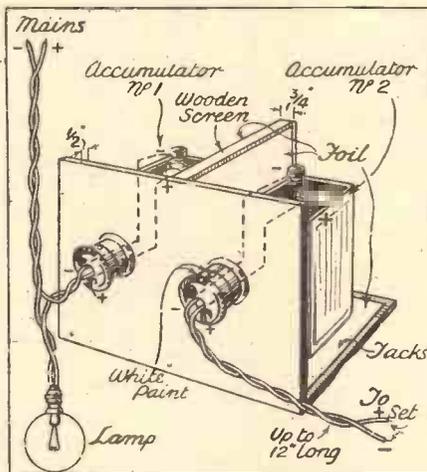
The reason for this precaution is that when the contrivance is in use the accumulator in one compartment will be

connected to the mains, while the other will be supplying the set with current. Thus it is desirable to isolate the two batteries from one another, and the break in the metal accomplishes this.

In passing it may be mentioned that the object of the foil is to reduce any tendency to hum.

Two ordinary electric light sockets—those used for wall connections are most suitable—must now be affixed to the front of the panel, and wires should be taken from each one to the accumulator which occupies the space immediately behind it. This point will be rendered more clear by

VERY COMPACT



How the unit is constructed and connected to the electric light supply.

reference to the diagram, but it should be noticed that for ease in operation the positive terminal of the battery should be joined to the right hand side of the socket in both cases.

In order to obtain the charging current it will be necessary to make a break in one of the wires leading to a light or similar point, the severed ends, after connection to a length of twin flex, being bound with insulating tape. A plug, of a type which will fit into the sockets, is then attached to the other extremity of the flex and afterwards tested for polarity.

This is effected by inserting a lamp in the holder whose leads have been treated as just described, immersing the points of the plug in water, and switching on the current. The result will be an evolution of gas from both points, and the one which produces the greater number of bubbles is the negative. The plug is placed in one of the sockets on the panel so that its positive is joined to that of the battery.

An Important Point.

A similar plug is now secured to a piece of twin flex and put in position in the as yet unused socket, the polarity of the free ends of this wire being determined by means of a voltmeter or any other usual method.

Upon joining these wires to the low-tension terminals of the set, it will be found that the operation is the same as before, with the exception that it is now only the work of a few seconds to change over the batteries. This, of course, is carried out by removing the plugs from their sockets and replacing them so that the one which was previously in the right-hand socket is now on the left.

It would not be fitting to conclude without a word of warning about taking care to see that the plugs are always inserted in their sockets the right way round, and to the furtherance of this end a spot of white paint should be applied to the upper surface of each plug and socket. By noticing that the spots on the plugs are at the top every time, it will be impossible to make a reversed connection to the set or to the mains.

WHERE DO THE HIGH NOTES GO?

(Continued from previous page.)

selectivity will diminish the high notes. This is easy to understand. Glance at Fig. 1. Here is shown graphically the relation between a tuning curve and the low frequencies with which the carrier is modulated.

Points of Danger.

If selectivity were pushed to its theoretical limits, only the 1,000-kc. frequency would be admitted to the set, and no sidebands (i.e. no modulation). You would hear no speech and music. Ideal station separation would show a flat-topped curve, so that all the sidebands were admitted beyond which there would be a complete cut-off.

And now turn to Fig. 2. There must be a falling off of high notes if the tuning of the aerial circuit is made "peaky" by such things as (1) an aerial series condenser; (2) a loose aerial coil coupling; (3) a

tuned grid circuit. A tuned intervalve H.F. coupling (4) will still further add to selectivity and knock off high notes; while the application of reaction (5) is good-bye to pretty well anything above 2,500 cycles!

Then there is the L.F. end of the set to consider. An L.F. transformer (6) of good design will take in nearly everything that is available even under the best average conditions. The poorer one will begin to show a falling off of a serious nature above something round about three thousand cycles (Fig. 3), and as for the bass—but we are not discussing that just now.

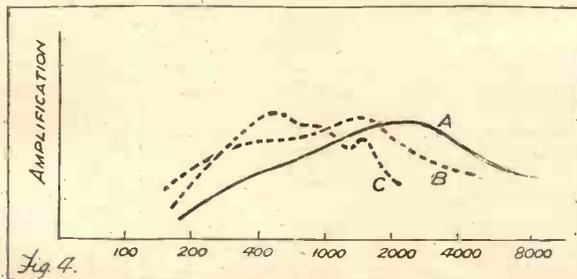
Getting Them Back.

There will be another transformer for the loud-speaker (7 in Fig. 2), and this, too, must be pretty good if it is to pass on the high notes without reducing them. Finally, there is the loud-speaker itself, and it is necessary to say only that the moving-coil principle needs to be applied with skill and care in design

if a speaker is to have any "top" worth listening to.

Those high notes are very valuable and deserve to be nurtured. We have seen how easily they can be lost, but this article

WHICH IS THE BEST?



The overall curves of three different sets taken under working conditions. C has little bass and no "top"; while A has fairly good "top" but a bad falling-off at the bass end. B has the best "balance."

would be valueless if something were not said as to ways and means of getting them back again.

This is not so difficult as it might at first (Continued on page 584.)

"TO BE BROADCAST LATER"

Alan Hunter visits the B.B.C.'s New Recording Studios

BY now everyone knows the B.B.C. has a vast orchestral studio out at Maida Vale, built within the shell of a dis-used roller-skating rink. Very few realise that, quite apart from studios, this new B.B.C. building houses an elaborate and ever-expanding recording outfit.

For many years the B.B.C. has "bottled" a good deal of its material on the steel-tape machine—material needed for subsequent broadcasting or for "playbacks" after rehearsals and so on.

An Entirely New Method.

It is only recently that there has emerged from the B.B.C. Research Department an entirely new type of disc recording, a type eminently suited to the peculiar needs of broadcasting.

At Maida Vale I was shown the Watts disc system—originally designed by Mr. Watts but modified recently to meet the growing needs of the B.B.C. It was made clear to me that the Watts system was in no way outdoing the much-used steel-tape machine; that in truth both systems were in full working order at Maida Vale; that both were essential in future recording developments.

The B.B.C. aims to install six distinct recording channels at least, with the promise of still more channels if programmes demand them. But what is a channel? In brief, it is an endless recording availability. One channel, as it is termed, consists of at least two complete recorders, so that before one is finished the next can come into action.

Changing Over.

The frequency with which the change-over is made from one recorder to another depends on the system. With the discs the change-over must be made every four minutes or so. With the steel-tapes one recording can carry on for as long as half an hour.

At the moment only three channels are in full service—one disc and two steel-tapes. The disc channel has two recorders of the Watts type, which I was able to see in operation.

A very robust affair, the Watts recorder. The discs themselves are of aluminium, coated with cellulose compound to a thickness of about .005 in. They are 12 to 13 in.

in diameter and revolve on the turn-table at 78 r.p.m. The full playing time, from the innermost to the outermost grooves

An interesting description of the latest system installed at Maida Vale for making records of the programmes.

that can usefully be cut, is between 4 and 4½ minutes.

And now what is the special advantage of this system for B.B.C. work? Simply that the discs can be played back instantly. There is no real delay—not even the short delay caused by the metal tape machine when the steel spools are being wound back. As soon as the cutter is lifted off the last groove the waste material—looking very like spun silk thread—can be cleared away and the cellulose fixed with a solution of acetic acid.

Fixing the Record.

I saw an engineer do this. Very simple. He took a pad—rather like a lady's powder puff—and dipped it into the acid solution, after which he carefully wiped it over the whole of the record's surface, finishing off the job with a soft duster. Altogether a process of so few seconds' time that it can be considered negligible.

Once the disc has been treated in this simple way, it can be put back on the turn-

table and played with a pick-up in the usual fashion through an amplifier and loud-speaker. Up to about ten playings the surface is not audibly affected by the travel of the pick-up, but after that number of reproductions the disc does begin to show signs of wear—mainly in the increase of background noise.

Normally a disc does not have to be played nearly as often as it would be possible to play it. And if for any reason the recordings assume an historic interest—or an interest permanent enough to suggest a future value—a re-recording on the standard wax system can always be undertaken. Or the Watts disc itself can be sent away to be processed and any number of prints taken from it.

Ensuring Correct Cutting.

I saw two Watts recorder units on a solid-looking base, with extensive monitoring equipment beneath to ensure correct cutting. A certain amount of finesse is needed here. If the input to the cutter is reduced to an extent that makes absolutely certain there will be no overdoing of the cutting process during heavy passages, there is the danger of a low modulation producing a high background.

On the other hand, if too much is put through the cutter in an effort to achieve the most modulation and the least background, there is a risk of breaking down the walls of the cellulose grooves. It is a job for an expert, although with this Watts system I am told that the robust nature of

the material greatly simplifies the adjustment.

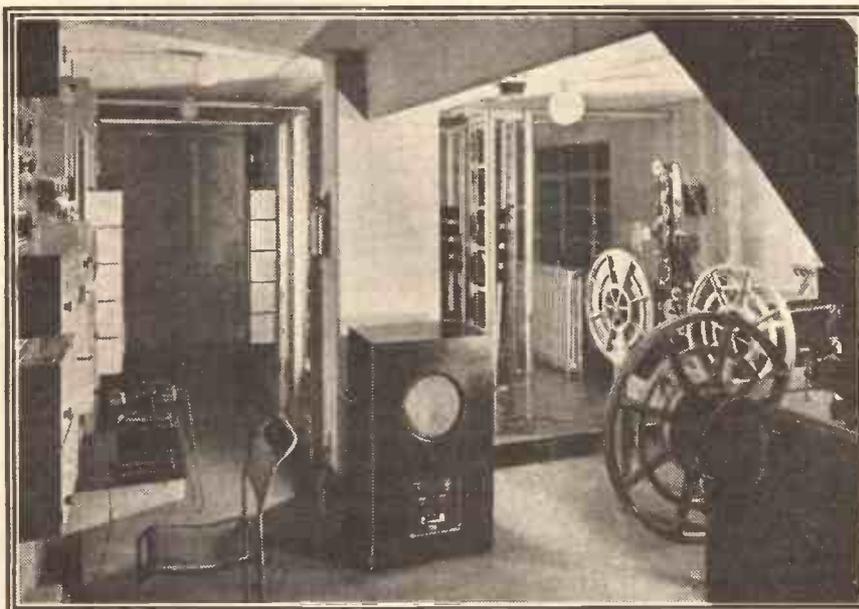
Cueing System.

Cue lights and a pair of headphones or a loudspeaker keep the recording engineer in close touch with the studios from which the records are possibly being taken. Indeed, as an engineer pointed out, the whole outfit would be quite useless unless a complete system of cueing were installed.

With the disc system, involving perhaps several change-overs from one recorder to another during a complete programme, a certain degree of ingenuity is needed to ensure a clean change. There is a key-switch working the change-over

(Continued on page 582.)

SOME OF THE MAIDA VALE EQUIPMENT



A general view of the steel-tape recording room at Maida Vale. The photograph shows, from left to right, the tone source and amplifiers, the special checking loudspeaker, and two steel-tape recording machines.

RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return M.S.s. 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 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.

QUESTIONS AND ANSWERS

CAUSE OF EXCESSIVE H.T. CURRENT IN MAINS SET.

S. C. (Waterloo, Liverpool).—"Checking over, to find the reason for muzzy quality and distortion which had developed on my set (Mains Four) I found that the total anode current from the H.T. supply section to the anodes and screens was about twice what it should have been.

"After going over everything several times, I came to the conclusion that it might be the automatic bias at fault, so I put a grid battery into the cabinet and extended leads to this from the various valves. I find the fault is apparently cured by the following alteration to the secondary of the transformer in front of the power valve:

"Normally the end of this secondary, that is farthest from the G terminal of the valve holder, is joined to a 1-mfd. condenser and 1,000-ohms resistance, the other sides of these going to the C terminal of the valve holder. This end of the secondary is also connected to earth via baseboard (metal).

"If I take out both resistance and condenser, and use a battery for bias, I connect its + to the baseboard, its - tapping to the secondary, and the cathode terminal of the valve holder to metal baseboard as well. This cures the distortion and reduces anode current to normal.

"This, however, does not seem right, because the G.B. now goes between secondary and baseboard, whereas before these points were joined together; and connecting the C terminal to the baseboard seems wrong, as before it was connected to bias resistance and condenser.

"If, however, I take out the bias resistance, and join the battery flexes in its place I cannot get rid of the fault, though I have tried various voltages, and the battery both ways round.

"Although it is now going O.K. I do not want the battery to be permanent, so can you tell from the above what is wrong, and how it can be put right without using a bias battery?"

It seems quite clear from your description that the 1-mfd. condenser across the automatic grid bias resistance is shorting.

Normally, if a bias resistance is taken out of a mains set, and a grid bias battery is connected in its place, the set will function perfectly if (a) the voltage applied is that normally produced across the bias resistance; and (b) the battery's + connection is taken to the cathode terminal of the valveholder, and the - connection to earth, secondary, etc.; in other words, if the battery replaces the resistance, and other connections are undisturbed. You have tried this unsuccessfully.

You have found, however, that if you re-wire the secondary and associated leads to give a normal battery-produced bias you get rid of the trouble, thus indicating it is a grid bias fault.

The explanation would therefore appear to be that the bias condenser has broken down, and voltages from either resistance or battery cannot be developed properly across it, because of a complete or partial short.

If you revert to the original connections, but with a new 1-mfd. condenser across the bias resistance, you should find that the trouble can be removed without using a bias battery.

THE DISAPPEARING INSTABILITY.

M. G. (Ambleside).—"I had a curious experience with my set which perhaps you can explain. It started when I began to get distortion on Midland Regional's wavelength, and thereabouts, all the stations in that part of the waveband being afflicted with instability.

"As it was only in the one part of the waveband that the trouble occurred, I let it go on for some weeks before doing anything about it. And then I thought I would have a good overhaul.

"Naturally I was looking for something in the way of a dud valve or badly spaced wiring, but the first thing I found wrong was purely mechanical—the connection from the frame of the ganged condenser was dud. After I had fixed it, I tried the set out again, before going further, and to my surprise the instability had completely disappeared!

"As it had been continuously present before that, and as it has not come back since, I suppose that I must have put the instability right at the same time as the dud connection.

Apparently you do not realise that a faulty connection in an H.F. circuit is a common cause of instability.

The instability in your case was a little unusual, manifesting itself at only one part of the dial; but ordinary H.F. instability—whistling and the like—can very often be traced to a faulty contact.

EXCESSIVE STRAY CAPACITY.

"I have a carefully ganged S.G.-Det. set, using a .0005-mfd. condenser to tune the aerial and choke-fed detector-grid circuits. It works like a champion, but the tuning goes only just over North Regional, and I think I must have too much stray capacity about, as trimmers have to be set well up.

"How is the stray capacity excess likely to be minimised?"

Use a really small series condenser in the aerial lead—certainly not more than .0001-mfd., and less if possible.

Try the effect of taking the coil screens off, and re-trimming. If the removal of the screens does not affect stability, this alteration alone may give you a much higher maximum range of tuning.

Then examine all the wiring connected to the fixed plates of the tuning condensers. Don't let it run within an inch of the earthed metal baseboard, or screening, because this is one of the commonest causes of stray capacity.

Also, pay special attention to the wire from the plate of the S.G. valve to choke and coupling condenser—if that has appreciable capacity to earth you are likely to restrict the range of tuning.

WHAT THE HYDROMETER TEST REVEALED.

A. E. (Portsmouth).—"As the accumulator did not seem to hold its charge as long as

it should, I got a hydrometer test on it, stopping the charging and allowing the acid to settle down each time before the readings were taken.

"The specific gravity is certainly right up to the full figure for this type of battery, but I notice one thing which I do not quite agree with. And that is that if the charging is carried on long enough it is possible to go above the correct specific gravity.

"This seems wrong, because the top gravity reading is supposed to denote "when a cell is fully charged." How is it that I can apparently go beyond the "fully charged" state for the acid if charging is continued? Would it do any harm to see how much higher the reading could be made to go?"

No, it would do the reverse of harm. Charging should be continued not for a predetermined period, nor until the hydrometer shows a predetermined reading, but until the plates are all gassing freely and until further charging is unable to raise the specific gravity.

In other words, charge until the hydrometer readings show that no further increase in the specific gravity is possible.

If, when this condition is reached, the readings on the hydrometer are higher than they should be for that class of accumulator, the trouble is revealed as incorrect strength of acid.

Apparently somebody has been adding new electrolyte instead of more water when the accumulator needed topping up. And consequently the electrolyte is now too strong. Pour off a little of it and add clean water until the specific gravity is reduced to normal.

MOUNTING THE S.T.600'S GANGED CONDENSER.

R. E. (Belper, Derbyshire).—"I do not want to depart from the instructions, but I find that I cannot get the condenser in line with the other control knobs if I use the wooden platform, as described. Can it be omitted without ill effect?"

The object of mounting the ganged condenser on the wooden platform was merely to bring it into line; so, if your condenser does not need the platform, it is quite in order to proceed without it.

Alternatively, a platform of slightly different dimensions may be necessary. But this is merely a matter of detail, and all you have to do is to compare measurements, and arrange accordingly for the knobs to come into line.

WHERE CONSTRUCTORS GO WRONG

(Continued from page 568).

seem to have the idea that a designer sometimes prefers a more expensive product. This is not so; certainly not in my own case. One's aim is to keep the price of the set as low as possible, consistent with good performance. Nobody would build the set of a designer who had more regard for the manufacturers than the constructor. And an expensive set is not in the interests of anyone if it is not built.

Take any of my big star sets and you will find that it is impossible to economise without taking some risk; I doubt if you could save more than a few pence. And do not ever defend the use of an unofficial component by saying that the firm is an excellent one. Many otherwise excellent firms have fallen short on one particular component.

Finally, let me say that whatever your excuse may be for using an alternative component not permitted by the designer, you are taking extremely grave risks and must accept all the consequences. If the set you are proposing to build is designed by myself, I implore you not to build it unless you are prepared to leave the designing entirely to me; in other words, unless you are prepared to follow the instructions.

You have been warned!

THE "ALL-WAYS" THREE

(Continued from page 574.)

favourite broadcast stars on the ordinary broadcast wavelengths.

The "All-Ways" Three completely solves the problem. It is not an expensive set: in fact, the cost of the complete outfit is comparable with that of any straight-forward three-valve broadcast receiver. It is economical as to its running costs. The anode-current consumption is low—lower than many conventional three-valvers.

As regards the efficiency of the broadcast side, this attains a very high standard; the general performance—taking into consideration selectivity, volume and quality of reproduction—is excellent.

Ganged tuning control is employed, so that there is only one tuning knob, and the volume is readily controllable by means of a pre-H.F. potentiometer in the aerial circuit.

No Chance of Instability.

Ample decoupling is employed, so that there is no likelihood of instability troubles.

As far as the short-wave section is concerned, this is particularly simple, and, in accordance with the best modern practice, interchangeable high-efficiency plug-in coils, enabling the different short and ultra short-wave bands to be covered without difficulty are employed.

This is a very brief outline of a truly remarkable receiver, and one which will give the home constructor many hours of enjoyable listening at a moderate cost. Those who decide to build the set will not be faced with any difficulties. It is straight-forward in its construction and equally straightforward in its operation.

And, remember, it is a set that will bring in programmes which will provide a new thrill and a new interest. But more about that next week.

THE ROOT OF ALL B.B.C. EVIL

(Continued from page 569.)

an orchestra and with only £120 to spend. What sort of "bill" can be expected for that? If the B.B.C. spent, as they should do, at least £300 on each variety bill and gave three shows weekly, the cost of John Sharman's department would jump from £7,000 to £45,000 per year. And, frankly, the B.B.C. cannot afford it because the Government insists on its several pounds of flesh.

Listeners nearly lost Tauber on account of his fee. He was announced to broadcast during the Jubilee celebrations, but at the last moment the broadcast was cancelled. The reason was that the great tenor would have imperilled his professional status by accepting the lowly fee the B.B.C. wanted to pay. They eventually paid him £300 for a session in which he had to appear as singer, conductor and composer.

Artists Out of Pocket.

Grace Moore was invited by the B.B.C. to give a half-hour broadcast from the studio in addition to her Covent Garden relay. They offered her 100 guineas for the session. She refused it and, in terms of her own, explained that she thought she had already made an adequate recognition of

her appreciation of the British public's support of her films. Philistines among the listeners declared that if Toscanini was worth £500 a broadcast to the lovers of classical symphonic music, Grace Moore was worth at least the same to her admirers who were in the overwhelming majority.

Howard Jacobs told me that he is out of pocket every time he broadcasts from the studio. Others have told me the same.

The fee paid for dance-band broadcasts is £40, and it is obvious to anyone with the slightest knowledge of band costing—instrumentalists with salaries ranging from £8 to £20; special orchestrations at £8 a number for 20 numbers, etc.—that the poor-band leader is "in the red" at the end of a £40 broadcast.

I've heard many complaints about the "ballad concerts" on the morning air. Unknown sopranos and apprentice tenors

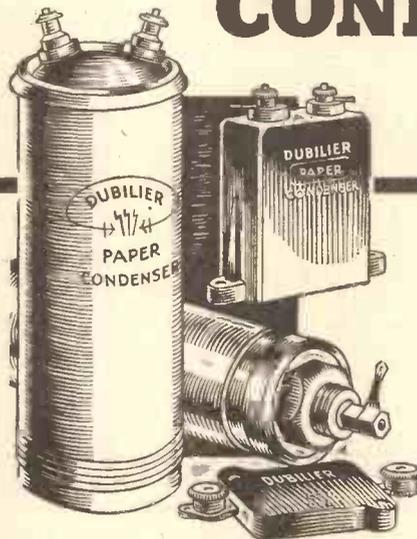
warble pathetically. What else can be expected? They get two guineas for their broadcast and they sound almost worth it. Members of the Wireless Singers get £8 10s. a week and, in addition to constant rehearsals, they broadcast on an average ten times a week: 17s. a broadcast!

Write To Your M.P.

Those listeners who moan that the B.B.C. programmes compare unfavourably with the American broadcasts should remember that the B.B.C. were only able to afford to pay Eddie Cantor £100 for a broadcast, whereas that particular broadcaster gets £2,000 every time he faces an American microphone!

More money will mean better programmes. This is almost one of those cases where the concluding remark could be: "Write to your M.P. about it."

LAST WORD in CONDENSERS



YOUR FIRST CHOICE

Dubilier Condensers are repeatedly specified by Set designers and constantly used by manufacturers and constructors alike. They have an unrivalled reputation for dependability, are soundly constructed, and suitable types can be obtained for your every requirement. The use of a Dubilier Condenser is an assurance of the finest performance, lasting value and trouble-free reception. Buy safely — buy Dubilier!



DUBILIER

CONDENSER CO. (1925) LTD.

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TO BE BROADCAST LATER

(Continued from page 579.)

from one turntable to another, and in its mid-way position the circuits are so arranged that both recorders are working. Potentiometers are fitted to each recorder, making a fade from one to another quite simple. By these means there is little chance of losing a vital bar of music or word in a sentence.

It is not a job for a temperamental engineer to tackle. But then engineers are not taught to be temperamental! It is left entirely to the engineer to decide exactly when to change over. Only a cool head and a great deal of experience can help in this ticklish part of the work.

Fortunately, the whole outfit is extremely well built, the turntables being specially designed by the Research Department to cope with the considerable toughness of the cellulose compound through which the cutters have to eat their way. Also the mechanism for dropping the cutters on to the disc is designed with an eye to easy manipulation.

Smoking is Prohibited.

It is fascinating to watch the cutters at work. They simply eat and churn their way through the surface of the aluminium discs, leaving behind a trail of wispy material sufficiently inflammable, I am told, to make it necessary to forbid anyone smoking while the stuff is about.

We adjourned to a listening-room to hear what a few of these discs sounded like when played through a standard B.B.C. amplifier and moving-coil loudspeaker. I heard a record from the "Messiah" that sent up my respect for the B.B.C. recording technique.

I thought the surface mush was distinctly less than I have ever heard on a commercial recording. The subject was about the worst possible, a high soprano. Yet the musical accompaniment was wonderfully good, the bass being full and natural, the "gutty" string tone so realistic I could hardly believe I was listening to a record.

I very much doubt if, on any ordinary set, one would be able to tell a record was being played—unless previously warned. It is definitely an achievement, this Watts recorder. And there is the added gratification it is all British.

We left the listening-room for the home of the Marconi-Stille apparatus—the latest type of steel-tape recorder, that is. I was more than surprised to learn that in these days the steel-tape can handle musical frequencies almost as effectively as the disc. This shows what advances have been made. In the early days, I remember, the frequency range was so limited that only speech was satisfactory—and not perfect, at that.

A Hundred Yards a Minute.

In these latest machines there is no difficulty in "bottling" a musical programme—and the advantage is that one complete spool of the magnetised tape will run for 31 minutes without a break. Although there is no hard tension on the modern tape it runs along at the good "lick" of 90 metres a minute. A full

spool of tape would be about 1½ miles long, I am told.

At the side of the machine is what looks for all the world like a car's mileage meter. As the spool passes from one bobbin to another this meter clicks up its numbers, so that the engineers have an instant check on exactly where they are in the lengthy run of tape. If desired, for instance, only a small portion of the tape need be used—extracted for broadcasting by noting the numbers at the beginning and end of the wanted length.

As was explained to me, the metal tape type of recorder is mostly used for topical items not likely to be wanted indefinitely. Normally they "wash" them—rub out the message so that the tape is ready to take another message—every ten days or so. If a recording assumes an historical importance it can always be transferred to a disc.

And so finally to the monitoring-rooms, for each steel-tape recording channel has its own check, at which points engineers can hear the programmes, either as they emerge from the studio or as they appear when having passed through the associated recording machines.

NEXT WEEK.

A SPECIAL EXHIBITION NUMBER

Don't Miss this HIGHLY ILLUSTRATED GUIDE TO THE RADIO SHOW

Usual Price. Next Wednesday.

THE DAY RADIOLYMPIA OPENS.

I have said nothing of the most imposing little control-room at Maida Vale, nor of the central power supply for the recording-rooms. All these signs give ample proof that the B.B.C. has entered the recording business—always for its own peculiar needs, of course—in a big way.

TOO MANY REPEATS

(Continued from page 566.)

And, as it would seem that almost every source of entertainment has already been tapped, it will require a very fertile brain to devise a new one.

One looked forward to these five new people who recently appeared before the mike for the first time. They were in the capable hands of Lawrence Baskcomb, who introduced them. One hoped that one of them, at least, might be the pioneer of a new style of performance, or some other novelty. But not a bit of it. Theirs was the same old stuff that the old gang have been doing for years. I shall be surprised if any of them made much of an impression with the authorities or listeners.

Tom Drew has a good way with him, but why sing that futile song about "wooting"? There's nothing in it.

Bobby Farrell sang "Danny Boy" quite well. But so have many other singers before him. Stanley Kirkby's monologues were interesting without being distinctive.

George Lane—the second comedian—was much too quick, and at times inaudible. He made it quite clear he was making his premiere before the mike. There seemed to be too many asides in his patter.

The best of the five newcomers was Joan Rawlings, the 15-year-old crooner. Fifteen years old she may be, but she is no crooner, as I understand crooners. She isn't a straight singer either, but I think she might be. Her enunciation was remarkable, and a model for many. "It is true she sang 'When I grow too old to dream,' but she sang it in her own way, which, in my opinion, is an improvement on the commoner rendering. This girl should be encouraged to sing a better type of song."

Hollywood was given two pieces of publicity, first in "Hollywood Headlights," when there appeared in impersonation Elisabeth Bergner, Mae West, Greta Garbo, and Jean Harlow. Beryl Orde did the impersonating, so well, in fact, that this famous foursome seemed quite as much a reality in the studio as the gathering of contemporary film stars in a studio later the same evening, at that party arranged by Radie Harris, the Hollywood commentator.

I didn't quite see the object of this party, unless it was to cater for listeners who are film fans as well. Somehow I cannot enthuse when film stars for-gather at the mike. There is always too much fatuous talk and no humour. Everyone giggles at the pretty compliments they pay one another.

A Clever Act.

But Beryl Orde is different. She is clever. Co-operating with Eddie Pola they worked out between them quite a smart little scheme for presenting the impersonations. Eddie fairly whisked her through it all with a whirlwind of chit-chat, all of which was superficial and humourless, yet brisk and businesslike.

Perhaps it isn't quite fair to Eddie to say this about him. He did say one bright thing. You may remember his answer to Jean Harlow's question (I think it was Jean Harlow): "How do you like my gown?" His reply was "Between me and the sunlight."

The "Ceremony of the Keys" is one of the more popular perennial features of broadcasting. I can quite understand this popularity. It is perhaps because this bit of ceremonial dates back to the time of the Conquest. If one knows the Tower, one can better appreciate the nature of the ceremony. In any case the broadcast is quite vivid and easily visualised. It is unusual to hear the National Anthem played on fives, especially the arrangement of it for this occasion. The Last Post came through splendidly, as did the tinkling clock striking ten.

I'm afraid that the sentimental interest one might be expected to have in the ceremony didn't prevent me from recalling the song of the Bloody Tower as told by a now-famous radio comedian.

C. B.

"P.W.'s" UNIQUE RADIOLYMPIA EXHIBIT

(Continued from page 573.)

mated as high as 150,000 metres—about five times higher than any produced by man-made apparatus. This opens up most fascinating and romantic possibilities, as the mind pictures the 'Elettra,' anchored in the Mediterranean, a little speck holding the highest inventive development known to man, receiving mysterious signals from the unknown." (These signals, which could not be accounted for, were at the time believed to be emanating from Mars.)

In another paragraph in the same article it was stated that "Besides his other experiments Mr. Marconi will carry out tests for the Meteorological Office in London during the voyage. These will have special reference to the collection of reports of the weather in the areas of the Azores and the Bermudas." And to-day it is commonplace to know by radio the weather conditions in practically all parts of the world.

The inestimable value of Marchese Marconi's numerous experiments on the "Elettra" to shipping, to aviation and to mankind generally, give particular point to the exhibition on our stand at Olympia of the magnificent true-to-scale model, and it is a show-piece that should not be missed by anybody.

"WIRED WIRELESS"

Jottings of interest to all.
By Dr. J. H. T. ROBERTS, F.Inst.P.

EVER since the earliest days of broadcasting, people have toyed with the idea of sending radio transmissions over the electric light mains, or, in fact over other existing line conductors. This system, I believe, originated in America, and was given the name of "wired wireless."

Even as far back as eight or ten years ago, a famous American radio engineer gave demonstrations of wired wireless by which high-frequency radio waves were "directed" over long-distance electric power cables. In a sense it amounts to "directed radio"; instead of the waves spreading out in all directions, as in ordinary broadcast transmissions, they are "directed" along different conductors, and so reach only definite pre-determined destinations.

Saving Waste Energy.

You can see at once that there is a good deal to be said for all this; it saves an enormous percentage of waste energy that goes out in all unwanted directions, since the energy can be confined into the desired channels. Furthermore, it makes use of existing conductors, and in this respect differs from the radio relay schemes which are now finding favour in this country.

Wired wireless, in its broadest sense, is not to be confused with radio relay, because in the former the high-frequency impulses are directed along the conductor, whilst in the latter the low-frequency impulses are transmitted. If the high-frequency impulses are received, naturally a radio receiver has to be used, exactly as though the impulses came in on the aerial. If, however, the low-frequency impulses are sent over the line, it is only necessary to have a loudspeaker at the receiving end.

"P.P.'s" Work.

A great deal of work has been done on wired wireless in different forms during the past few years, but it never seems to have made any very great headway. Quite lately, however, P. P. Eckersley, former Chief Engineer of the B.B.C., who is also so particularly well known to readers of "P.W.," has carried out some very important investigations, in conjunction with British Insulated Cables, Limited, on the question of sending the radio broadcast over the electric light mains so that they can be received in any home which is connected to the mains. An important official demonstration of this system was given some months ago, which I understand was very successful.

Naturally the technical details are not at present being made public, but it is evident that means must have been found to cut out the various kinds of interference which are so readily transmitted over the electric light mains—as every user of a mains set knows—and also to cut out effectively the 50-cycle hum.

A Substitute for Broadcasting?

I do not just know how it will be possible on this system to prevent unauthorised

people from receiving the broadcast over the mains. Perhaps it is not intended to do so, and it may be that the system is intended as a substitute for ordinary broadcasting, reliance being placed upon the regulations which require that a listener should pay for his receiving licence. In the case of the ordinary radio relay systems, every subscriber has a separate line actually wired up to his house so that none but subscribers can receive the transmissions on that particular system.

M.C. Speakers.

You might think that in these days pretty well everybody uses a moving-coil loud speaker, but you would be surprised to know the number of letters I get from readers asking various questions about their balanced armature, inductor, or other type of speakers. A question very commonly received is from those who contemplate changing over to a moving-coil speaker, from some other type, and who want to know whether the moving coil will need more upkeep in the shape of current, and so on. There seems to be quite a prevalent idea that a moving-coil speaker "eats" a lot more current than, say, the balanced-armature type.

I think this is quite the wrong impression, although a great deal depends on what particular kind of moving-coil speaker you use, how much volume you want from it, and what sort of an output valve is used in the set, and all sorts of other conditions. If you have a good sensitive loudspeaker and you are not trying to push it to extreme limits, there seems no reason why its energy consumption should be anything out of the way.

The Output Stage.

I think really the question refers more to the output valve than to the speaker itself, and it is true that if you want to get the best performance from a moving-coil speaker you want to have a fairly decent sort of output valve. Some people use a very small power valve and then wonder why the loudspeaker doesn't come up to expectations. It is much better to have a good output stage, whether it be a single valve or a pair, and this may quite well involve a little extra expenditure on H.T. current.

Short-Wave Aerials.

If you go in for short-wave reception at all, you will no doubt be fully alive to the importance of the short-wave aerial. There are, however, some people who, when they first turn from broadcast wavelengths to explore the short-wave region, fail to realise that, whereas the precise characteristics of the aerial on broadcast reception are not very important, they become extremely important on short waves. I have known people use their ordinary broadcast aerial, anything in length from say 30 to 60 feet, and expect this to function satisfactorily for short-wave reception.

(Continued on next page.)



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"WIRED WIRELESS"

(Continued from previous page.)

The Aerial Tapping.

The fact is that you must make very careful trials as to the length, capacity and other characteristics of your short-wave aerial, and also it is very important to have the aerial tapping in exactly the right position. Sometimes a very small shift in the position of the aerial tapping will make a difference of as much as fifty per cent in the efficiency of reception. You will see from this that the coupling between the aerial and the tuned circuit is very important if you want efficient short-wave reception.

Some people do not, I am afraid, give sufficient attention to this very important point, but rely upon making up any deficiency by means of extra amplification. That is all right in its way, but is uneconomical because, if you pay proper attention to the aerial, it may well be that you can save yourself an extra valve.

A Cause of Fading.

Fading and crackling in a set may be due to a variety of causes, most of which are quite well known. But one cause which was mentioned to me recently by a reader of these Notes, and incidentally which I have come across once or twice before, relates to the low-frequency transformer.

Possibly some of you may have noticed the effect, which is characterised by the fact that when the set is first switched on it works all right, but after a time, long enough for the transformer to get very slightly warm, a sort of fading, generally accompanied by crackling, sets in. If the trouble is traced to the transformer it will generally be found that the transformer is an inferior type or, if of a good type, pretty old.

Radio in the Air.

Now that air services are increasing so enormously in importance it seems that yet another application of radio is going to become more important, too. Of course, aeroplanes have for a great many years past been equipped with radio transmitting and receiving equipment; in fact, it seems difficult to imagine how aircraft could very well proceed about their ordinary business without the aid of radio.

WHERE DO THE HIGH NOTES GO?

(Continued from page 578.)

appear, because, although we have been using the word "lost," it must be understood that this is applied only in the practical sense. The high notes are not irretrievably destroyed by the action of sharp-tuning circuits and reaction and so on, but are very greatly reduced in strength.

There is no complete cut-off. As a matter of fact, it would take a very elaborate filter arrangement to destroy them utterly. It is possible to bring back to proportionate strength a very large proportion of all the high notes which have been transmitted by the broadcasting station.

This can be done by means of low-frequency tone adjustment. There are methods of tone control which will em-

phasise the high notes at will, or there are those compensating L.F. transformers which provide a fixed degree of high note lift.

Using a pentode valve in the output stage of the set is another and very common method of providing tonal adjustment of this kind, although usually the pentode is employed because of its considerable amplifying powers, and its tone compensation is merely a useful incidental.

In the more ambitious receiving sets you often find a "tweeter." This is a small loudspeaker, supplementing one of normal dimensions, which is designed to reproduce high notes almost exclusively, and so restores the correct tonal balance.

POINTS FROM THE POSTBAG

(Continued from page 576.)

radio wave, which can't penetrate those layers, will go through brick walls almost *ad lib!* Of course, once you start trying to find analogies between light waves and radio waves you ascend several gum-trees and probably stick there.

The thing I like about his theory of waves being attracted to the earth in inverse proportion to their frequency is the fact that it does fit in with the known effects so well—the proportion of "wasted" waves becomes higher and higher as the wavelength becomes shorter. But it seems to me that the existence of some sort of reflecting layer is proved by the way in which short-wave conditions vary with the degree of daylight and the number of sunspots.

R. D. E. (Standon) sends in several additions to his capacious "bag," including CX 1 A M (Uruguay), T I-2 O F R (Costa Rica), both on 40 metres, and T F J (Iceland), on 24.52 metres. Another station he mentions is E A Q (Madrid) on 15 metres. I haven't caught this one yet—has anyone else found him?

W. L. S.

EVERYBODY'S UNCLE

A Few Lines About Uncle Bob.

BOBS Y'R UNCLE is one of those expressions that convey a sense of satisfaction and well-being. No literal translation has ever attached to "Bob's Y'r Uncle," yet it seems to suggest that things are RIGHT, as they should be—and there's no need to worry. Of course, you've heard the phrase: we wonder if you've made the acquaintance of the new game, which coins it for a title? In this case, BOB'S Y'R UNCLE certainly means good-bye to the necessity of taking one's pleasures sadly. For Uncle Bob turns out to be the jolliest of relatives. It's something quite new, quite simple to play, yet most entertaining. It puts a broad smile on everybody's face, and lightens the load of care, too apt to sit on our shoulders these days.

BOB'S Y'R UNCLE is a pack of bright picture cards, a pack packed with a thousand laughter-making potentialities. The rules of the game are so easy to follow that everyone can take part, from the tiniest tottler to the dearest, densest old dodderer. Of course, success is the reward of skilful play in this as in any other soundly contrived card game, and brainy grown-ups as well as the kiddies may confidently look to BOB'S Y'R UNCLE for a mental stimulus, as well as lively entertainment and happy fun.

May we invite you as well to meet Uncle Bob—and the other Uncles, the Three Little Nigger Boys, and the Nursery Rhyme people everybody remembers? They're waiting to liven up your parties and bring you gay entertainment—just for the modest expenditure of one and sixpence at your stationer, any toyshop, or newsagent.

TELEVISION JOTTINGS

By L. H. THOMAS

A READER in South Africa has forwarded to me an interesting article in which television conditions in the U.S.A. and in Great Britain are exhaustively compared. He has also forwarded his own comments, which seem very sensible and make interesting reading.

The gist of the whole article is that the Americans are "up against it" with a vengeance. The "R.C.A." states that "the area capable of being effectively and commercially covered by ultra-short-wave stations of about 10 kilowatts capacity will not exceed a radius of approximately 25 miles over moderately undulating country:

"With England occupying a territory not much larger than New York State alone," the statement goes on, "the vastly greater problems of television service for the United States are self-apparent. The present wire systems are not available for inter-connecting television stations as they are for broadcast stations. For that purpose, either a new wire system must be created or radio relays must be further developed and established."

In spite of the recent report of a new co-axial cable that will solve the difficulty I can't help feeling that the television people in this country are going to have a comparatively easy time! But the ultra-short waves are sticky things to handle if they are to be made to cover longer distances, and their present restricted range, although it may be actually an advantage if several transmitters are to work on similar wavelengths, is undoubtedly a large-size fly in the ointment.

Reflected Short Waves.

Recent experiments by British amateurs include the interesting development of reflecting ultra-short waves from clouds. This, naturally, has no particular commercial value, since we can never rely on the presence of clouds in the right place!

A recently confirmed report that the American 5-metre record now stands at 1,500 miles (New York to Chicago or thereabouts) makes me wonder whether they have been up to the same scheme over there. It seems inconceivable that ordinary beam aerial systems can be made to operate over such a distance as this.

Our South African friend, in his private comments, suggests that television has been very unfortunate in coming up against such a complete change of technique all of a sudden. From the crude pictures which can be transmitted, on medium waves, over some hundreds of miles with a band-width of 9 kc. only, we have jumped to something that bears absolutely no resemblance to them.

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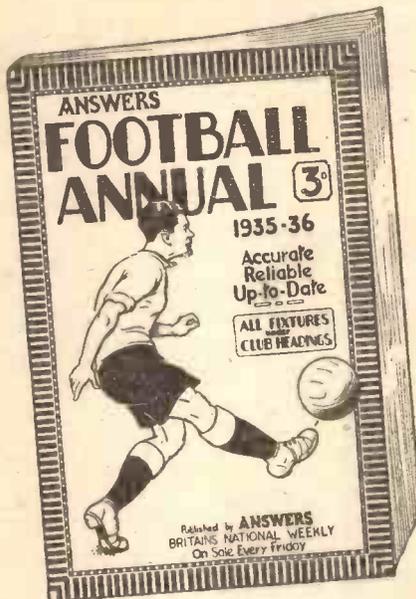
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New FULL-OF-THRILLS CARD GAME

Bobs y'r Uncle

Here's a game *all* the family can play; a jolly good game, too! It's quite new, quite simple and 100% entertaining. "Bobs Y'r Uncle" is going to be the cry at many a jolly party. How those dull minutes will fly! The game consists of a highly coloured pack of 54 cards in a novelty container with full rules of the play. Smiles grow into laughs; laughs form into roars of hilarity when Bobs Y'r Uncle bobs up. Try out the new card game to-day.

It's going to be the big hit of the season and you can't begin too soon if you want to be in the swim.



Made by
JOHN WADDINGTON Ltd.
Makers of the World's
Finest Playing Cards

*On Sale
Everywhere*



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