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Popular & Wireless & TELEVISION TIMES

POWER FOR
THE
A.C. BAND-PASS

EVERY
WEDNESDAY
PRICE

3^D

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TELEVISION in AMERICA

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



Also this week:

ALL THE RADIO WORLD'S A STAGE

★ ★ ★
MY SHORT-WAVE ADVENTURES

★ ★ ★
Etc., etc.

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RADIOLYMPIA
"FLEA-POWER"
CO-OPERATION

RADIO NOTES & NEWS

THEY SAID IT
HIGH AMBITIONS
P.O. PUZZLE

The Radio Show

BERLIN'S radio exhibition, held from July 30th to August 7th, was a sort of curtain-raiser to Olympia this year. And the general opinion is that all the big thrills will come from the British Show.

Additional to the sixteen cubicles in which first-class television will be demonstrated three times daily, there will be a large number of rooms in which the capabilities of the various ordinary radio sets exhibited will be demonstrated. (How we have managed to do without this feature in the past is something I shall never understand.)

A galaxy of stars have been engaged for this year's Olympia, and I am particularly looking forward to friends Leonard Henry, Sandy Powell and his full company, Eric Coates and Orchestra, Flotsam and Jetsam, the Two Leslies, Louis Levy and his Symphony Orchestra, Phyllis Robins and Peggy Cochrane. The Show runs from August 25th to September 4th. Admission, 1s. 6d. daily.

"All At Sea"

I HEAR that the radio burlesque, "All At Sea," by the Melliush Brothers, is being revived. It will be heard on the National wavelength on August 16th, and in the Midland programme on August 17th. The Captain of the Betty Martin is in love with Susan, and his suit is complicated by Susan's mother, who also comes on board. There are many amusing episodes, a neatly contrived mystery and some first-rate humorous songs in this burlesque. It had its first broadcast on Christmas Day, 1934, when Edgar Lane played the Skipper, Captain Brassface. As at present Edgar Lane is on holiday, the part will be played by Lawrence Baskcomb.

Radio v. Rent Collector

COLLECTING the rents from independent-minded citizenry who do you the honour of living in your houses is seldom an easy task; but landlords are saying that radio has made it much harder than it used to be.

The gentle knock or ring of the rent collector either goes unheeded because

of massed band music, or else it interrupts a favourite orchestral item, and so produces housewifely acidity—the worst enemy of rent-book regularity.

In some places a fatal time to call is when there is a morning service going on. Certain devout ladies arrange the housework so that they can join in the singing, and they become very hurt and reproachful

MY WORD

By THE EDITOR

ADVISERS AND WHAT NOT

WE have frequently had occasion to comment on the dictatorial attitude adopted by the B.B.C. and the manner in which they often appear to ignore the wishes of those who, by buying wireless licences, pay for the broadcasting services of this country.

But it would be wrong to say that the Big House makes no attempt to discover what listeners actually like and dislike.

At intervals the opinions of selected circles of critics are solicited. For example, quite recently applicants for "admission" to one for film talks and another for plays were invited.

However, it is our opinion that this is only toying with the idea of democratic radio. There is no guarantee that the ideas and tastes of a small band of listeners chosen by the B.B.C. from a handful of correspondents fairly represent the ideas and tastes of the majority of the eight million holders of licences.

It may be said that it would be quite impracticable to suggest contacting so vast an audience. We disagree. It is not a new idea that with every licence as it is issued there should be presented by the P.M.G. a small form on which listeners could register their opinions in general and their votes upon certain specific questions in particular. Handed back to post offices these forms could be sent direct to Broadcasting House for examination and analysis. Though we fear there might be a tendency for such judgments on the results to be passed as, "So this is what they THINK they like! Huh!"

if anything so mundane as the rent is mentioned. It needs a trained diplomat to transact business on a doorstep while favourite hymns are being announced, or to mention that little matter of the arrears between chant and Psalm.

"Fleas" By Night

HURLING himself with Oirish abandon into the hunt for "flea-power" radio stations, G. L. S., of Belfast, sends in a list that will extend your atlas to the

full unless it has some good large-scale maps of European countries.

Apparently it was the striking success of our Southampton reader, J. W. G.—reported in "P.W." July 17th issue—that fired G. L. S. to hunt the "fleas," and he has certainly secured a fine selection of those elusive transmitters.

Before giving you the details, however, I ought to point out that G. L. S. admits that "most of these stations, like nocturnal animals, were captured after dark, but a few were got in daylight."

G.L.S.'s Log

THE set used by G. L. S. in Belfast (Rosetta district) was a five-valve plus rectifier superhet, and here are the stations he has logged, in descending order on the dial:

Fredrikstad, 415.4 m.; Agen, 360.6 m.; Porsgrund, 352.9 m.; Limoges P.T.T., 335.2 m.; Radio-Cité, 280.9 m.; Newcastle, 267.4 m.; Cork, 242.9 m.; San Sebastian, 238.5 m.; Aberdeen, 233.5 m.; Magyarovar, 227.1 m.; Montpellier, 224 m.; Dublin, 222.6 m.; L'Ile de France, 219.6 m.; Kaiserlautern, 209.9 m.; Miskolc, 208.6 m.; Bournemouth, 203.5 m.; and Nimes, 201.1 m.

This is a pretty good bunch, you will agree, and it must have taken some doing to get these elusive chappies.

Three of the stations secured (Agen, Dublin and Kaiserlautern) were working with only half a kilowatt when G. L. S. roped them in.

I haven't heard just lately from J. W. G., the Sleuth of Southampton, but I have a hunch that it will be a high-jumping and smart "flea" which gets past him this coming week or two.

One Good Turn

A COMPREHENSIVE scheme for radio co-operation in life-saving or similar emergency has been worked out, and is now being put into operation. It involves team work in technique of the Royal Air Force, coastguards, Post Office radio stations, lifeboats, and Admiralty.

How it works out for mutual good may be instanced by the part played by the R.A.F. In future, if coastguards or life-

(Continued overleaf.)

NEXT WEEK: PRE-VIEWING THE RADIO SHOW

BOY ENTRANTS NEEDED FOR ROYAL AIR FORCE

boats are unable to find the position of a vessel known to be in distress, R.A.F. flying-boats will be available at once to join in the search; on the other hand, if an aeroplane is in distress or becomes seriously overdue, the Admiralty, coast-guard and lifeboat authorities will render all possible assistance.

Plenty of Latitude

DARKNESS, hurricane, and terrific seas assailed the little trawler. After one awful bump in the blackness the skipper managed to get to the mate, who had volunteered to use the radio direction-finder, in the hope of ascertaining the position.



"Where about do you reckon we are?" shouted the captain.

"Can't say yet," was the reply. "If that station I just

heard was Land's End we're a little south of the Scilly's. But if it was Ushant we must have shot right over Plymouth breakwater, and as near as I can tell we're just outside Dartmoor Prison."

They Said It—

"**W**HY on earth are we the only people in the world to say that a monopoly is necessary in wireless? Is there anybody living who seriously believes that competition in every walk of life, sport, or business is a bad thing? I think that this monopoly affair is an assumption we have made, and that without fanatically attempting to abolish the B.B.C. there could easily be allied organisations competing with each other for our favours." (Professor A. M. Low.)

"This Conference, while welcoming the great services to religion rendered by wire-

AN HOUR AT BLACKPOOL

Northern, August 18th

A big Blackpool programme on August 18th will bring nine outside broadcast points into use. The entertainment will be presented to Northern listeners under the title "Going Up," and among the places of entertainment which will be visited by microphone will be the Tower Ballroom, the Arcadian Follies at the South Pier, "Punch and Beauty" at Feldman's Theatre, the Tower Circus, the Pleasure Beach Palace Theatre, and the Central Pier Follies.

Blackpool's well-known organist, Horace Finch, will be heard from the Empress Ballroom on August 19th—the day after the big Blackpool programme in which Reginald Dixon is to play at the Tower Ballroom organ.

less, does not regard it under normal conditions as a substitute for attendance at Divine worship." (Resolution proposed by the Archdeacon of Norfolk, at the Norwich Diocesan Conference.)

"In the early days of broadcasting there was quite a tense feeling between newspapers and the broadcasting authorities, and it was not unnatural that journalists and Pressmen should feel alarmed at this new invention. . . . Experience had shown there

is room and need for both newspapers and broadcasting. (Major Astor, M.P., Chairman of the Empire Press Union.)

High Ambitions

YOUNG men of not more than 17½ years of age on September 1st, 1937, and not less than 15½ years, may be glad to know that 400 Boy Entrants will be required on that date for the Royal Air Force, to be trained as armourers, photographers, and wireless operators. Entrants are selected from candidates found to be educationally suitable and medically fit.

Full particulars are given in A.M. Pamphlet 54, obtainable free from the Inspector of Recruiting, R.A.F., Victory House, Kingsway, London, W.C.2. The Boy Entrants' initial period of engagement is for nine years after having attained the age of 18. He has opportunities for promotion to non-commissioned officer, and for selection as airman pilot or air observer. Since a limited number of commissions is granted annually to airman pilots and airmen who have attained the rank of warrant officer, this is an opportunity to be thankful and thoughtful about.

College Knowledge

AT a big college in Tennessee devoted to the study of physics one of the professors got a bit too enthusiastic about heterodynes and similar phenomena, and the students became bored.



He made them study carrier waves, fundamentals, overtones, and interacting whistles, and then one day he announced that next day he would demonstrate that their ideas about tone and pitch were all wrong.

"Pitch," he affirmed, "does not really exist at all."

Next day he failed to convince his class of this, because when he attempted to start lecturing on the subject he found that he could not get up from his chair. The cushion had been secretly provided with a filling of nice warm pitch!

Puzzle for Post Office

GERMAN P.O. officials are sitting up late at night with cold towels wrapped round their heads, thinking hard over a recent decision of the courts.

The trouble began when enterprising residents of summer houses and bungalows near the Hamburg radio station found that, by attaching electric lights to a circuit tuned to Hamburg's wavelength, they could light their premises on the "buckshee" system. All the time that the station is working on 100 kilowatts its field-strength is sufficient to light the bulbs.

Postal officials, nettled by this ingenuity, summoned the hut-dwellers for "stealing the energy of a broadcasting station."

The judge, who was apparently a bit of a sport, ruled that the P.O. wins its case

only if it can show that the use of the bulbs reduce the reception strength of the transmitter. And the P.O. officials, hastily donning their thinking caps and ice-packs, have retired to think out why illumination should impair radiation.

"OCEAN TIMES"

National, August 27th

Listeners who enjoyed the popular revue feature, entitled "London Pie," may like to note that Harry Howard and Sydney Vivian have written a special summer show called "Ocean Times," a Mediterranean carouse, which will be broadcast in the Empire and National programmes.

The action of "Ocean Times" takes place on a luxury liner during a pleasure cruise, and some amusing and typical characters are introduced. There is a Lancashire man who sings rather plaintively, "We should have gone to Blackpool after all," and a hilarious scene in the engine-room between two stokers, which provides a good contrast in comedy dialogue, one stoker being a Scot and the other a Cockney. A rather more serious character is that of a steward, who makes one realise that a steward on a luxury liner is as liable to become tired of his job as any other worker.

There is a lively number on the idea that on board ship the girls cannot escape—in fact, they are "On the Spot." Romance is always a strong suit on a cruise, and this is provided by a lilting waltz, "Home for Two," and a sentimental number, "Dreaming of You."

While Uncle Sam Nodded

CITIZENS of the U.S.A. are apt to regard "God's Own Country" as the natural birthplace and rightful home of progressive invention. But they are now awakening to the fact that radio was forecast mathematically in England (by Clerk Maxwell), experimentally demonstrated in Germany (by Hertz), and developed to world-wide importance by Marconi, an Italian.

Edison, in America, first investigated current-flow inside an electric bulb, but it was Fleming, in England, who applied the effect to wireless reception; and though the grid of the valve was introduced by de Forest in the States, the greater part of radio pioneering was done outside that country.

Good Americans are now feeling puzzled and peevish because television, too, in the Old World had advanced faster and farther than in the U.S.A. They particularly envy and admire British television, which they freely admit has got the U.S.A. brand beaten to a frizzled fizzle.

Non-Stop Neighbours

WHEN housing estates are being developed it is quite usual to find a little friendly rivalry between the new neighbours. This is all right when restricted to such matters as the flatness of lawns or the size of vegetable marrows; but there should be no rivalry between neighbouring loud-speakers.



I heard of one sarcastic chap whose neighbour said to him:

"I expect you've heard my loudspeaker? Do you know what kind it is?"

"Sure I know!" was the acid reply. "It's an Escape-Me-Never."

ARIEL

POWER FOR THE A.C. BAND-PASS

An efficient unit which can be built in an evening

Designed and described by the "P.W." Research Dept.



The power pack is a simple and straightforward job.

THOSE who are building the A.C. Band-Pass which we described last week, and who already have a power pack which will give an adequate supply of H.T. and L.T. are not concerned with the one which we are describing below.

Most constructors, however, will need a special power pack for this set, and to these we can highly recommend this simple and efficient unit.

It will interest, also, constructors who are in need of a power supply unit for their experimental work.

As will be seen from the photograph the general arrangement is such that there are no complications whatever. There are only

four components, namely the mains transformer, electrolytic condenser, rectifier valve holder and smoothing choke. These are screwed down to a metallised baseboard 10 ins. by 5 ins., and along one side there is an ebonite terminal strip containing six terminals for L.T., H.T. and the loud-speaker field.

The "Field" Terminals

The circuit is a straightforward one for use on A.C. mains of 200-250 volts. The mains supply is applied to the primary winding of a Wearite universal type transformer and the energy required is taken from the three secondary windings giving L.T. for the heaters of the valves in the set, L.T. for the filament of the rectifier and H.T.

For the valves in the A.C. Band-Pass four volts are required from the L.T. windings, and these are obtainable from the 2-0-2 terminals on the transformer. Full-wave rectification is employed, the valve used being a Marconi or Osram U.12. As we stated last week, the A.C. Band-Pass can be used either with a permanent-magnet or mains energised speaker.

If you look at the wiring diagram on the next page you will notice that the field

terminals are joined together by means of a piece of wire connected across the two terminals. When a permanent-magnet speaker is employed these terminals are left connected as shown in the diagram, and the permanent-magnet speaker is attached to the loud speaker terminals on the set, the input transformer on the speaker being suitably adjusted to the optimum output load of 7,000 ohms. In the case of those transformers marked "Power" and "Pentode," the "pentode" tap should be used.

Using an Energised Speaker

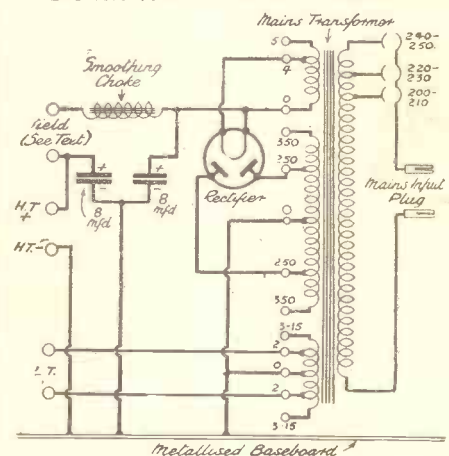
When a mains energised speaker is employed the leads from the anodes of the rectifier, which in the diagram are shown joined to the two 250-volt tappings on the mains transformer, should be removed from these terminals and instead joined to the two terminals marked 350 on the mains transformer. The field winding leads of the speaker should be connected to the "field" terminals on the power pack, the short-circuiting lead being first removed. The resistance of the speaker field should be 2,000 or 2,500 ohms.

There is little to be said about the construction of this unit, since one has only to screw down the four components to the metallised baseboard, fix the terminal strip with its six terminals in position and wire with a good quality insulation-covered wire. The various terminals on the mains

transformer are clearly marked, so there is no possibility of going astray here.

Make sure that you wire up the rectifier valve correctly and take care to place it on the baseboard as shown in the diagram. This position will be quite clear if you remember that the two filament sockets go to 0 and 4 on the mains transformer, and the two anodes to the two 250 terminals on the transformer, or to the two 350 terminals if you are using a mains energised speaker. These anode connections are those which would normally be the "anode" and "grid" connections on the ordinary four-pin valve holder.

FULL-WAVE RECTIFIER



Full-wave rectification is employed and the unit is suitable for A.C. mains of 200-250 volts.

The H.T. - terminal is joined to one of the holding down screws on the electrolytic condenser mounting bracket. So also is the "0" connection on the mains input-plug side of the mains transformer. This is a simple way of making connection to the metallising on the baseboard.

Connections to Set

The connections of the Power Pack to the A.C. Band-Pass are quite simple and were given last week, but we will go over them again to make them absolutely clear.

Join the two L.T. terminals on the Power Pack to the leads marked L.T. on the A.C. Band-Pass. Connect H.T. + and H.T. - on the Power Pack to their respective leads on the set. Insert the mains socket on the set into the mains input plug point on the power pack transformer. Join the two leads marked "To mains" on the set to your mains supply plug. Before switching on the set make quite sure that the mains tapping screw-

(Continued overleaf.)



The A.C. Band-Pass and the power pack ready for placing into a cabinet. A permanent magnet or mains energised speaker can be used.

RADIO IS CHANGING US

A new book well worth reading

THE author of this thesis was a senior official of the B.B.C. for eight years, and he has accordingly based this survey of radio development on his own personal experience as a B.B.C. official, a listener, and an observer of wireless conditions in this and other lands. He has interested himself especially in the part broadcasting can play in the evolution of democracy.

In spite of some rather hard hitting and a disarmingly bantering tone, the author never loses sight of the serious aspect of his thesis. He apportions credit where he considers it to be due. But he is not slow to blame where he feels it to be deserved.

Every Aspect Studied

Mr. Cleghorn Thomson describes this book as the "scrapbook of an eager contemplative listener." It is far more than that. Every aspect of radio development has been studied. In a chapter on *The Problems of Democratic Culture*, he considers among other aspects the question of radio and propaganda, radio and speech, radio and education, Government relations, and radio and international brotherhood.

Throughout, the value of the book is enhanced by its extracts from notable speeches and articles of such people as Robert Graves, George Buchanan, Major Attlee, and Hamilton Fyfe.

There are several reproductions in line

from *Low's Topical Budget*, and a photographic illustration of Prospero and Ariel, the figures standing over the entrance of Broadcasting House.

Mr. Cleghorn Thomson shows a decided partiality for the naïve philosophy of *Alice in Wonderland*, and he has in many cases supported his arguments with the banter of *Alice* and her queer friends. These little "human" touches make the book very easy reading, and transpose the otherwise high tone of the theme to a more comfortable key.

As a man who has seen the wheels go round from the inside and has by experience found the direction of the deepest current of our time, it is felt that the author is justified in maintaining so forcefully that *Radio is changing us*.

F. C.

(This book is written by D. Cleghorn Thomson, and is published by Watts and Co., at 2s. 6d. It is one of the *Changing World Library* editions, and is accordingly tastefully printed and bound. It makes a worthy addition to any bookshelf.)

DISUSED OIL-CANS



These two lamps, described in the next column, are made from disused oil-cans.

HOME-MADE SPIRIT LAMPS

A practical hint for the handy-man

FOR performing fine soldering work, a small spirit-lamp is a very useful adjunct in the wireless workroom, particularly when an electrically-heated iron is not available.

Two handy home-made spirit-lamps will be seen in the photograph reproduced on this page. Both are easily made from disused oil-cans, the one on the left comprising an oil-can through the nozzle of which is passed a length of cottonwool reaching to the container below.

Must Be Cleaned First

The improvised spirit-lamp on the right has had its nozzle permanently blocked up, and through the stem a half-inch slit has been made through which passes the cottonwool "wick." This latter spirit-lamp gives a more spread-out flame than the former lamp and consequently a hotter flame than the latter.

Both lamps are fuelled with ordinary methylated spirit, a single charge of the spirit providing for about a quarter of an hour's continuous burning in the case of an average small cycle oil-can.

It is essential before converting an oil-can to spirit-lamp use to clean it out thoroughly, otherwise traces of oil clinging to the inner walls of the can will be dissolved off by the methylated spirit and, clogging the cottonwool wick, will give rise to unsatisfactory burning.—J. F. S.

POWER FOR THE A.C. BAND-PASS

(Continued from previous page.)

plug on the mains transformer is in the appropriate hole.

If your mains are 200-210 volts, insert the plug in the hole marked 200-210 on the mains transformer, as shown in the diagram. For mains of 220-230 volts insert the plug in the centre hole, and for 240-250-volt mains, in the hole in the extreme right,

YOUR SHOPPING LIST

- 1 Wearite mains transformer, universal type.
- 1 B.T.S. 40 H. 60 m/a. smoothing choke.
- 1 Dubilier 8-8 mfd. electrolytic condenser, type 9203E.
- 1 Peto-Scott mounting bracket for above.
- 1 W.B. 4-5-pin A.C. type valve holder.
- 6 Clix indicating terminals, type B.
- 1 Peto-Scott "Metaplex" baseboard, 10 in. x 5 in. x 1/2 in.
- 1 Ebonite terminal strip, 7 1/2 in. x 1 1/2 in. x 1/2 in. (Peto-Scott).
- 18-gauge T.C. wire and insulating sleeving for wiring (Peto-Scott).
- Screws, etc. (Peto-Scott).

RECTIFIER

Marconi or Osram U.12.

looking at the diagram. This is very important, for if, for instance, your mains happen to be 250 volts and you insert the plug in the 200-210 hole you would damage your transformer.

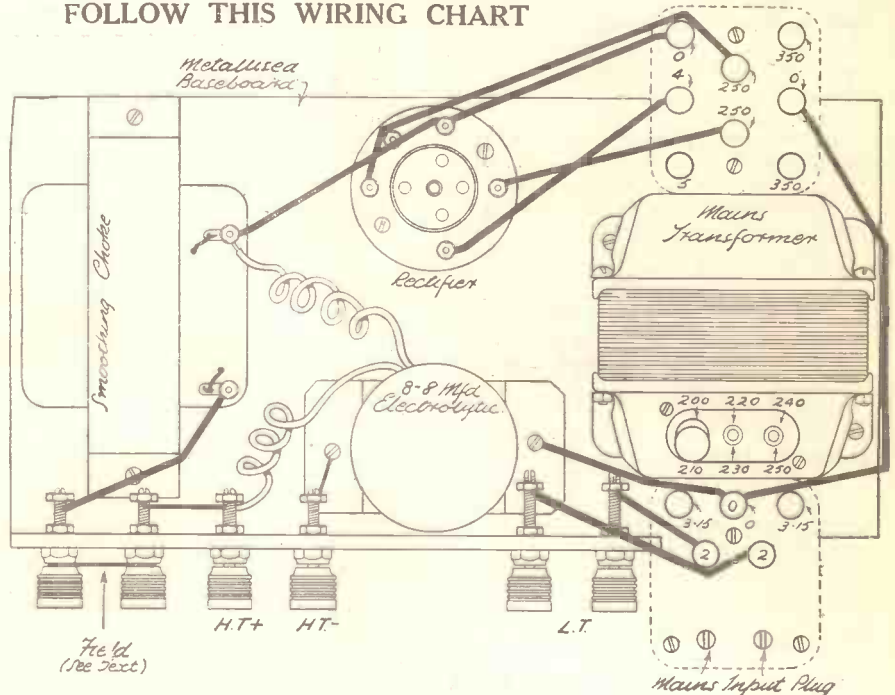
The voltage of your mains should be marked on your mains supply meter, but if you have any doubts as to the correct

voltage of the supply, ask your electricity company, who will be only too pleased to put you right.

In practice the unit will give excellent

service, not only with the A.C. Band-Pass, but with other sets of similar type. No cabinet is specified, since constructors will have their own ideas about this.

FOLLOW THIS WIRING CHART



Here are all the wiring details you need. Note the lead joining the two "field" terminals. This should be left in position when a permanent magnet speaker is used.

ON THE SHORT WAVES

LAYOUT AND WIRING

By W. L. S.



CAN it be that there has been another sudden boom in home construction?

I have been receiving a tremendous number of letters from readers who have suddenly decided that they want to build up "really nice" short-wave sets, and these enthusiasts want all the dope that I can give them on how to make their sets a little better than the average.

Last week I mentioned a reader who had sent along a little plan of his layout for an ultra-short-wave set. Since then I have received letters from two readers who are both thinking of making up short-wavers for the 20-metre band *only*—with the idea of smashing all records in amateur-band DX reception.

Well, it is pretty definitely established that records are not broken by adding incredible numbers of valves to an existing set. You have got to make up your mind to squeeze every ounce of efficiency out of one or two valves, and then, if your eardrums are capable of standing it—which they shouldn't be—you can think about adding more.

Thus we come back to that vexed subject of *layout*, which, almost alone, constitutes the difference between a good set and a bad one, starting off with precisely the same components.

Some Interesting Experiments

During the week-end I have been making some interesting experiments on this subject, and have gone to considerable trouble over it. To be precise, I have gone so far as to make up two complete sets, one with the best layout that I could think of, and the other just slung together. In both, mark you, the wiring was carefully done, so that any difference between the two sets could not be put down to high-resistance connections or general untidiness.

The sketch on this page shows the layout used by the reader I have already mentioned. This was the one I used for the "good" set. You will see that it effects a considerable economy of space by making it possible to mount the coils immediately above the tuning condenser instead of behind it. This also shortens wiring, since the valve holder is also brought closer.

The sets were both single-valvers, so if you imagine a reaction condenser mounted under the baseboard, at right-angles to the other and at the far end of the thing, you have a pretty good picture of the complete set.

The other set used an ordinary vertical panel and horizontal baseboard, and was built more or less on the pattern that I have learned from examination of readers' sets that gave disappointing results. The coils were too far back from the condenser, the

valve was an unnecessarily long way from the coils, neither the panel nor the baseboard was metallised, and the earth return leads were inclined to be on the long side.

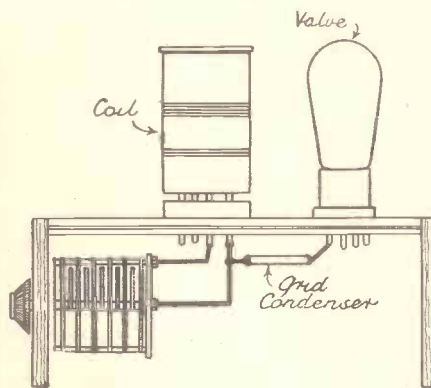
These two specimens were rigged up side by side, with separate batteries, but change-over switches for the aerial and the headphones. I put a 20-metre coil in each, and proceeded to investigate the 19- and 20-metre bands.

It was obvious from the start that the double-decker had the other beat. It oscillated more freely—always a healthy sign—and reaction control was smoother.

It had no hand capacity—the other had quite a bit. The double-decker brought in all its stations about fifteen degrees higher on the dial than the other one—the effect of shorter wiring.

But the real surprise came when I

SHORT LEADS



The layout used by a reader for his ultra-short-wave set. Note the economy of wiring which is achieved by this particular arrangement of components.

started tuning-in really weak stuff on 20 metres. It was obvious that the "bad" set not only gave weaker signals, but also had considerably more background. The signals were perhaps 10 per cent. weaker, but the signal/noise ratio must have been 25 per cent. worse.

When eventually listening round on the good set, I managed to find something so weak that it was almost unreadable (it was a W6 station at about 2.30 in the afternoon!) I hurriedly switched over to look for it on the other set. Although I knew exactly where it should come in on the dial, since there was a moderately strong station on either side of it, I simply couldn't find the slightest trace of it.

I went back on the good set and there it was—just as weak as ever, but still audible. So now I have proved to my own satisfac-

tion that bad layout does not simply cause uncomfortable handling; it may quite easily account for the fact that your deadly rival across the way can hear signals that never reach your ears, even though you *think* you have a similar set.

I haven't mentioned selectivity. Actually there didn't seem to be much in it, but I realise now that the good set, thanks to the fact that it was oscillating more strongly, was given tighter aerial coupling than the bad one, and in spite of this it was just as selective.

If you're going after the ultra-short waves this autumn and winter—as you certainly should if you want some thrills out of radio—you will do well to start re-building your set, or building a new one for the job. You simply can't tolerate any long leads between tuning condensers and coils if you hope for efficiency below 12 metres or so. The layout shown on this page is altogether admirable for ultra-short-wave work, and it is no more difficult to build than the conventional affair.

To be Used in Set Designs

I expect I shall be describing some sets before very long, and you can be pretty certain that a layout on these lines will be used in them. I know I have advocated it before, but this little week-end experiment of mine has quite convinced me that something must be done about it.

I might mention, in closing, that my own big superhet was in action all the time, ready to be switched on as a check. Nothing that I picked up on the superhet was lost on the "good" single-valver. As a matter of fact, I was distressed to find that one or two really weak signals on the "super" appeared to be even *more* readable on the single.

One point that is of great importance, but remains entirely apart from set designing, is the skill of the operator. This is obviously of considerable importance. To hear some fellows meaning that they "can't get DX on their fifteen-valve superhets," you would imagine that they hadn't yet learned how to twiddle the knobs.

I refuse to believe that any sets are as bad as some of their owners make them out to be. Intelligent operation is more than half the battle, and a good and experienced operator can produce results even from a set that really is bad.

Many amateur transmitters, strange to relate, possess the most hopeless receivers. I write this from experience, for I have met them and tried to operate the brutes! Good layout, good wiring and good operating are all necessary for real first-class results.

MY SHORT-WAVE ADVENTURES

By L. CHESTER

ARE STRAIGHT THREES SELECTIVE ENOUGH?

Asks L. Chester, in describing his further experiences with his H.F., Det. L.F.

It is, I find, one thing to make a set work—and quite another pair of boots to make it work impeccably well. And that is roughly what I aim at, you know; first, to make a set work, somehow, and then to worry it until it works as well as I can possibly manage.

Here I am, then, with a quite imposing-looking 1-V-1, as I hope you will be able to see from the photograph that accompanies the present adventure record. High-frequency pentode, triode detector and Harries pentode output. It worked well enough right away to bring in the usual stars of the short-wave firmament—including, to my great delight, Peru.

Before I go any further, perhaps you had better glance at the layout, which I show as Fig. 1. As I mentioned last time, I have put my five holders in line, not because I thought this was the finest possible arrangement but because, well, it looked neat and did not seem to involve any very long leads.

From Right to Left

The layout starts on the right and works leftwards, my aerial and earth coming in a right-hand window. This means the aerial condenser is on the right and the detector grid tuning condenser on the left, with the reaction condenser between. As the aerial condenser is the less critical of them I find it easy to adjust critically the grid tuning with the left hand and the reaction with the right.

As for the five holders—they read from right to left in the order of aerial coil, high frequency pentode, high frequency transformer, detector and pentode output. The aerial coil is on the right of the aerial

ances and condensers, as well as quite a maze of battery leads, the whole bunch coming out of a hole at the back of the chassis on the extreme left.

You may remember I found rather a large discrepancy between the dial readings for the two tuning condensers—and this puzzled me for quite a time, as the two coils I am using are intended to cover the same wavebands.

But there it was. Bound Brook, W 3 X A L, was logged at 53 and 70 degrees respectively for grid and aerial windings; W 2 X G B, the new Press Wireless Incorporated station at 59 and 75 degrees; and Schenectady, W 2 X A D, at 81 and 95 degrees. All these, of course, on the coils marked 12 to 26 metres. Four-pin for aerial, six-pin for transformer.

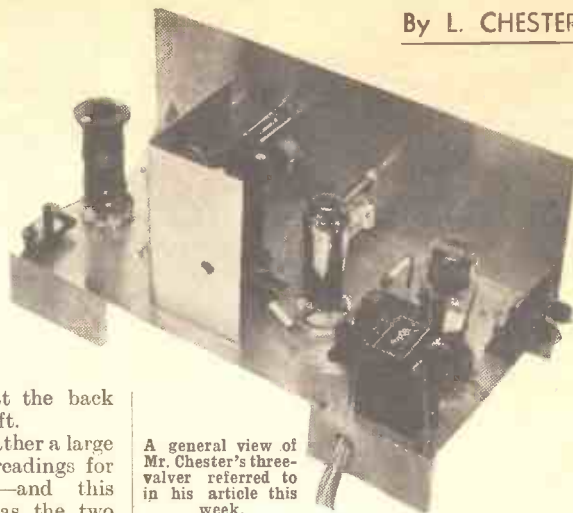
High aerial readings, hey? Would that mean something wrong, I wondered. Puzzling, because if it were due to the aerial loading, one would have imagined the right-hand condenser settings lower. I slackened off the pre-set in series with the aerial winding without much belief in the sense of doing so—and of course it made no difference.

Then I remembered I had my unusual (to me, anyway) method of applying bias to the grid of the high-frequency pentode, whereby the .1-mfd. condenser was in a sense in series with the tuning condenser—see Fig. 2. I had a wild theory that perhaps this was in some way reducing the effective capacity of the tuning condenser, making a lot more condenser setting necessary to give the same wavelength result as on the high-frequency transformer.

Cutting Out Bias

The way to test this was very simple. You will see that by taking G.B. -1 to the positive end of the grid-bias battery I not only cut out the bias on the high-frequency pentode, but also cut out the .1-mfd. condenser by shorting it on to the earth line.

As you, dear well-informed reader, probably have guessed, this made no difference at all to the setting of the aerial



A general view of Mr. Chester's three-valver referred to in his article this week.

tuning condenser to get a given wavelength in tune. But it did prove that all my trouble in applying negative bias was, from a signal point of view, quite unnecessary with this particular valve. On the other hand, I suppose the anode current would be increased through lack of negative bias?

Having, as so often happens with these experiments, drawn a complete blank, I left the set and went out with the dog for a walk. While "Rags" is full of canine sense, he contributed nothing to the solution of the problem—but during my walk I had a flash of inspiration.

Of course! Why had I taken it for granted that just because my two tuning condensers were of exactly equal capacity my coil inductances were equally well matched? Why, indeed.

I had a look at those coils forthwith. Here's what. The aerial coil had 4½ turns against the transformer's 5½ turns. In other words, the problem was solved—for naturally, the aerial coil needed more capacity to tune the same wavelength as the transformer winding. A moral in this, somewhere!

A Simple Solution

I could have kicked myself afterwards, because this simple solution was really staring me in the face, since on the 22- to 47-metre coils the readings were much more in step, while on the 41- to 94-metre pair the readings were almost identical. It was on the last-named pair I got Peru, by the way.

Which brings me to the next spot of bother. I found that while the set was perfectly well behaved on the 12- to 41-metre gamut of wavelengths, it tended to go cock-eyed on the insertion of the largest of my coils.

And here follows an object lesson in how not to think things out. Obsessed with the lack of certain decoupling components, (Please turn to page 552.)

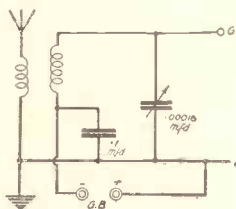


Fig. 2.—The G.B. scheme employed.

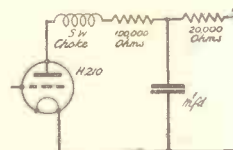


Fig. 3.—Decoupling is added to the detector.

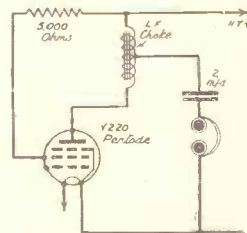


Fig. 4.—Adding a resistance to the screen-grid circuit.

THE COMPONENT ARRANGEMENT

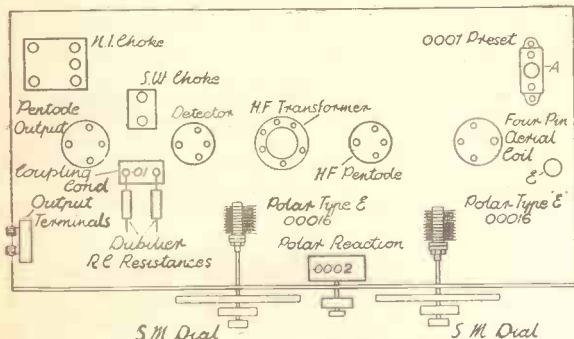


Fig. 1.—How the layout is arranged. Note the row of valve holders and coil holders.

tuning condenser, the grid tuning condenser roughly between the high-frequency transformer and the detector valve.

I think the rest is pretty self-explanatory, except that underneath the chassis are now to be found various decoupling resist-

THE DIAL REVOLVES

By LESLIE W. ORTON

HIGH UP IN THE HILLS WITH A RADIO SET

A wonderful response :: On 20 metres :: The mystery of EAJ8 :: Radio UPOL heard in U.S.A.

SUNBURNED to a cinder, I'm writing this whilst on holiday in the land of Tommy Farr—in other words, South Wales! And it's been an eye-opener. Yes, and a jaw-breaker!

Sing a song of sixpence, an ether full of carriers,
When the Dial Revolves reception has no barriers,
Four and twenty stations all come tumbling in,
Oh, boy, what a dainty dish for the DX King!

That rhyme by Mr. Shakespeare's great rival (*sic*), yours truly, explains conditions here to a "T."

Good Mountain Reception

The other day my set "Dynamite" and I took to the mountains, and high up in the hills I felt like a wireless wave myself! Bryn Mawr to the right of me; Pwllwreth to the left; Garn Wen at the back of me, and the Garw Valley mountains before me. Delightful scenery, but what screening!

It's no great shakes to be on top of Pwllwreth (why not call it "Popeye" for short?). One slip, and it wouldn't merely rain cats and dogs, but also DX-ers, on Maesteg below—I daren't even drop an "H"!

But the climb was well worth it, for what was lost in weight was gained in stations. My log included many American broadcasters, of which W2XAD, Schenectady, was undoubtedly the best. W8XK, Pittsburg, on 19.72 metres, and W2XGB, Hicksville, on 17.33 metres, were almost as powerful, but W3XAL on 16.87 metres was quite a poor signal.

European stations also provided a feast of entertainment, and the best heard were 2RO, Rome, on 25.4 metres, DJA and DJN at Zees, and Radio Colonial on approximately 25 metres. Indeed, reception was so good that even the sheep were interested, although one fellow (sounded like a retired colonel!) was rather sarcastic, repeating "Baa" several times!

On top of Bryn Mawr, VK3LR, Lyndhurst, and several other stations came in extremely well. By the way, my aerial during these Alpine exploits comprised a 50-ft. wire slung between two walking-sticks!

A Call to the Colours

My recent appeal for information regarding reception of low-powered British stations on 20 metres has acted like a call to the Colours, and I'm proud (and the postman annoyed!) at the wonderful way in which you DX hounds have responded.

Your letters and reports make interesting reading. Weather conditions, skip-distance, and the moon are all blamed (or praised!) for the phenomena.

At one time it was thought that when "G's" came in well the "Yanks" would be off the map. That theory appears to

have been exploded so thoroughly that all the King's men couldn't put it together again!

And here is a new puzzle. J. J. (Cadishead, Lanes) reports reception of G2AK, Birmingham, on 40 metres. Nothing exceptional in that, but G2AK was calling test on 10 metres! I wonder how many of you have had similar experiences?

Amateur Reception

I've spent several nights at the dials of late, and it grieves me to have to report that the 20-metre band is becoming temperamental again—indeed, I'm crying crocodile tears as I write!

Nevertheless, on many occasions conditions are wonderful—indeed, anazing would be a more apt description.

Between 11 p.m. and 2 a.m. the other night I logged VP5AC, Kingston, Jamaica; K4AM, Porto Rico; PY2B,



Many of the above amateurs and broadcasters are heard in the country at the present time.

Brazil; CO2AZ, Cuba; and an awe-inspiring list of "Yanks." Incidentally, I find that "W's" come in extremely well in South Wales. Indeed, it's a regular figure eight country! Among my catches are W4DW, W1TW, W2ME, W8S, W8HM, W8LGY, W8ZU.

From 7 to 9 a.m. the band has been alive with stations, and among my most cherished catches are OX7EV calling on G2. Now, in case you don't know it, "OX" is the prefix of Greenland stations, and consequently I'm wondering whether I heard a station from the far north or a pirate next door.

(Please turn to page 549.)

Short-Wave Station Identification

By F. A. Beane

LATIN-AMERICA REVIEWED

BEFORE embarking upon our "etheric" visit to Japan and the mystic East (or West from our imaginary tour of investigation), we momentarily revert to some of the countries already traversed, for there is always something new to record from Latin-America, and since we commenced our "travels" quite a number of broadcasters have made their debut in the ether.

In the West Indies we note that the Island of Martinique, a French possession in the Lesser Antilles, now boasts of FZF6, a somewhat unusual call-sign, operated by the "Radio Club of Martinique" in Fort-de-France. The wavelength employed is 31.58 m., a channel shared by numerous others of greater power, and it may be heard from about midnight onwards with both French and English announcements.

Venezuela certainly does not mean to be eclipsed by any other Republic of South America, and so she has blossomed forth with a YV6RC, "Radio Bolivar," on 46.73 m., also on 48 m. we now find a YV5RJ, a relay of YV5RI. The latter employs the slogan "La Voz de Esfera."

HJ5ABD, of Cali, in the neighbouring Colombia, is again active on 49.3 m., but apart from this everything remains the same, with the exception that HJ1ABB, previously "discovered" by us, is reported to be radiating on 31.36 m.

From Chile we learn that "Radio Service," the popular broadcaster on 24.4 m., advertises its call as CB615 and not CEB, as generally thought. Their QSL card is a most attractive one, and gives their power as 1 kw. CB615 is not the sole representative of Chile, however, for a CB960 of Santiago is said to operate on 31.25 m., a CEBM on 34.10 m., and CED on 29.4 m., but so far I have failed to gather any of their identification characteristics. The Argentine has also produced another transmitter, namely "Radio Belgrano," operated by the Radio Telephone Co., of Buenos Aires, on 31 m.

Again, in the West Indies we observe plenty of activity in Cuba; there is COBC (or COVC), already covered in these articles, on about 33 m., and the newcomer COCW on 47.61 m. The latter may be heard testing in the mornings, and is probably a potential relay of medium-wave CMCW, "La Pre-dilecta Muebleria," in Havana. Tuinucu has also again sprung into prominence, for it is there that the famous Frank Jones, of CO6OM fame, resides, but this time Frank is carrying out tests on 19.3 and 29.45 m. with the call CO9XX.

In Central America there appears to be only one piece of news likely to be of interest to my fellow "excursionists," and that concerns TIEP, of San José, and is simply a change from TIEP's original slogan, "La Voz de Tropic," to "The Voice of the Isthmus."

North America

Our final survey of North America shows that Newfoundland has recently been carrying out tests of a broadcast nature through the well-known amateur transmitter VO1I of St. John's, on a wavelength of about 20 m., then W2XGB has been heard at exceptional strength on 17.33 m. between 16.00 and 19.00. Listen for the announcement "This is station W2XGB, Press Wireless Incorporated, Hicksville, New York, operating on a frequency of 17,310 kc. We continue now with phonograph recordings"; that is about all you will hear, anyway! Last of all, I learn from the A.R.R.L., via G5GQ, that W10XGY, which I mentioned a few weeks ago, is operated by W1HQQ, of the Smithsonian-Roebbling Exploring Expedition, and situated on the yacht Iorano. Listen for it on 6,425 or 12,863 kc.; it has been heard on the former. Incidentally, the yacht is visiting Cuba, Haiti, Canal Zone, Panama and Yucatan, and reports on its transmissions are requested and should be sent to the A.R.R.L.

TESTED BY DISASTER AT SEA

Nations select an International distress call—The S.S. Republic and Florida crash in fog off Sandy Hook—Binns flashes C Q D—Ships rush to the scene—The Baltic arrives just in time—A dramatic rescue in the night—The Florida moves slowly toward New York—Attempts to salvage the luxurious Republic—Rescue of Captain Sealby and crew—Marconi hailed as benefactor of mankind—Binns feted as a hero—De Forest makes wireless sing and talk—First broadcast from Metropolitan Opera House—Station at Arlington talks with Eiffel Tower, Paris—Powerful stations spring up round the earth—Marconi at Coltano gives Italy a place in the wireless "sun"—Girdling the globe with high-power waves—Success of foreign wireless news service celebrated—An old-timer compares Edison and Marconi

AN invention, no matter how expedient it appears in theory or prophecy, is frequently tested in the crucible of disaster before mankind thoroughly comprehends and appreciates its value.

Some day a big ship might founder. That would be a crucial test for the Marconi contraptions. It would etch the glory of wireless on the dark background of calamity at sea. But it would be "a disaster darker even than Martinique" for the inventor if ever an ocean liner, equipped with wireless, went to a watery grave with human souls washed off its decks.

Some day, it seemed, this terrible test of wireless was sure to come, for ever since ships plied the Seven Seas collisions and wrecks, storms and mystery, permeated through the stories of sailors. In the throes of catastrophe men had gone down to the sea in ships never to be heard from again after they waved farewell; never a trace of what happened or where. They vanished as the grim Reaper swept across the waves, sending the helpless to a sepulchre in the sea.

But now, wireless could call for assistance. It could warn of hurricanes and icebergs, and possibly ward off the blow. It could guide vessels through fog when screeching sirens and swath-like beams from lighthouses failed to penetrate. The utility of wireless at sea became evident in more ways than the mere handling of friendly *bon voyage!* messages, news bulletins or business dispatches.

Wireless had proved itself under favourable conditions across the Channel and across the Atlantic, but what would it do in time of emergency in the dead of night at sea, with all lights out and frantic people screaming for help far off any shore?

First of all a distress signal known instantly by all, no matter what their tongue, must be in readiness for such a day.

The C Q D was chosen in 1904; in 1908 it gave way to S O S, quicker to send and more easily recognised—three dots, three dashes and three more dots!

But the dash, dot, dash, dot—dash, dash, dot, dash—dash, dot, dot, of the long C Q D remained in force to play an heroic rôle in disaster and write itself on the pages of marine history, because

all nations had not promptly ratified the S O S.

Fog hung heavy over Sandy Hook on the early morning of January 23rd, 1909. Suddenly there was a crunching noise. The S.S. Republic, bound from New York to the sunny Mediterranean, had been moving slowly, feeling her way through the impenetrable darkness, and a little off the beaten path of ocean liners. She had turned a bit north to get a start on the long sweep across the Atlantic.

Out of the dark came a dozen quickly repeated blasts of a nervous fog siren, apparently dangerously at hand.

A hazy shape in the mist loomed up, bearing down like some monster of the deep on the luxuriously outfitted Republic and 461 human souls. There was no time to reverse engines. Two ships crashed!

The Republic lurched over on one side as the sharp prow of the colliding vessel

gouged through the iron plates, tore them asunder and opened wide the engine-room of the White Star liner. Then the other vessel pulled away, righted herself and staggered off in the murk.

Captain Inman Sealby called the Republic's crew to quarters. The bulkheads were closed, shutting off the engine-room from other parts of the ship. Luckily the Republic was one of the 180 ships equipped with Marconi apparatus. All hope rested with the wireless!

The S.S. Florida's bow, for that was the ship of Lloyd's Italiano Line that rammed the Republic, had crumbled and stove-in the side of the wireless cabin. It was smashed to splinters, but Fate had saved the instruments and had spared the twenty-six-year-old Marconi man, an English lad; John R. Binns, known to his shipmates as Jack, had been asleep in his bunk.

The smash startled him. His first thought when tossed from slumber was that the ship had run aground in the fog. He peered through the wrecked woodwork from his bunk and saw a lifeboat torn from its davits, which his sleepy eyes visualised as a rock. All the lights went out!

Binns climbed out of the cabin and tried to make his way to the captain on the bridge. But the wreckage blocked his path. The ship's dynamos stopped. Binns tried the storage batteries—the emergency current supply for the wireless. The steward came from the pilot-house and led Binns through the wreckage so he could report to the skipper that the Marconi equipment was working. Then Binns rushed back to the cabin and called Siasconset on Nantucket Island. A. H. Ginman was the operator on watch there.

The C Q D flashed from the mast-head. It was the ambulance call.

Ginman heard the spark of the Republic say, "We are shipwrecked. Stand by for captain's message."

In reply Siasconset flashed, "All right, O M (Old Man). Where are you?"

Then came the captain's report. Sealby ordered the following message broadcast:

Republic rammed by unknown steamer, twenty-six miles south-west of Nantucket Lightship. Badly in need of immediate assistance, but no danger to life.

It was 5.30 o'clock in the morning on January 23rd, 1909. A disaster was impending 175 miles east of Ambrose Lightship.

(Continued overleaf.)

HE HELPED MARCONI IN HIS FIRST EXPERIMENTS



A recent photograph of Mr. P. W. Paget, who started with Marconi in 1898 as his first personal assistant. Mr. Paget is looking at some early apparatus.

MARCONI—THE MAN AND HIS WIRELESS—Continued

Five minutes after the CQD had sped across the waters in search of assistance, the operator at Siasconset broadcast the assuring news that the U.S. Revenue Cutter Acushnet was proceeding from Woods Hole, Mass., to Latitude 40, Longitude 70, where the Republic was foundering.

The Baltic, the French liner La Lorraine from Havre, the Furnessia of Glasgow, the Nantucket wireless station, the S.S. City of Everett, the United States naval stations at Newport, Woods Hole, and Provincetown, and the Lucania from Liverpool, had also picked up the call of distress. The ships turned in their tracks and sped towards the stricken vessel, while the land stations rushed aid from nearby ports.

Never before had wireless such a chance to prove its value at sea. Dawn revealed the peril of the Republic.

The Baltic was 115 miles east of Sandy Hook, inbound. The Lorraine, inbound, was 70 miles east of Sandy Hook. The Cunarder Lucania was just east of Nantucket. The torpedo-boat Cushing was on its way full speed from Newport. The Acushnet was less than 100 miles away. The revenue cutter Mohawk left New Bedford. The cutter Seneca was speeding from New London. All had one purpose—to reach the Republic before she sank!

All day long the helpless Republic drifted as more water poured into her wounds, making her position more perilous as the hours passed. She was settling fast. Captain Sealby radioed:

Come to our leeward to take up our boats. Have Lorraine and Lucania convoy the Florida.

From the bridge of his sinking ship Captain Sealby said:

Passengers of the Republic, I want to advise you that the steamer has been injured in collision. We are in no immediate danger, but I want to ask you to stand by me and act with coolness and judgment.

There is, I repeat, no immediate danger, but to be on the safe side it is necessary for you to be transferred to the Florida as soon as possible. It will take some time.

I expect that you will be cool and not get excited. Take your time getting into the lifeboats. Remember the women and children go first, and the first cabin next and then the others. The crew will be the last to leave the vessel.

There were shouts of approval and a cheer or two, and then, with a direct objective before them, and the prospect of not standing by helplessly any longer, the passengers hastened in orderly manner to prepare for transfer. The sea was calm. The transfer of the passengers took a trifle more than two hours. The shift was accomplished without a mishap.

Darkness and thick weather set in again. Bombs sounding in the distance revealed that the Baltic on its rescue mission was near. The Republic's wireless was weakening. The batteries were running down. The Baltic said by wireless that only a solitary bomb was left. And the faint

rumble following that message left little doubt that the Baltic would soon be alongside.

Captain Sealby took direction from which the last bomb sounded, and Binns wireless to the Baltic how to steer to reach the Republic. There were no radio direction finders, else the task in the fog would have been less puzzling—less of a guess.

Soon a fog-horn sounded faintly. Binns told the Baltic to proceed carefully as she was apparently close to the port side. A cheer went up from the Republic's decks. Off the stern, ablaze with light, was the Baltic, which Binns later described as "the most beautiful sight in the world is a ship at sea, especially when that ship is needed to supply a link between life and death."

The Baltic was on the scene!

Now the Florida with her bow ripped

AT AN EARLY EXHIBITION



Marconi with Lord Wolmer (speaking into the microphone) at the opening of one of the early wireless exhibitions held at the Albert Hall.

away was in peril herself. The passengers had to transfer again, this time to the rescue ship.

The Baltic and the Florida lay about two miles apart as ten lifeboats, each capable of carrying ten passengers, in addition to a crew, crossed the intervening water. A sea was running and the little boats tossed and pitched as they wended their way back and forth between the two vessels, laden until their gunwales were almost under, then riding back with the lightness of feathers, after depositing their passengers.

The Republic and Florida passengers totalled 1,650. The Baltic carried 90 first-class passengers, 170 second class, 220 steerage, far below capacity, so could easily care for extra passengers saved at sea.

The Florida was ready to proceed to New York. But before she left, thirty-eight of the Republic's crew, including Binns, went back to the sinking ship to await the tugs. The Furnessia stood by to safeguard those who returned to the ship. Slowly and under her own steam the Florida pulled away from the scene. Her bow and cutwater were smashed and her

two forward holds filled with water. Still the liner floated and, freed of her passengers, now safe on board the Baltic, she struggled to reach New York.

The Florida's departure was not the last act in the drama. It was but the climax. The shore was anxious for news.

The Marconi man on the Baltic, H. G. Tattersall, broadcast with an unsteady hand that revealed fatigue from long hours at the key:

The steamship Florida collided with the Republic 175 miles east of the Ambrose Lightship at 5.30 a.m., on Saturday (January 23rd, 1909). The Republic's passengers were transferred to the Florida. The Republic is rapidly sinking. It is doubtful if she will remain afloat much longer. The Baltic has taken all the passengers aboard. The Lucania, Lorraine and Furnessia are standing by to render assistance and to convoy the Florida to New York.

It is reported on board that four passengers on the Republic have been killed. The weather is threatening and the Florida is seriously damaged. We hear that assistance is coming from New York—signed, Marconi operator.

The Baltic started for New York shortly after one o'clock on the morning of January 24th, as its radio sputtered:

I can send no more. I have been constantly at the key without sleep for fifty-two hours.

And so the rescue ship sailed away to land the survivors who had not many hours before waved good-bye to friends on the wharf in New York, as they shoved off for what they hoped to be a happy winter cruise along sunny shores, intending to call at the Azores, Madeira, Gibraltar, Genoa, Naples and Alexandria. But Fate, fog and King Neptune halted their pleasures in a wintry clime. Wireless saved them!

Guglielmo Marconi was hailed as a benefactor of mankind.

"I am exceedingly gratified and very grateful that wireless telegraphy has been the means of saving so many lives," said Marconi in London. "I am confident its usefulness will go on increasing with the extension of the system by smaller ships as well as by the great liners, because of the ever-increasing range of instruments."

What was happening off Nantucket?

The Republic still had the right of way on the wireless. She was in distress.

The fog lifted the next morning. The Republic was a pitiful sight in the grey of the morning. Her engine fires were out and her engine-room flooded by the waves that washed in through the gaping wound in her side. This once queen of the ocean was at the mercy of winds and waves, drifting—to a watery grave.

Lifting of the mist revealed a fleet of salvage tugs on the scene in hopes of towing the Republic to port. But they would have to hurry. The S.S. New York had taken a position not far away, and the Furnessia was still standing by, ready to offer assistance. Life of the 15,400-ton Republic, commissioned in 1904 and valued at \$1,500,000, was fast ebbing. For several

years she had held the record for the fastest passage between Boston and Queenstown. She was luxuriously equipped and had a beautiful dining saloon that seated 200 diners. The room was furnished in ornamental wood. The upholstery was of rich texture, and the wood carvings the finest to be found on any ship afloat. Now her one funnel, at a rakish angle, was not befitting the grandeur and pride of an Atlantic queen.

The cutter Gresham arrived, quickly took a tow-line aboard and steamed ahead with the Furnessia, attached by two lines to the stern of the Republic to steer her towards New York. The destroyer Seneca, in command of Captain Reynolds, arrived and put a line aboard the Gresham so that it, too, could assist in the tow.

But they did not go far. Settling of the Republic sent the Gresham's crew into fever of activity. Hurried orders rang out from the bridge and boat crews tumbled over the side. They pulled with rapid strokes through a choppy sea to the side of the big passenger ship, the gunwales of which were almost under water. From the end of a rope the Republic's crew abandoned ship and jumped into a small boat. The hawser connecting the Republic with the Gresham was quickly severed with an axe. The Gresham's seamen in the lifeboat pulled with full speed toward their own craft to dodge the suction. All lines to the sinking ship were cut. Yards astern, the Furnessia men had thrown their line into the sea. And none too quick, because the Republic was going, and the water around her surged with bubbles of air. The big steamer's stern plunged downward.

A searchlight beam gave a last, fleeting glimpse of the bow. Captain Sealby jumped and so did First Officer Williams. The bow rose quivering into the air and then backed ignominiously toward the bottom of the sea. Chaotic waves washed over the spot where but a moment before the Republic had floated and struggled to live.

"Down, down, down went the Republic," said Captain Sealby in describing his experience, "and soon she was entirely submerged. A moment later I was in the water. I wore my greatcoat, and the air getting under that made it support me, while the binoculars, the revolver and the cartridges that were in my pocket acted as ballast. The water around me was seething and roaring, due to suction as she sank. Several times I was carried down, only to be churned back to the surface again. I was wet through and through and my coat became a perilous burden instead of support. I could not get it off. I found a stout piece of lumber and made fast as best I could.

"All this time the searchlights of the Seneca and Gresham were playing about me. I fumbled in my pocket and got out my pistol. Then I got a cartridge and put it in the cylinder. I had no idea it would go off, but it did. My strength was fast going. I found a towel in the water and managed to wave it—a few minutes later a lifeboat picked me up. First Officer Williams had been picked up earlier and had directed the hunt for me."

Soon after Captain Sealby had been hauled aboard the Gresham he wirelessed:

Republic sunk. All hands saved. Making Gay Head on the Gresham.

And while the valiant effort had been made to save the Republic, the Florida, under Captain Angelo Ruspini, was moving slowly toward New York. On January 26th, with thirty feet of her bow cut away and tilted at such a perilous angle that she seemed about to dive into the harbour, she reached New York. At her halyards between the masts were the "not under control" signals, black and grim, while her flags half-masted, told of death on board.

The Florida had lost four negro seamen, killed by the impact. And two passengers of the Republic, Mrs. Eugene Lynch of Boston, Mass., and T. J. Mooney of Langdon, N. Dak., in outside cabins had been crushed when the ships collided. They went to watery graves with the Republic, forty-five fathoms down.

Striding up and down the pier with a nervousness that revealed lack of sleep, the little, slim, red-whiskered Londoner, Tattersall of the Baltic, said, "Was I excited? No; it's the awful nervous strain of striving, always striving, to get the right messages, when half a dozen gigantic batteries are jerking flashes to you at the

NEXT WEEK
CHAPTER XIV
"SOS—We've struck a berg!"

The rôle of wireless in a marine disaster—S.S. Titanic sails on maiden voyage equipped with latest Marconi instruments—Messages that warned of ice—A terrific crash in the night—Frantic calls for help—Death in mid-ocean—Ships that answered and rushed to the scene—Meagre but tragic news by wireless—What the Carpathia found—A babel of dots and dashes—Why dispatches were garbled and news fragmentary—Marconi meets the rescue ship—His comments on the gang-plank—Findings of the Senate Committee in regard to wireless and its heroic operators—Pupin lauds Marconi's immortal job—Lessons the Titanic taught wireless engineers—Improvements that resulted—Tributes to Marconi—Edison's applause—Engineering Society greets Marconi at a lecture.

same time, drowning each other out, pounding in your ears, making the night seem to swarm with sparks before your eyes. That's what gets on a man's nerves; that's what makes you next to insane. I hardly knew what to do, with the Republic calling me faintly, so faintly that I could not make out whether they were saying: 'We are sinking!' or 'All safe!'—but all the time I kept calling 'Republic! Republic!' and telling them we were coming to their aid."

The gallant Binns was feted on every hand; dinners, theatres, medals and kisses. "I can't stand any more of this," he told friends after five days of the ordeal. "I never want to see my own picture again. It was nothing. Any fellow could do that much."

And off he fled to his home in England.

The first decade of the twentieth century neared an end, with the infant wireless beginning to utter spoken words instead of a mere jabber of dots and dashes. Wireless was talking and learning to sing! Dr. Lee de Forest was teaching wireless how to use an electrical tongue, and through

new instruments he evolved, chiefly the audion (three-element vacuum tube), Enrico Caruso, the distinguished tenor, and a number of other Metropolitan Opera stars, on January 13, 1910, sent their golden voices into space from back-stage of the opera's mid-Victorian setting on Broadway. The songs reached the wireless cabin of the steamer Avon at sea, and amateur experimenters in Connecticut eavesdropped. A newspaper observed that "it begins to look as if an enterprising inventor had perfected a can-opener for use on 'canned' opera."

Jubilantly, De Forest predicted that some day vessels departing from New York would have "Pagliacci," "Cavalleria Rusticana" and other operatic masterpieces every evening until half-way to Europe and then they would be entertained by concerts from London, Paris or Berlin. That seemed fantastic!

By what miracle of science could a symphony of 100 or more musicians, and a stage crowded with singers, ever be electrified and sent through the air with every tone preserved and reassembled as the original? That could never be! One voice might go by wireless but never a chorus. One violin might play but never a symphony orchestra playing Verdi, Wagner, Beethoven or Puccini.

This thing called the wireless telephone presented weird possibilities. It gave dreamers something to work upon.

"The messages wirelessed ten years ago have not reached some of the nearest stars," said Marconi when asked where the signals might end. "When they arrive there, why should they stop? It is like the attempt to express one-third as a decimal fraction; you can go on for ever without coming to any sign of an end.

"What is jolly about science is this: It encourages one to go on dreaming. Science demands a flexible mind. It's no use interrogating the universe with a formula. You've got to observe it, take what it gives you and then reflect upon it with the aid of reason and experience.

"Science keeps one young. I cannot understand the savant who grows bowed and yellow in a work-room. I like to be out in the open looking at the universe, asking it questions, letting the mystery of it soak right into the mind, admiring the wonderful beauty of it all, and then think my way to the truth of things."

Marconi knew that wireless in 1910 needed more driving power in its wings to fly long distances with dependability. It needed strength to combat the elements and bombardments of static flung at it from all directions by magnetic storms. Electricians heard the call of the wireless engineers for more power, and this was their answer:

If you can use oscillations of low frequency for wireless then we can make you a powerful dynamo-electric generator that will produce them.

You will no longer have to depend upon the spark gap with its intermittent, spitting explosions. We will give you a powerful high-frequency machine that will send out a continuous, smooth train of oscillations and yet will have 100 horse-power to drive the signals as far as you wish.

That was a promise. The wireless men told them to go ahead. But while the big alternators were being built as a means of

(Please turn to page 551.)

ALL THE RADIO WORLD'S A STAGE

HOW AMATEUR BROADCASTERS ARE FOUND

SHAKESPEARE could never have imagined that all the world would become, literally, a stage.

Yet radio has made it so, and many of its men and women have already been the players; men and women, that is, whom even a brief broadcast has lifted from workaday lives to pass them for a moment before the focal point of a nation's attention. Broadcasting has, in fact, made folk sound-conscious, and few who listen have neither imagined themselves nor been told that they are undiscovered "stars" of radio.

"I am sure I could sing as well as that . . ."

"You play the piano well enough to broadcast . . ."

"Haven't you ever asked the B.B.C. for a chance to go on the air . . . ?"

Auditions at Broadcasting House can obviously deal only with professional talent, and the recruitment of unknown amateurs for such productions as "The Amateur Hour" has a system of its own.

Looking for Real Talent

Listeners, remembering how Carroll Levis put his "discoveries" on the air last winter, will know what to expect during the forthcoming series of three amateur hours which he has arranged for October, November and December. But they can have little idea either of the way in which amateurs are discovered or what happens to quite a number of them after their broadcast.

So Carroll Levis talked about these and other things in discussing his plans for the future and telling a few stories of his "discoveries" in the past.

"Before coming to England," he said, "I, as a Canadian, had had considerable experience of radio talent 'spotting' in the Dominion, as well as in the United States.

"When I approached the B.B.C. in the first place, I made it perfectly clear that I was not out to exploit anybody. I tried to find real talent, and the only amateurs whom I include in the programme are those who are entertaining and amusing, not those who would be merely ridiculed.

A Cinema Contest

"Leonard Urry, my manager, made a contract for me with a large group of cinemas in all parts of the country, and at each cinema I ran a talent-discovery contest four months prior to putting the first show over the air. I invited amateurs in the audience to come up on the stage and do the turn they wanted to do, and allowed the audience to tell me by their applause which of the amateurs they liked best. Every Friday night there was an eliminating contest, and the winner of the week was picked. That was all right so far as stage shows with a live audience

were concerned, but for radio it does not necessarily follow that the person who is very good on the stage will please radio listeners. Instead, he or she may be a real microphone flop. Consequently, I use my own discretion as to which of the amateurs is most likely to do well in a broadcast. Altogether, sixty of them have, up to now, broadcast from St. George's Hall, and some are well on the road to a successful stage career.

Some I have actually formed into a touring company which has been playing to theatres all over the country. But I am looking for brand-new 'stars' for the autumn and winter broadcasts; several have already been found. I shall be seeking others during the next few weeks at Plymouth, Blackpool, Nottingham, Swansea and Northampton.

"Fares of every amateur who takes part in 'the Hour' are paid, in addition to the broadcasting fee, and it is rather a strange thing that quite a number of the people I have found have come from the ranks of the unemployed. Incidentally, no amateur is ever encouraged to abandon a safe job in the hope of becoming a professional artist.

A Great Success

"One of my best discoveries was a young slaughterer who worked in Leeds. He found that he could easily imitate sounds made by birds and animals on the Council's farm, and his broadcast was a great success. Then there was a Wolverhampton upholsterer whose tenor voice made him a real radio find.

"A page in one of the cinemas had a very good voice, and now he is beginning what should be a successful vaudeville career.

"We find people in pretty well every walk of life, and among the successful ones have been a couple of apprentices in Woolwich Arsenal, a fur cutter, three London milkmen, a dressmaker and a typist.

"I have been the victim—if that's the word—of one or two gate-crashers—amateurs who, unable to get to any of the contests, have been determined that I should hear their act. Several times, as soon as I have lifted the 'phone when the bell rang in my office, a voice has said something like: 'Don't ring off! Don't ring off, Mr. Levis. This is Billy Jones.



WIZARDS OF THE KEYS

Charlie Kunz tries out Blackpool's own Wurlitzer organ, so ably played by Reginald Dixon, whom you also see in this photograph.

I play the mouth-organ. Listen to this just a minute.

"And I have just had to listen.

"As a matter of fact, one boy did play the mouth-organ so well over the 'phone that I got in touch with him afterwards and he has since broadcast.

"How many amateurs have I heard in this country? Oh, if you say a hundred thousand, you will be about right, I guess!"

AUTUMN DANCE MUSIC

The B.B.C.'s New Scheme

THREE kinds of dance music programmes are planned for the autumn, all specially designed to please a section of listeners.

First, there will be programmes labelled "For dancing only," for people who like to dance to the wireless, and here the bands will play in strict dance rhythm without vocal refrains of any sort. Then there will be programmes for the much larger section of the public, which enjoys music by dance bands but does not actually want to dance to it. Here special presentation, popular songs of all kinds, and other ways of entertaining listeners will be introduced. There will be no restrictions, except of quality, on the number of vocal refrains, or on any other way of making these programmes go over successfully. The third type of programme will be for the connoisseur of dance music. It will include a certain number of records and musically interesting forms of jazz, and also some foreign relays.

The general reason for planning on these lines is to please a maximum of listeners with what is one of the most popular forms of broadcasting, and one that certainly reaches a much wider public than wishes to dance.

TELEVISION IN AMERICA

By JOHN SCOTT-TAGGART

M.I.E.E., F.Inst.P., Fel.I.R.E.

PART II

New York, July 1937.

BRITAIN, for once, has led the world in radio by giving a national television service. Is this a technical triumph or a heroic feat like the Charge of the Light Brigade? America is not sure. In a land where to be biggest and best and first is worshipped ideal, they are at least envious.

Everywhere I went admiration for being first was on all lips; but there was the unspoken suggestion that we had stepped in where they, angel-wise, had feared to tread.

To-day we are still the only country giving a public service of television. To me it seems that might well be a reflection on us rather than a proud boast. Have we been stampeded into an unprepared service of doubtful entertainment value handicapped by, as yet, technically inadequate reproduction? Have we plunged ahead into a jungle leaving behind no organisation of communications? Probably America thinks so. Certainly I saw not the slightest sign of their following in our impetuous wake.

What Baird Did

Baird, of course, started it all. He gave the tremendous impulse to television which is now moving the heavy bulk of the world's radio companies. I say emphatically that, however inadequate his earlier results, he put the television clock forward ten or even twenty years. His 30-line service—however little it resembles modern television—was a start which also startled. Technical circles had been frankly sceptical. The problem seemed insoluble, the difficulties insuperable. The engineers who have done most for television were then inertia-ridden. They did not even want to tackle the problem; and the radio industry to-day still privately hates the idea of television as a disturbing element to radio sales and production alike. All that is changing, but who changed it? The answer is: Baird, the Post Office, and Big Business.

At what stage should an invention be exploited? Television came to us in the early laboratory stage. The Post Office, with a tradition for giving radio inventors a "break" (it was the British P.O. under Sir William Preece who encouraged Marconi), got the Baird 30-line system on the air via a reluctant B.B.C.

Was it all a waste of time? Psychologically, no. The amazing publicity injected strychnine into the veins of Baird's competitors. They were galvanised into action. Heads of such concerns as the Radio Corporation of America and its associates developed vision and made their engineers develop television. Plodding research was made to gallop. Men and money became available.

We are still conducting our experiments in public—experiments that could nearly as well be done in private and at far less

cost. That's what America feels. But nevertheless there is something to be said for leaping before you can walk. It makes you speed up the necessary process of learning to walk.

When every defect is made public and fully open to criticism there is a tremendous incentive for the business sponsors and engineers to improve matters. Perhaps we have, in establishing a public service, flung out a front line without adequate reserves. But 1914 showed how rapidly those reserves can be prepared when the front line imperatively needs them. Moreover, to get the B.B.C. and Post Office committed to developing television is of incalculable value, moral and financial. None of that backing would be there if we waited patiently—and perhaps unendingly—while private interests slowly perfected television in their own laboratories.

The backing of the B.B.C. has no real parallel in the U.S.A. where there are no licence fees and where there is no broadcasting monopoly. I did not get the impression that the broadcasting corporations were in any hurry for television. They are doing very well out of their sponsored programmes paid for by advertisers. Those chiefly interested are potential sellers of television sets.

"Trying Our Cookery on the Dog"

In America television will burst upon the public. In Britain it is oozing. In America apparatus and service will be perfected (after a fashion) before being offered to the public. In Britain we are trying our cookery on the dog as we go along. There has been a good deal of canine indigestion, but the incidence has been small. Few sets, comparatively speaking, have been sold.

Which system is better? In Britain—I think our own. People may gain a poor opinion of television to start with, but that will soon be wiped out when they see something really good. I am very conscious in Britain of a driving force behind television. Sir John Reith will undoubtedly put his broad shoulders to the wheel while certain commercial firms are more than keen.

Here in America there is not the same electric atmosphere. Outwardly there is very little doing. There are no services, although near the top of the Empire State Building—the highest (for the moment) in New York—the National Broadcasting Corporation has a transmitter which is



A glimpse of some experimental work in progress in the Philco television studio.

reputed to have cost a million dollars (£200,000). It is, however, virtually a testing station for the R.C.A. interests. The Philco people at Philadelphia sometimes radiate a public television programme, but I do not know who picks it up. It is, like the Farnsworth near-by station, a test station for their own work.

It is rather a coincidence that the three hot-houses for developing television are all within a few miles of Philadelphia. It is there that we have the R.C.A.-Victor plant with Dr. Zworykin, Philco with Mr. A. F. Murray as engineer in charge of television, and the Farnsworth Television Laboratories with Farnsworth himself in control and Mr. A. H. Brolley as Chief Engineer.

Philco's Huge Output

The first two are commercial firms which will sell television receivers in due course. The Farnsworth Laboratories are not—at present at any rate—a manufacturing concern. Their work is of a development nature and they would license others. Their business manager told me that their plans did not include the establishment of a factory—but "one never knew."

The R.C.A.-Victor people are regarded in Britain as the chief radio set manufacturing concern in the States. But actually this is not so. The Philco Corporation now does easily the largest business. A Radio Manufacturers' Association of America estimate puts the sales of Philco at 1,800,000 and R.C.A. at 600,000 for the last year, with Zenith third with about 550,000.

This huge output of Philco is all the more surprising when it is realised that they started up only in 1928 and before long were in the throes of the Great Depression. Their factory at Philadelphia was certainly humming when I went over it. Charlie Chaplin would have gone even crazier had he been compelled to test out, solder or otherwise man-handle receivers passing at an inexorable rate along the conveyor belt.

The television department is run by Mr. A. F. Murray, who was most courteous

(Continued overleaf.)

TELEVISION IN AMERICA—Continued

and anxious to give me information. In giving some opinions culled at Philco I should say they were not all his, as I discussed the subject with others there. I raised my pet aversion to the small size of pictures. Those shown me were about 12 in. by 8 in., or perhaps a trifle less, and I asked Mr. Murray at once whether he was satisfied with this size.

He said that there was a definite market for this size of picture; that the extra cost of larger pictures would militate against sales; and that, anyway, what was wrong with this picture size? I asked him if he had a home movie, and what size of screen he used. He said he used a smaller screen than usual, but when I suggested 12 in. by 8 in. he admitted my point. He preferred the smaller screen because he got a brighter picture, but this was rather a reflection on his projection gear.

I see that no one less than George Bernard Shaw has been condemning the size of the British television picture, but all the television people in the States and not merely Philco feel rather hurt if you complain of the small size of the picture, and will tell you in half a dozen ways, technical and psychological, that 12 in. by 8 in. is quite all right, that the detail is the same in any size of picture, that the angle of vision is unaltered, and so forth.

A Depressing Attitude

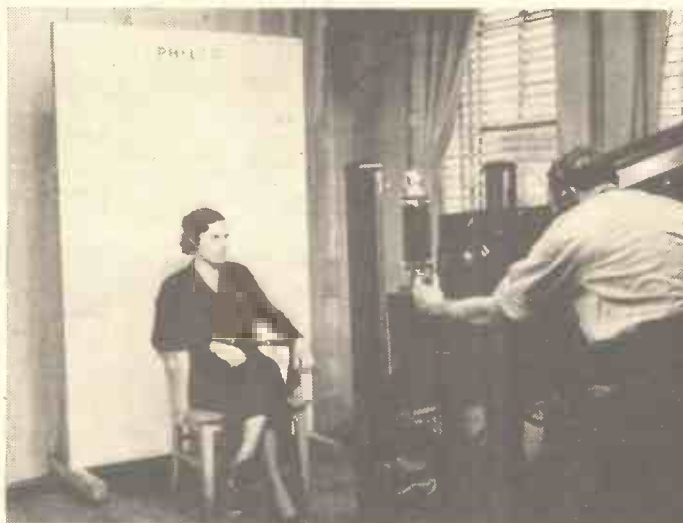
Well, we shall see. I am convinced that the satisfaction with 12 in. by 8 in. or less is due to daily working with this size, and a vivid appreciation of the technical difficulties of larger sizes. When he knows he cannot do any better it is surprising how satisfied a technician becomes with what he offers. It hardly occurs to him that the public may throw out his best as not good enough.

In all my American contacts I found very considerable satisfaction with things as they were and the general idea that improvements lay only in refinements. This attitude depressed me, because I am used to engineers setting a higher standard than that which the public can appreciate. The reverse applies to television. Engineers are so gratified—and with every reason—with high-definition television that they lose touch with a public which automatically sets the cinema talkie up as their ideal. The pitiable showing made by television when compared with the "movies" is apparent to all who are not lost in admiration and blinded by the very real miracle of modern television. Many television engineers are much in the same position of the man who swears his loudspeaker is a king amongst speakers because he is used to it. Only an outsider with an ear for music and a knowledge of what's what realises how poor is the reproduction. But whereas some knowledge may be necessary to criticise quality of reproduction, almost anyone who can see at all can criticise a television picture.

In the case of all the demonstrations I saw, those present gave me the impression that they were satisfied, if not delighted, with what they showed me. Nowhere at all did I fully share their satisfaction, and the situation needed all the tact I possessed and a good deal that I didn't.

While on the question of size of picture, I ought to mention that the R.C.A. people (with whom E.M.I. in Britain are associated) have been demonstrating most effectively a picture about 3 ft. by 2 ft., which could be extended even to 10 ft., but with less success. The system used involves a cathode-ray tube, the picture on its end being sufficiently bright to permit its being projected through an optical lens system on to an ordinary screen. The rival interests whom I saw, and also the N.B.C. were all appreciative of this demonstration given before the Institute of Radio Engineers. They all agreed it was most successful.

ADJUSTING THE CAMERA



Adjusting the Philco television camera in readiness for transmission. Mr. Scott-Taggart states that picture detail with the Philco system is such that when a dollar note is held before the camera the serial number can be read on the screen.

The use of a cathode-ray tube ordinarily restricts the size of the picture. The cost of a tube rises rapidly with size, and the pressure of the air on the outside of the tube may easily be over a ton. Nor is the shape of the tube adapted to bear this enormous strain, and an implosion (the collapse of the tube) becomes increasingly possible as the picture size, and therefore the tube size, increases. A 15-in. diameter tube seems at present about a conveniently practicable limit. No increase in picture size is thus likely, according to present views, if the ordinary methods are adopted. The R.C.A. work of projection is thus intensely interesting.

How far these schemes with their increased cost will affect marketability remains to be seen. It is estimated that the lens system of the new R.C.A. arrangement would cost perhaps £15 sterling—a substantial addition. It is to be remembered, however, that the lenses used can be of a type optically inferior to those used in a good camera, and mass production would bring the price down. Philco's felt, however, that price would become a main issue

in popularising television, and that a comparatively small picture with good detail would be preferred to a larger picture given by a more expensive receiver. Personally, I disagree, but in this matter of picture size I was opposed by Philco, Farnsworth and National Broadcasting Corporation, all of whom felt that a picture about 9 in. by 7 in. would "go over."

I owe Philco my particular thanks for erecting their equipment, temporarily dismantled, for my especial benefit. They gave me a most comprehensive demonstration, which involved carrying out tests which they permitted me to stipulate. The broadcast was radiated to all and sundry (more sundry than all, I imagine), and the announcer informed his public that the afternoon's programme was dedicated to the "inventor of the S.T.75," who was present at the laboratories. I would have felt more flattered if I could have remembered what the S.T.75 was.* It seems a very long way back. I don't seem to be able to live down these circuits, even in America.

The demonstration at Philco's did not, unfortunately, involve an ether link. I should have been happier if the transmitter had not been connected directly by cable to the receiver, but Mr. Murray assured me that the results by radio were practically as good, and certainly not less than 90 per cent. as good.

Film Stars "Stills"

About a dozen still photographs of film stars were received after the initial introduction by the announcer, to whom I had spoken earlier, and who, of course, was perfectly recognisable. These "stills" of Ruby Keeler, Al Jolson, Kay Francis, and other celluloid idols, were really superb, and undoubtedly the best thing I have seen "on the television." Afterwards I saw the photographs themselves, and the detail that came over was remarkable.

The photography, of course, was good, and the personalities clear-cut. But, apart from this, at none of the demonstrations I saw in America was there any attempt at showmanship. The announcers were quite ordinary-looking (aren't we all?), and routine engineers don't usually use lipstick or mascara. A Miss Cowell or Mr. Mitchell would have been more effective as an announcer, but, after all, television in the raw is what I was after. And I got it. I have never seen such poor, difficult-to-reproduce films as those shown me at the different laboratories. Most of them would have been bad shown in a cinema in the ordinary way. There was no attempt at proper contrast, while appalling patches of unadulterated black or white were common.

* This was the "tuned anode with reaction" circuit, first published by Mr. John Scott-Taggart in the "Electrical Review," February, 1919. This circuit, the basis of so many popular sets, swept both America and this country.—EDITOR.

(Please turn to page 552.)

FROM OUR READERS

ADDING AN EXTRA VALVE WITHOUT WIRING

The Editor, POPULAR WIRELESS.

Dear Sir,—Am writing these few lines to you, as I make a point of reading other readers' letters first on receiving my "P.W." each week. I am employed by a local firm of wireless specialists, and some time ago an A.C. radiogram in for overhaul was taken out of its cabinet, and the first thing noticed was an ordinary baseboard valve holder had been screwed to chassis with no connections and a battery S.G. valve plugged in with wire from anode passing through hole in chassis.

On tactful inquiries being made at customers we learnt that some time previously another dealer had been called in to see to this set and had told them he must fit extra valve, which was duly done and charged for. My firm's comments on dealer can well be imagined.

Here is a hint: In receivers using a pentode output valve I have found that fitting a 0005-mfd. variable condenser from grid of pentode, other side to chassis or earth connection, gives tone control and helps to stabilise set. This scheme is used on several commercial receivers I have serviced.

F. V. TRENT.

128, Hawthorn Road, Bognor Regis.

WHY NOT?

The Editor, "Popular Wireless."

Dear Sir,—A lot has been written on the possibility of communicating with other planets by means of wireless. Scientists say that this is impossible and that in any case there are no living people on any of the planets.

The reason given is that there is no air for them to breathe. But I fail to see how this rules out all life. I look at it this way: Animals and human beings are suited to the conditions under which they live, e.g. the negro has a dark skin to protect him from the effects of the sun, birds have plumage so coloured as to blend with their surroundings; therefore, why not people who are suited to live on a particular planet.

Observations by means of the spectroscope have convinced astronomers that there are certain gases such as hydrogen, nitrogen and helium in the atmosphere of some of the planets. Why, therefore, should not human beings, who are so constructed as to be able to live by breathing one or the other of these gases, not live on them.

If they do, and if they have the power of thinking as we have, could not they have invented some form of communication, and why should not this be wireless—not perhaps as we know it, but in a similar form.

A. C. SKEELS.

58, Fairville, Tennyson Avenue, King's Lynn, Norfolk.

THE COST OF COMPONENTS

The Editor, POPULAR WIRELESS.

Dear Sir,—I feel I must congratulate you on your very interesting publication, from which I have learnt a good deal concerning radio construction. I have built many of your designs with good results (the S.T.700 was about the best of them all!).

The great difficulty in South Africa is the obtaining of components, which are also very expensive, but the cost is not great when one bears in mind that a factory-produced radio (American) costs £30 including batteries.

I am enclosing a snapshot of my six-valve battery set which has untuned S.G., detector, two L.F. stages and two pentodes in push-pull. The set is an all-wave design, and fully loads the two loudspeakers shown in the photo. The earphones are used for tuning-in weak overseas stations. The L.T. (.9 amp.) is supplied by one cell of a car battery. The H.T.

The amazing experience of a reader employed as a service engineer

is supplied by a 135-volt layer-built "Philco" battery. In Oudtshoorn, I receive all the better-known overseas broadcasts (Davenport, Zeesen, Eindhoven, Schenectady, Tokio, Melbourne, Lourenço Marques, etc.) on short waves, and also many amateur broadcasts from America.

Trusting that you will be able to publish my snapshot in "P.W.", and thanking you once more for the many valuable hints picked up in "P.W."

WYNAND W. JALJAARD.

Rand Street, Oudtshoorn, Cape Province, S. Africa.

HAVE YOU HAD IT?

The Editor, "Popular Wireless."

Dear Sir,—I suppose everyone who is interested in short-wave listening has come up against harmonics at some time or another, so I'd like them to know of my experiences.

My friend next door owns a long- and medium-wave set (obtained by smoking umpteen cigarettes!) and whenever he has it tuned to N. Regional I can always hear that station very strongly in the background of the 7 and 14-m./c. bands, much to my annoyance. Strangely enough, as soon as he tunes his set to another station or switches it off, I no longer hear the unwanted station on those two "ham" bands. When he feels like listening to a spot of music, and I feel like hunting the "ham" bands, trying to pull in a 5-watt S. American, I call him every-thing under the sun (to myself, of course).

FROM SOUTH AFRICA



The snapshot referred to by Mr. W. W. Jaliyaard of South Africa showing him with his radio gear.

Would you call that a harmonic—or would you call my friend an illegal Txer? I think I shall have to denounce him. Hi! Hi!

Within a radius of about three miles of my QRA, half a dozen Txers are continually off and on the air. They all operate on 40 metres, but one or two of them are on the 20-metre band as well, and when any of them are on the air on 40 at the same time as I am hunting for DX I can hear them nearly as well on 20 as on 40.* I suppose this is a true example of harmonics.

My Rx, by the way, is an 0-V-2 battery set with plug-in coils, and I can get all the ham bands with the exception of those below 10 metres.

If any other readers of your very fine paper have experienced similar happenings (with reference to the first part of my letter) I'd like to hear from them.

Wishing you and all the staff of "P.W." '73's and very good health.

JOHN T. ANGLIN.

233, Welholme Road, Grimsby, Lincs.

* Incidentally at R99, so I just have to switch off for an hour or two.

WIN A GUINEA!

This sum is awarded to the writer of the letter, which, in the Editor's opinion, is the most interesting of the week's batch. Letters on any radio subject are welcomed. Let us have your opinions or experiences. This week the guinea goes to Mr. F. V. Trent.

APPRECIATED IN AUSTRALIA

The Editor, POPULAR WIRELESS.

Dear Sir,—Having in the past ten years or so derived a great deal of pleasure from the reading of POPULAR

WIRELESS, I write to express my appreciation of all the varied and excellent articles which one can be sure of finding in every issue.

Especially interesting are the replies to listeners' queries given by Mr. K. D. Rogers and the weekly writings of our old friend, W. L. S. The Technical Jottings of Dr. Roberts is usually the first page I turn to upon opening the eagerly awaited weekly issue. The set I am at present using is the Super-Centurion by Mr. Scott-Taggart—and very good service it gives, too. Most of the sets in use out here are commercially made, and are almost all manufactured in Australia.

Great interest is being shown this year in the new model all-wave sets, the short-wave side being very useful when local static makes listening to local medium-wave stations uncomfortable.

During the summer here the Empire stations at Davenport provide good entertainment, almost free from atmospherics. Recently the Post Office have erected several powerful regional stations, and the position of outback listeners has greatly improved.

In conclusion, long life to well-named "P.W."

T. H. PULLEY.

Nyabing, West Australia.

A SUCCESSFUL SOS

The Editor, "Popular Wireless."

Dear Sir,—Thanks very much for insertion of my SOS in "P.W." Have got what I required by the evening post of the same day as "P.W." was issued.

Would like to send my appreciation of some of the features that appear in "P.W." weekly, namely, L. W. Orton's "The Dial Revolves" and W. L. S.'s articles; also Mr. Chester's. Of course, this is all short-wave stuff, but don't think that I do not appreciate the other articles. "P.W." has got very interesting just lately. I was able to assist another "P.W." reader

(Continued overleaf.)

FROM OUR READERS—Continued

through my SOS; he wanted to know if I could assist him with the Extractor Unit which came out with the S.T.800, so I have forwarded to him two copies of "P.W." containing the S.T.700 and S.T.800, including the blue prints and dial cards.

Thank you once again.

J. O. HEYMESON.

221, Welbeck Road, Carshalton, Surrey.

ANOTHER EARTHED AERIAL

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to Gordon Birrell's claim to receiving short-wave stations on earthed aerial. This method has been used by me for some considerable period, using S.T.800.

My aerial arrangement is somewhat different to your correspondent's, it being a 50-ft. inverted L directly earthed with a .0003 variable in series and brought to aerial of set; 12 feet of the inverted L feeder is entwined with another feeder which is also earthed through a .0002 variable, and it is found that this latter arrangement gives a vernier effect on tuning. The arrangement was originally intended to help cut out static from cars, and being fed-up one evening I earthed the main aerial, but found that W 2, X A D still romped in at R 6-7.

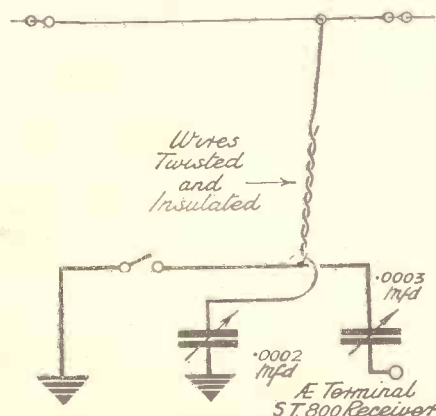
It seems to me that the whole pick-up is coming from the earthy side, via the .0003 variable, but I doubt if the results would be the same if the terminal were connected direct to earth.

Again, similarity is noticed to Birrell's case. With regard to tuning position, whether aerial is earthed or not, the actual tuning varies only by a quarter of a degree.

As a pointer to the efficiency of this arrangement, I heard, or presumed it was, the Caledonia the other day. "Now passing Newfoundland coast, 09:20 G.M.T." I could not swear it was the Caledonia, as I did not hear call signs, but it was round about 32 metres.

Whilst writing, I thought I would like to speak about the automatic alarm system. Unfortunately, I have been unable to find the back number where one of your correspondents from Sweden, I think, stated that

AN UNUSUAL SCHEME



This is the aerial arrangement used by Mr. Hobden.

it was a failure. It may interest him to know that this system was thoroughly tried out in 1924; in fact, a destroyer was fitted out and kept standing by specially for rough weather trials—and, believe me, they were rough-weather trials too! Even so, the system behaved well and was a definite success. Perhaps W. L. S. could make some comment on that, for in the manner he writes I should think he, too, was an ex-naval operator.

It is of interest to read in your columns "Old Memories." I have mine. In front of me now stands one of the first valves used for wireless purposes—it is a B.T.H. 4-volt, Patent No. 3987. I am no photographer, but should it be of interest to you I would very willingly pack it off to you for photographic purposes; it looks anything but a valve, with its anode and grid in two pieces. I think its date of production is 1916, but cannot vouch for it.

Well, here's hoping this will be of a little information to Mr. Birrell. I have enclosed a rough sketch of aerial arrangement.

Wishing your "P.W.'s" all the best.

L. F. J. HOBDEN.

17, Hartington Road, Brighton, 7.

AN EXPLANATION

The Editor, "Popular Wireless."

Dear Sir,—The solution of Mr. Gordon Birrell's problem is as follows:

The earth-lead and the aerial have capacity, a certain amount of resistance and inductance; and, if twisted flex or 7/22 copper, considerable inductance for very high frequencies (short waves). So that when he (as he thinks) shorts his aerial to earth, he is doing nothing of the kind—in effect, he is merely switching in an auto-coupled inductance in parallel with the one in the set, and, as that decreases the D.C. resistance for the overall inductance of the two inductances combined, it would not surprise me if he jolly well got signals a trifle stronger than otherwise, and a trifle more selective into the bargain, by reason of the auto-coupling of the first inductance previously overlooked.

If he is using a series aerial condenser (and he probably is) he has an auto-coupled aerial circuit capacity-coupled to his tuned circuit proper, which suggests a circuit well worth deliberately making up and trying out on any waveband, say a centre-tapped inductance for aerial circuit.

E. VASS.

22, Cardigan St., Kennington Cross, S.E.11.

HOW MUCH IS "TOO MUCH" ?

The Editor, POPULAR WIRELESS.

Dear Sir,—Although I have been a reader of POPULAR WIRELESS for five years, this is the first time that I have written to you. The article on Service Engineering, in your issue of June 19th, prompted me to write this letter.

I disagree with Mr. Barnard on one point. He states that, in his opinion, too much theoretical knowledge is a drawback to efficient service work. Although all my arguments rest on the definition as to how much is too much, I consider that it is almost impossible for a service man to have too much theory. You see, in this country, it is necessary to make any set as sensitive as possible.

A service man must have a reliable all-wave (20 m./c.—100 kc.) oscillator which can be modulated at will. He must also have an output meter of some description. This is generally an A.C. voltmeter in series with a fixed condenser of about .1 mfd. For accurate alignment it is no use trusting to the ear. I have known many sets which, when aligned by ear, could not pick up overseas stations, but which, when aligned with the use of an output meter, would pick up practically anything which was on the air.

In this country a service man must also

be able to make slight alterations to manufacturers' wiring in order to gain extra sensitivity. He has also to be able to fit in parts of other sets and to wind coils; spares are often not available. The coil winding is, of course, done by trial and error; but, nevertheless, has to be accurate.

Must Be An All-Rounder

Manufacturers state that variable condensers should never be touched, but should be sent back to them for adjustment. This means a delay of ten weeks to six months for American sets. The customer cannot be asked to wait this time, so the service-man has to do the job himself. Speaker cones are often made by him and power transformers and smoothing chokes re-wound. The service man has to be an all-round man here; as a matter of fact, in the smaller towns he is also the salesman. There is another thing—he is expected to be able to service refrigerators.

As a service man I can speak for hours about the job in this country. Though I do not wish to discourage anyone, I consider no one should

take on radio servicing before he has a thorough grounding in the theoretical side of radio. And even then, I should suggest that he learns something about refrigeration before tackling the job.

I consider your paper grand. It is technical—but not to the extent of becoming boring.

The American papers have a habit of talking all round the point in question without coming to it. You do not try to press yourselves upon anyone, but do your stuff quietly and efficiently. I, for one, appreciate this—as well as "Ariel's" twitterings!

R. CURLING HOPE.

13, Ebdon Street, Queenstown.

THE "EAR OF EDMONTON"

The Editor, "Popular Wireless."

Dear Sir,—I was very much interested in Mr. F. Lanaway's letter which appeared in "Popular Wireless," dated June 19th, 1937, and would like to make some sort of comment on it. Will you be so kind as to grant me a little space in your mag. in order to do so?

First, I would like to congratulate the "Ear of Edmonton" on his amazing log of short-wave stations—to hear over 200 foreign short-wave stations in a period of 30 days is really remarkable! I only wish that my receiver would do it—counting "hams" in as well! However, I suppose the ability to "nurse" a set counts a lot, so I will leave it at that, although I sincerely wish that I had details of his two-valver. What about it, Mr. Lanaway? I am sure many more readers of "Popular Wireless" would appreciate your circuit. All those in favour say "Hi!"

The Question of Veri's

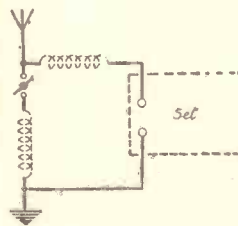
As regards to his challenge, I personally don't believe anyone in the British Isles will accept it, although I would like someone to, because it's all for the good of the game. What do those well-known DX-ers, such as R. D. E. of Sawbridgeworth and F. A. B. of Ridgewell, say re this? If Mr. F. Lanaway would give me his circuit, I would have a go at it myself.

And, lastly, a word or so about "veri's." This writer is of the opinion that unless a reply from a radio station actually states that reception is verified, it cannot possibly be a "veri" by the true sense of the word.

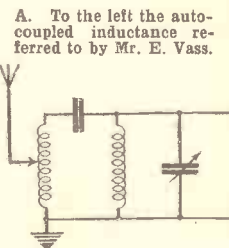
Here's wishing my favourite wire book all the best.

J. CLIFFORD.

45a, St. Loys Road, London, N.17.



B. On the right shows the effect of a series aerial condenser.



TELEVISION TOPICS—Collected by A. S. Clark

"TELEFRAMES"

Items of general interest

PHILIPS PROJECTION RECEIVER

ALTHOUGH television reception by means of a small picture on a high-voltage cathode-ray tube projected on to a screen is not new to the laboratory, the Philips projection receiver is, as far as we know, the first to be brought to a stage where it can be housed in a cabinet and looked upon as a prototype for production models.

The original picture is two inches wide and is produced on the screen of a cathode-ray tube using a voltage of 25,000. The projected picture may be in one of two forms. It may be either projected on a ground-glass screen incorporated in the instrument, or it may be focused on a screen separate from the instrument.

In the latter case the screen is three feet square. The picture received on the ground glass screen is 20 ins. by 16 ins.

BAIRD DROP WORD "TELEVISOR"

The word "televisor" has popularly been used by many people to describe any television receiver, and sometimes transmitter. Actually, in the past it was a registered trade mark of the Baird Company and, rightly, was only applied to their products.

However, recently, this company has decided to drop this word as a trade mark and to market their goods under the trade name of Baird. In the official announcement the following explanatory sentence occurs: "Television apparatus is still, comparatively speaking, in its infancy, and the Company considers that it would be right to use as its trade marks words which will be regarded by all as distinctive of its goods rather than a word which many contend should be available for the use of all as a descriptive word for any kind of television apparatus."

The word "Televisor" was originally invented by Mr. Baird in 1925.

THEATRE TELEVISION IN AMERICA

The possibilities of the application of television to theatres is not being overlooked in America. Courtland Smith and Jack Connolly, who have both held important positions with Pathé News, have already plans in mind for a group of television theatres.

It is stated that their schemes are made vastly more practical by a special lens they have developed, which can project large-size pictures on a cathode-ray tube up to a size of many feet. Such a feat is not, of course, new to optics; but the new lens scores in that it is comparatively cheap.

HAVE YOU HEARD THEM?

Experimenters in television and those interested in ultra-short-wave reception should have a listen for the Scophony transmissions if they reside in the London area.

These transmissions are sent out to work the Scophony receiver at the television exhibition at the Science Museum at South Kensington. The sound is on a wavelength of about 6.4 metres and the vision on 6.1 metres. The address of Scophony is Thornwood Lodge, Campden Hill, London, W.8, and no doubt they would be interested in reports on reception of their transmissions.



A good impression of television programme providers—both engineer and "performer"—at work. It shows Mr. Bernard Tussand, the famous waxwork modeller, at work on a bust of Mr. Neville Chamberlain, the Prime Minister.

A NEW TELEVISION CAMERA

A recent patent concerns a new type of television camera which appears to have every promise of being extremely sensitive. The main feature appears to be based on the electron-multiplier principle.

Instead, however, of this principle being used to amplify a single current sequence, it is used to amplify the picture as a whole.

The picture is focused on a photo-sensitive screen from which electrons are emitted in accordance with the intensity of the light at the various points. These electrons pass straight to a second screen, where they produce secondary emission of a stronger nature. This produces charges which are scanned by a cathode-ray beam in the same way as scanning is achieved at the present time in the television cameras at Alexandra Palace.

to right, or top to bottom, it is possible that diagonal or curved scanning lines would be less perceptible. At the same time, it must be remembered that if definition—namely the number of lines in the picture—is increased sufficiently in the future, it will be impossible for the eye to pick them out, no matter what form they take.

The Time-Base Problem

Another thing which must be remembered when considering the advantages of scanning forms is the possibility of added complication in the time-bases at the receiver in order to produce the necessary scanning structure. The question of synchronising-pulse difficulties also has to be borne in mind.

But at the same time, it is never safe to assume anything is final in television.

SCANNING CONSIDERATIONS

WE have become so accustomed to horizontal line scanning, either in sequential or interlaced form, that there is a tendency to take it for granted that this is the form of scanning that will remain with us in the future. Maybe it is, but there are other forms, and it is not impossible that they might find place in future developments.

There is the original vertical line scanning, spiral scanning, and various criss-cross scanning patterns. Then there are systems in which one form of scanning—say horizontal lines—are interlaced with another such as vertical lines.

The main object in all special forms of scanning is to remove any possibility of the lines of which the picture is made up, being visible. Also, by varying the form of scanning, the effect of interference can be more broken up.

Since the eye, when looking at a picture, tends to move in straight lines from left

SERIAL THRILLER FOR NORTHERN LISTENERS

THE first "round" of a radio serial thriller called "Knock-out Kavanagh" is to be broadcast in the Northern programme on August 23. The author, Brian A. Stuart, has crammed a good deal of adventure into his thirty-five years. Perhaps it was reaction to six years in the Bank of England that sent him adventuring to India. Horror of the humdrum certainly seems to have shaped his character. He has hunted, trapped and "lumbered" in Northern Quebec. He joined the French Foreign Legion, which he subsequently defended strongly in his book "Adventures in Algeria." In the Legion he rose to the rank of sergeant and, to the best of his belief, is the only Englishman recommended for a commission from the ranks. When defective eyesight ushered him out of the Legion, he achieved the feat of crossing the Sahara Desert alone on foot. Just now he is organising an insect-collecting expedition in British Guiana.

SEEN ON THE AIR

By L. Marsland Gander

Our special radio-screen correspondent has just returned from a visit to the German Radio Show, and below he gives his impressions of television in that country

I HAVE no sympathy with the "idiot who praises in enthusiastic tones all centuries but this and every country but his own."

Nevertheless we should, I think, be foolish not to recognise that Germany is moving ahead of this country in the presentation of television to the public. I believe it would be salutary if the Postmaster-General, the members of the Television Advisory Committee, Mr. Gerald Cock, and, in fact, anybody who matters in British television, could be transported in a body to the Berlin Radio Exhibition.

The outstanding impression of my recent visit is not that Germany is ahead technically, but that she is spending far greater sums than the B.B.C. and the British Government on television development. As I expected, the 441 lines standard of interlaced scanning at fifty pictures a second is not noticeably superior to the B.B.C. standard of 405 lines. But Germany has adopted an ambitious plan, involving construction of three television transmitters to the new standards.

Like Modern Castles

One transmitter will be in the existing Witzleben tower at Berlin, which at the moment is still transmitting on a standard of 180 lines. The other two will be on mountain summits, one on the Brocken, the 3,747-ft. peak in the Harz range, 120 miles from Berlin; the other on the 2,900-ft. Feldberg, near Frankfurt. Mural pictures in the exhibition showed that these stations are like nothing so much as modern castles, each with a stone tower 100 feet high.

Construction is, I understand, already far advanced, but is liable to be held up by bad weather as the winter months approach. I happened to meet Dr. Goerz, head of the Reichspost Television section, in the exhibition, and I asked him when these stations would be opened. He cautiously declined to name a date, though I believe October has been mentioned as a possibility. I also asked Dr. Goerz how much had been allocated to television expenditure, his reply being "More than I have."

He asked me if I knew how much England had spent on Alexandra Palace. I replied that I did, namely £110,000. At which information, for some reason, he seemed somewhat sceptical.

But I must, in justice, say that England is far ahead of Germany in the quality of television programmes. The Germans, for some reason, seem satisfied with the simplest and most unsophisticated entertainments. In the television hall there were three stages constructed to resemble television studios, and on them, as a rule, there were artists dressed in national costumes singing or playing. There seemed no attempt at production or presentation as understood

by the B.B.C., and, in fact, I must say that the average turn would not have a very cordial reception at an English provincial music-hall. I can only judge that the Berliners are satisfied with this simple fare from the fact that the viewing rooms throughout Berlin are still thronged nightly.

How different conditions are compared with this country may be judged from the fact that the Germans cheerfully envisage their artists travelling to mountain tops to give their television broadcasts, though to be sure land line will also be used. The fact is that the artists are paid a mere pittance, so that programme expenditure—a serious item for the B.B.C.—is of little account in Germany.

The television section of the exhibition was considerably larger than last year, and occupied the whole of one of the eight main halls. The three most important exhibitors are the German Post Office, which acts as the fairy godmother of German television, the Fernseh and the Telefunken companies. Loewe and Lorenz have smaller exhibits.

Both the Telefunken and the Fernseh

REMOVING SOLDER FROM SCREW THREADS

IT is apt to be exasperating when one comes to make use of an old bolt or piece of threaded rod during the course of some radio job and finds that the threads of the bolt or rod are choked up with remnants of solder.

In such instances, it is, of course,



A little heat, followed by the application of the brush, is all that is needed.

impossible to get rid of the solder by rubbing the bolt with sandpaper, since this attempted procedure would only injure the screw threads.

By far the best way of removing solder from screw threads of the above description is to heat the bolt or rod in a gentle flame—the flame of a spirit-lamp, for instance—until the solder softens. Then withdraw the bolt from the flame and immediately rub it, with a twisting movement, over a perfectly dry nail brush. Every trace of adhering solder will be removed instantly, leaving the screw thread in its originally "clean" condition. J. F. S.

companies have developed an enormous 20-in. cathode-ray tube which shows a picture measuring about 16 in. by 12 in. Surely this must be the maximum size, and there is more promise in the miniature tube with a magnified picture such as the Philips Company are developing here and in Holland. This Philips set produces a picture measuring 20 in. by 16 in. I am told that there is every possibility of a demonstration at Radiolympia. One advantage is that the screen is flat, having none of the curvature at the edges associated with the large cathode-ray picture. As to brilliance, quality and durability of the tube I am not yet in a position to judge.

An important exhibit seen at the preview by the Press was a 729-line picture produced by the Fernseh Company. On the opening day the apparatus had disappeared, by order. The reason for this ban was obvious. As the German Post Office had just adopted a standard of 441 lines, and there is a possibility of sales to the public, the authorities did not wish their plans to be upset by the display of a superior picture.

Clear and Brilliant

The 729-line picture, which consisted of film, was extremely clear and brilliant and would have been quite indistinguishable from the best home cinema reproduction had it not been for the fact that for some reason there was a slight flicker. As interlaced scanning was being used, with fifty pictures a second, the flicker was inexplicable but was attributed by the technicians to the unusual brilliance of the tube.

One of the most remarkable features is that the Fernseh Company are still using disc scanning for 441-line film transmissions. And what is more, in my considered opinion, the film pictures reproduced by this system are brighter, better, and more clear-cut than those transmitted by the Iconoscope method.

Another rather unexpected feature is that the Fernseh Company are persevering with the intermediate film method for outside broadcasts. I was not able to see a demonstration of this, but did

inspect the apparatus which has been greatly reduced in dimensions. The bulky gear which used to fill the whole of a van as large as a Green Line 'bus has been reduced to the size of a crate that could be carried on an Austin 7 chassis.

The water-cooled "cold" lamps developed by the German Post Office are an important novelty. I stood in the glare of a battery of nine used on one of the television stages, and felt no heat at all. They should be an enormous advantage in the television studio.

In the big-screen demonstrations I was slightly disappointed. Good, but indifferently illuminated pictures were being shown on screens measuring three feet by four and six feet by eight.

TECHNICAL JOTTINGS

By Dr. J.H.T. Roberts, F.Inst.P.
Items from a Radio Expert's
Notebook

Receiver Efficiency

MANY sets do not operate at maximum efficiency, and for this there are a variety of causes. One of the commonest causes is the use of a grid-leak resistance of unsuitable value. If you think that your set is not quite up to scratch, this is one of the first things you might turn to, and it is worth while to try making some adjustments in the value of the grid leak until you find out the best value, that is, the value which best suits the valve you are using.

Some of you will remember a few years ago variable grid leaks were very popular. If they had been fully reliable they were certainly a great asset because, with a variable leak, you could not only adjust to the best value by continuous adjustment, but you could readjust very quickly for different purposes, for example, when receiving very loud and powerful stations or when receiving weak transmissions from a distance. The trouble with variable grid leaks was that they never seemed to be really reliable.

Grid-Leak Adjustment

They usually depended upon some sort of high-resistance liquid, and as there was only a column of an inch or so in length of this resistance element, you can easily imagine that slight leakage or other effects would make a great difference to the resistance. At any rate, after having had quite a vogue for a year or two they gradually fell into disuse and were replaced by fixed grid leaks of different values. In one way there is a good deal to be said for a fixed resistance, because it is very much simpler and more permanent; it has a great advantage over the variable resistance if only you can strike the right value. To-day, most people use fixed grid leaks and make any necessary changes in the grid-leak value by substituting different resistances.

Try This

If, however, you particularly want to try a variable grid leak you can easily do so by the old trick of making a line of Indian ink (it must be Indian ink, made of carbon, and not ordinary writing ink, which is an aniline dye) on a strip of cardboard; this forms the resistance element, and you then put a springy paper-fastener clip on to each end of the cardboard and bring a blob of the ink from the end of the streak into good contact with the metal clip at each end. A third paper clip, pushed on to the edge of the cardboard and making contact with the streak of ink, will serve as a "sliding contact" and can be pulled off and put back into different positions.

A Test of the Circuit

I am not recommending this arrangement for permanent use, but it is interesting to play about with and it will, at any rate, soon tell you whether different values of grid leak will make much difference to the efficiency of your set. If with a dodge

of this kind you discover that the actual value of the grid leak is very important in your particular circuit, then you will know that it is worth your while to get a hold of some different fixed grid leaks and try them in position for the best value.

You can, if you particularly wish, use the Indian-ink arrangement mentioned above as a permanency, but if so you should give it a varnish over with cellulose or shellac, after having adjusted it to the best position. Even then it is not particularly reliable, mainly for the reason that there is apt to be trouble at the contacts.

Selling Radio

It is curious how the marketing of radio develops year after year. Who would have thought a few years ago that we should see a large business in the renting of radio receivers? I guarantee if you had brought up this scheme ten or even seven years ago it would have been regarded as an impossible proposition. To-day, there is an enormous business done in the letting-out on hire of radio receivers on a maintenance basis. It is evident that there must be hundreds of thousands of people who would sooner pay a small sum per week to have all the advantages of radio without any responsibility or trouble than to have their own radio receiver and have to attend to it. The point of view is similar to that of the flat-dweller who prefers to have his flat at so much a month or so much a year, including all rates, taxes, central heating and so on, rather than to buy a house and have to attend to all these things himself. I do not personally share this view, and no doubt a good many of my readers feel as I do, but at the same time there are lots of people who feel the other way and the number of flat dwellers is not only enormous but rapidly increasing. In the same way the popularity of renting radio is increasing, too.

Radio Relays

The radio manufacturers have had an additional incentive in making rented radio attractive, because they have had to compete with the radio relay services which, as you know, provide you with alternative programmes actually on tap by means of a wire laid on to the house. The radio relay service is actually simpler than the rented radio but, of course, it doesn't give you anything like such a wide selection of stations.

When you rent a radio set the manufacturers install it free, arrange for a suitable aerial and, if it is a battery set, provide a service of charged batteries at the proper intervals. They also undertake to keep the set in perfect condition and, of course, to replace defective or damaged valves.

Question of Cost

I suppose it must come out more expensive in the long run to hire a set than buy one—although on this point there is a good deal to be said by both sides—but it evidently suits many people better to have the set simply do its stuff whenever it is switched on, with somebody else taking all the responsibility of keeping it in order.

In this connection there has been for a long time a movement on foot to provide a sort of radio relay service by means

(Please turn to page 549.)

PETO-SCOTT

A.C. BAND-PASS RECEIVER and POWER PACK KIT "A" Cash or C.O.D. £7:17:6 Carriage Paid


Comprising Complete Kit of first specified parts for Receiver and Power Pack portions, excluding Valves. Or Deposit 13/6 and 11 monthly payments of 14/6. KIT "B" as for Kit "A" but including set of Specified Valves. Cash or C.O.D. Carriage Paid. £10/6/0, or 18/- down and 11 monthly payments 19/-.

CHARGE your L.T. for 1/3d. A WEEK!

Peto-Scott TRICKLE-CHARGER

● Nothing to wear out or go wrong. ● Modern metal rectifier. ● Air-cooled mains transformer. Never be "left without your Radio" because your L.T.'s run down. The new Peto-Scott Lamp, Trickle Charger will charge your 2-volt accumulator at 1 amp while you sleep. 12 months guarantee. 7 days approval against cash A.C. Mains. 200/240 volts, 40 / 100 cycles. Overall dimensions: 3 1/2" high, 2 1/2" diam.

CASH 12/6 PRICE




H.T. for 1d. a Week!

Peto-Scott H.T. ELIMINATORS

MODEL A.C.12. For outputs of up to 12 m/A. A.C. 200/250-v., 40/100 cycles. Output 120-v. at 12 m/A. 4 tapplings: 60v., 75-v., 90-v., and 120-v. Cash or C.O.D., 30/-, or 2/6 down and 10 monthly payments, 3/-.

MODEL M.A.10/30. Eliminator and Trickle Charger. Cash or C.O.D. £2/19/6, or 5/- down and 11 monthly payments of 5/6.

2/6 DOWN



S.T.800 BATTERY VERSION

KIT "A" YOURS FOR 7/- DOWN

Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart, with Koncetakit. (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker. Cash or C.O.D. Carr. Pd. £3/10/0, or 7/- down and 11 monthly payments of 6/4.

KIT "B." £4/16/6, or 9/- down and 11 monthly payments of 8/10.

KIT "CT." £5/14/0, or 12 monthly payments 10/6.

KIT "CC." £6/11/6, or 12/3 down and 11 monthly payments of 12/-.

KIT "OLL." £8/14/0, or 12/3 down and 11 monthly payments of 12/3.

NEW 4-valve S.G., Det., Pen. A.C. ALL-WAVE CHASSIS

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THAT OHM'S LAW EQUATION

A. B. (Essex) objects to the method shown him of rearranging Ohm's Law to deal with milliamps. He says it is confusing, and asks if a simpler method is obtainable.

The formula he does not like is :

$$\frac{\text{Volts}}{\text{Milliamps} \times 1,000\text{'s of ohms.}}$$

He says :

"The idea is to put the finger over the term desired, and work out what is left. Surely the term '1,000's of ohms' is a little obscure? It must mean, to make the equation work, for each 1,000 ohms put down 1, or if the ohmic value is below 1,000 divide this figure by 1,000. I first took the term to mean multiply the ohmic value by 1,000, but this is, of course, incorrect. Can you suggest a better way of writing the equation?"

Oh, dear! But let's try to explain. The Ohm's Law equation is really $E = C \times R$. We want to know E, say, and writing the equation so that we can do the finger-covering trick, we have

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

 But that is an equation in volts, ohms and amperes. If we want to deal in volts, ohms and MILLI-AMPERES something must be done.

Now consider this. Suppose we have this equation: $10 = 2 \times 5$.

I have given E a value of 10, I have given C a value of 2 AMPS, and R is 5 Ohms.

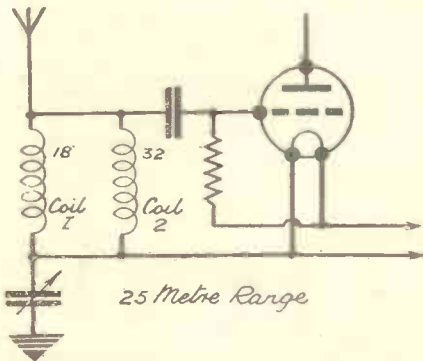
That equation is right. Now suppose we do not know the value of E, but we know the values of C and R. By the

$$\frac{E}{C \times R}$$
 equation we get 2×5 , which is 10. (Covering over the E with the finger as instructed.)

Now suppose C is in milliamps. Let us work out the equation with $E = 10$, but not knowing R.

We have $10 = 2 \text{ m/a.} \times R$. That is straight. It gives us $10 = \frac{1,000}{1,000} (\text{amps}) \times R$, which brings us to Ohm's Law stated in volts, amps and ohms. The answer is obviously that $R = 5,000$ ohms.

COILS IN PARALLEL



This is the scheme put forward by F. G. H. M. (Potters Bar) and referred to in the next column.

If we stated the Law like this :

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

we should be wrong if we put 2 in place of C when C was in milliamps. We must divide C by that 1,000. If we use this formula :

$$\frac{E}{\frac{C \times R}{1,000}}$$

we are right, for using our same values we get

$$\frac{10}{\frac{2 \times R}{1,000}}$$

and by covering R with the finger we arrive at

$$\frac{10}{2}$$

which is the same as $\frac{1,000}{2} = 5,000$ ohms.

There is only one way I know to put the formula so that it is fool-proof for those who want to do the finger stunt. It is this :

$$\frac{E}{C \times R \times 1,000}$$

The result is in milliamps, volts and ohms. The idea of milliamps times thousands of ohms is confusing. I prefer the above formula, which is clear mathematically and precise. It must be understood, of course, what one does with the formula as regards the three lines. I mean that when one is getting at what R should be the person working the formula should know that

$$\frac{E}{C \times R \times 1,000}$$

Once that fact of working fractions is clear the formula should not present any difficulty.

AERIAL TUNING

I have been asked to put this idea forward to short-wave readers. The ordinary short-wave coil was used in the aerial circuit of a set—see diagram—with series tuning. Then a second coil was placed, as shown, in parallel with the first. The result was that tuning on the second coil by reducing and increasing the number of turns resulted in much better signals than when Coil 1 only was used.

As the writer does not state whether the second coil is coupled in any way to the first coil, I cannot say exactly what is happening, except that it is merely a method of parallel inductance tuning, which should work quite well. It is understood, of course, that the second coil is large in comparison with the first, being of 32 turns against the aerial coil of 18 turns.

I strongly suspect, however, that the two coils were to some extent magnetically coupled and, therefore, a "variometer" effect was obtained to a certain degree. Not a variation of inductance due to opposing and assisting fields, as in the true variometer, but a variation of inductance that is obtained not only by the variation of the parallel effect due to alteration in the number of turns in the second coil, but also of inductance due to coupling—in other words, variation of mutual inductance which is obtained by the alteration in the inductance of coil No. 2 by variation of the number of turns.

I put it forward for your attention for what it is worth. My correspondent, F. G. H. M. (Potters Bar), has found it very successful. Let me know how you get on if you try it.

THE TOP BEND

J. F. S. (Barnstaple).—I have been told that there are two anode bends in a valve curve. I thought there was only one, the bottom bend, which is used for rectification.

There are two such bends, one at the bottom, which is the one usually employed for rectification when a set uses "anode bend," but there is another at the top which can be used. This bend depends on the saturation point of the valve and requires careful reduction of filament or cathode heat in order to obtain a good bend.

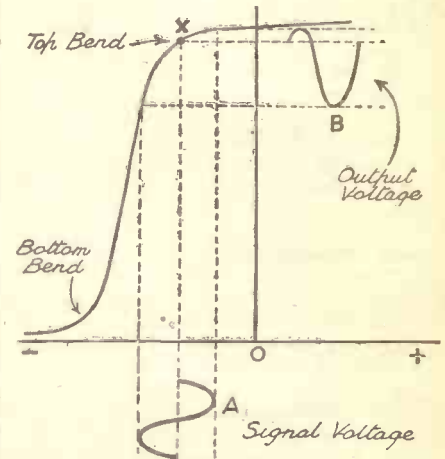
The curve of the valve is made to go like the one shown in the diagram, the point X being the bend point. In practice it is probably not as sharp as shown there, but there is a definite bend, and it can be used to provide rectification. There is not much point in it, however, since the anode current consumption is greater on an average than that when the lower bend is used, the anode current meter kicking down on rectification instead of up, as in the case with bottom bend.

The sensitivity of the top bend method of rectification is not usually so good as that of the lower bend. As a matter of fact, except as an interesting electrical phenomenon the top bend is of no value.

I doubt whether you could get it with some modern valves.

It works as shown, the fluctuations of the signal being denoted by the curve "A" and the output being shown as "B." The bias of the valve is arranged to keep the whole of the grid swing on the negative side of the curve, so that the grid does not at any time become positive or even reach zero potential. If it does, grid current is liable to flow and you will get a certain amount of grid current rectification as well as the anode bend.

THE CURVE USED



How the valve curve is arranged for top bend rectification, see reply to J. F. S. (Barnstaple). This scheme is of little practical value, the bottom bend method being the one normally employed.

FROM SHORT TO MEDIUM AND LONG

F. G. E. (Derby) wants to convert his short-wave set, with one H.F. stage and '0001 tuning condensers, so that it will receive medium and long waves. He wants to use iron-cored coils and the same tuning condensers, and to incorporate switching so that he can go over from short to medium and long, and then control on the incorporated switching in the coil units.

Well, F. G. E., I don't altogether like the idea. I do not say it cannot be done, but I doubt if you will find a standard iron-cored coil unit that will cover the range with the '0001-condensers. You would probably have to incorporate larger condensers in parallel, or in the place of the '0001's, when you were tuning on medium and long waves. Think what that would mean in the way of complicated switching!

In addition, you propose to use switching to cut the medium and long-wave coil units in and out of circuit, using the present plug-in coils for short waves. That is quite possible, except for the complication in wiring that will be introduced, and with it the hotch-potch lay-out that will probably result.

Let me ask you one or two questions: Are you satisfied with your set as a short-waver? Does it get all you want? Does it get the stations well?

If the answer is "Yes" to these, then, for goodness' sake, leave the thing alone. Use plug-in medium and long-wave coils, if you like, but in the name of all that is holy in radio, don't "muck the set about." Leave out that switching you propose to put in. You must not forget that if a tiny little short-wave signal spots a piece of switch wiring running along handy to its own path, it will immediately take upon itself the bounden duty to slip across to that piece of wire and to disappear silently to earth. You can almost imagine the devilish delight on the faces of the electrons as they jump the capacity gap and slide down the back banisters to earth, instead of going along the proper corridor and down the front stairs.

If you can be certain that you can re-build that set with all the wavechanging schemes you desire without providing these sly outlets for radio energy, go to it. You are a better man than I am, F. G. E.

TECHNICAL JOTTINGS

(Continued from page 547.)

of high-frequency transmissions over the electric-light wires. I think I mentioned this in Technical Jottings a little while back, but I understand that since then further progress has been made. It obviously depends upon the consent of the various authorities concerned and is the kind of thing which can hardly be expected to come to fruition very quickly.

Technical Advantages

The great advantage of it, from the technical point of view, is that it would not involve the carrying of any further conducting line to the home, whilst the obvious disadvantage of it would be the difficulty of preventing unlicensed listeners from receiving it. One scheme is to provide the B.B.C. transmission in this way, charging the ordinary licence fee as at present, in which case the mere possession of a receiver would render the owner liable to pay the B.B.C. fee just as now.

Bass Response

You may have noticed how difficult it is to get sufficient bass response from a set if you are not using a suitable low-frequency transformer. This is quite a common defect, and is usually attributable to the fact that the winding on the primary of the transformer has been skimmed by the manufacturer, in order to keep down the cost; this skimming has the effect of making the inductance value too low. If,

as well as all this, D.C. gets into the primary of the transformer, it will make it worse and you can take it as a pretty general rule that D.C. will get into the transformer. If you can succeed in keeping the D.C. out, this will help matters and, therefore, it is worth trying for. With this object you can try putting in a fixed condenser of, say, $\frac{1}{2}$ -microfarad capacity between the primary terminal of the transformer and

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 The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

the anode of the previous valve, the H.T. terminal being connected to the negative terminal of the H.T. source, whilst the anode terminal of the condenser is to be connected to a suitable value of positive H.T. A resistance should be put in series with this H.T. positive connection, the value of which resistance will depend, of course, upon the impedance of the previous valve.

THE DIAL REVOLVES

(Continued from page 536.)

At breakfast time F A 8 A E, Canary Islands; F 8 U I, France; I 1 V R, Rome; G 6 O S, Hull; V E 3 S M, V E 1 B C, V E 3 H L, W 9 R D Z, W 5 E M P, W 9 R R S, W 5 B Z, W 5 E K, W 5 T I C, W 5 T J, W 5 C C T, W 4 C Y U, W 6 O F, and a mystery, U R Z, came in extremely well, resulting in my bacon and eggs freezing before I got to them! Indeed, if William the Conqueror had lived at the present time he would have booked his passage to Cardiff, not Hastings!

The Franco Twins

Have you heard the Franco twins yet? Spain offers yet another first-rate mystery in the form of E A J 8.

If you are the parent of twins you may have noticed that they frequently disagree. And so it is with E A J 8. At times you may hear it boosting Franco to the skies. On other occasions it wishes him in a warmer climate! The explanation? There are two stations employing the same call, one a rebel, the other a Government station. Why? There you have me—someone's idea of a game, I suppose!

North Pole News

All the nice girls love a sailor—every DX-er likes red-hot DX dope. And here, lads, is some white-hot news from America. The North Pole radio station, Radio U P O L, is being heard there between 9 and 11 p.m. G.M.T. on 20 metres. How about searching for him?

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RANDOM RADIO REFLECTIONS

By VICTOR KING

COMMUNITY LISTENING :: MIDGET PORTABLES
SAGA OF THE VALVE :: THE RADIO EXHIBITION

CLUB AFFAIRS

BROADCASTING, in my opinion, is not a communal affair. As such I fancy it more often fails than otherwise. For the reason that it isn't taken seriously enough by people.

I know that there are a number of listening circles which meet to hear what broadcast lecturers have to say and then discuss the subjects. But I should think that of the twenty-five or so million listeners (reckoning about three to every licence) the members of these circles form a mighty small proportion.



"When, for example, the racing and sporting commentaries are coming over."

Of course there are times when the radio is listened to very attentively by furrow-browed audiences. When, for example, the racing and sporting commentaries and results are coming over.

In a recent par I was even able to disclose the beginnings of a new radio betting racket—a very small beginning, by the way!

But for normal full enjoyment of the ordinary programmes (and how ordinary some of them are!) I favour solitary listening, especially for plays. Then there won't be any remarks drowning interesting passages.

It's obvious why radio listeners don't make good group audiences: they don't have to pay for their seats; they don't have to study the feelings of the artists; they don't have to consider adjacent strangers. Inasmuch as it is only "Victor," "Bill," "Father" or "Flossie" who's listening, what does it matter if one does bang about the room or speak to someone else?

Why, they even barge into my study and ask me questions about this, that, or the other when they ought to know how much I'm wanting to listen undisturbed! At least, they used to, but years of frigidly polite reception has now nearly trained them to keep out until a musical item comes on.

Wireless experimenting can be communal, though. Quite a number of clubs are proving this by their virile existence. And to my mind there is nothing more pleasing than to see a bunch of fellows sitting round the club table discussing a complicated diagram.

There are some hundreds of wireless clubs in this country, I believe, and as far as I know the B.B.C. does little if anything to help them. Yet they plug unadulterated educational stuff, and that seems to me to be rather strange.

CULT OF THE MINIATURE

I'VE had quite a lot of letters about portables, as I always do round about this time of the year. Quite a

fair proportion are from people who aren't satisfied even with the compactness of my "Midget" design which was published in "P.W." a few weeks back.

They want pocket outfits of small dimensions, and what-not.

Now I'm here, and at this juncture declaring that my "Midget" can't be beaten by me at least (and I think it would be hard for anyone else to do so), taking into account what it will do and the service it will give.

Anything smaller would lose something somewhere, though I freely admit that the results might be considered good enough by many even if the performance of the "Midget" were depreciated quite a lot.

But I'm not doing it, folks. I'm not in the market for the design of curiosities and freaks. I'm a radio engineer, not a blooming Barnum or Bailey.

And with that pronouncement I replace my top-hat, adjust my white tie, and resolutely walk away from the subject.

MASS-PRODUCTION RADIO

IT is to me a never-ending source of wonder that the standards achieved by the radio industry with mass-produced sets are so high. A mere ten years ago it would have seemed quite impossible.

Some of you may remember how experts used to write learnedly on the losses that were inevitable between the model and the "production job."

I recollect Captain Round saying how he reckoned to lose, in this way, quite a percentage of the efficiency which he achieved in the laboratory, and how disheartening it was.

"It is safe to calculate that half your stage gain goes west in the factory," another notable designer said to me at about the same period.

Well, there are still losses. Something must be sacrificed in order to get a design through the factory in a layout and form attractive to the public.

But it isn't much these days, and such has been the rise in the curve of component and accessory efficiency that there is always that little bit to spare which can go "into the pot" without being very much missed.

And the keystone of this aspect of the progress of radio set production has been the valve. Indeed, the valve has always marched in the van of set development.

The milestones of reception technique are almost entirely fashioned from thermionic valves. First the bright emitter three-electrode valve. That greedy eater of L.T. that glowed so brightly that you could read a book by its illumination.

Then the dull emitter and its L.T. economy—and doubts on the part of the user as to whether or not it was working in view of the dim glow from it.

Next, and perhaps biggest jump forward of all, the screened grid valve, which placed high-frequency amplification once and for all time on the map. Before the

"S.G." controversies used to rage on the theme of "Is H.F. Amplification Worth While?"

If only because of its inherent instability it was easier for one to say "No!"

Following the S.G. valve came the pentode and a throng of "multi-electrodes" for all kinds of jobs. In that "tubular" flood was borne along the re-born super-heterodyne principle.

Sir Ambrose Fleming should be a proud man as he views the course that radio has run. Oh, yes, in case some of you have forgotten the fact or were unaware of it, our own British Sir Ambrose invented the thermionic valve.

Before he did that they used to transmit with spark coils and receive (telegraphy only) on crystal sets. The valve made radio-telephony and broadcasting possible and television, too, for that matter.

NOW THE SHOW

FROM what I have heard within the offices of "P.W." and elsewhere, this year's Radio Exhibition is going to be worth visiting—and how!

Maybe I shall see some of you at the "P.W." Stand, for this, as always, will undoubtedly be a rendezvous for the enthusiast.

By the way, there will be some surprises. I know there always are—but this time I



"There is nothing more pleasing than to see a bunch of fellows sitting round the club table discussing a complicated diagram."

mean real surprises—particularly in regard to television.

DOCTOR RADIO

I HAVE received a long letter from a medical man who asks me not to mention his name, for to do so might put him in bad favour with the big White Chiefs of the Medicine-Man tribe. This doctor has made a special study of rheumatic troubles.

Some time ago, he says, he noted a curious fact. One of his patients who had been suffering for a long time with rheumatoid arthritis purchased a powerful wireless set and became an enthusiastic listener.

And at once his aches and pains and swellings and what not began to diminish. Now, queries our jolly old medico, was this due to—1, pure coincidence; 2, resting and diversion of thought away from his trouble; or, 3, the air vibrations from the powerful radio?

He decided to conduct some research. He is still in the middle of it, and has asked my advice concerning the design of special types of amplifiers and loudspeakers.

The results so far seem to indicate that when a patient is subjected to continuous low-frequency sound waves for considerable lengths of time, there is a definite curative effect.

MARCONI—THE MAN AND HIS WIRELESS

(Continued from page 539.)

setting the "ether" in vibration, the spark transmitters were made more powerful.

Arlington, Va., went on the air in 1912. Men listening-in at Eiffel Tower picked up the shrill note from along the banks of the Potomac. Great masts went skyward at Nauen, Germany, at Sayville on Long Island and at Tuckerton, N.J. P O Z, that was the call of Nauen, and W S L was Sayville. Both were wafting strong signals to and fro across the Atlantic. Did the electrical experts realise that within a year or two wireless and these big stations would be embroiled in a World War?

While other nations were linking their capitals with distant domains and colonies, Italy, the land that gave wireless to the world, was feebly represented in space. Marconi was anxious to give his native land a globe-girdling voice.

When the summer of 1911 arrived the inventor was in Italy, personally supervising the finishing touches on the most powerful station in the world being erected for the Italian Government at Coltano, near Pisa. The primary aim was for communication with the Italian station at Massowah in the Red Sea, and with the Argentine, because a large proportion of the population of that South American republic was Italian. A new station was under construction at Buenos Aires, 7,000 miles from Coltano—the other end of the two-way ethereal channel through southern skies.

Coltano's first experimental programme was carried out with Clifden, Ireland. The operators at Glace Bay eavesdropped, and the Italian signals reached them so satisfactorily that two-way communication was immediately established between Italy and Nova Scotia. Marconi, mindful of the loyal support and the faith of *The New York Times* in his invention from the beginning, sent the first message direct from Coltano to Glace Bay as follows:

November 19, 1911.

To the Editor of *The New York Times*:

My best greetings transmitted by wireless telegraph from Italy to America. Pisa, 5.47 p.m.

G. MARCONI.

This was a long distance: it exceeded by more than 1,000 miles the Ireland-Nova Scotia route. The signals had traversed over one-fourth the way around the earth. There seemed to be little doubt in the minds of scientists that the day was not far distant when Marconi would envelop the globe with wireless by spinning an invisible peel around the planet in much the same fashion that a skin surrounds an orange.

Several days after the first message winged its way from Italy to the New World, *The New York Times*, on November 21, 1911, called attention to the fact that the waves from Coltano "did better than literally sweep from Greenland's icy mountain to India's coral strand."

Someone with a flair for mathematics estimated, if the waves went out from Italy in all directions over the face of the earth, and were caught as far west as 4,000 miles, the messages might have been intercepted in the east by a wireless tower in the mountains of Tibet.

This is how it was figured:

Pisa is situated at about 44 degrees north latitude, and, counting 60 miles to a degree, 4,000 miles due south of Pisa would be a point in the South Atlantic ocean, about 22 degrees south latitude. Ships off the coast of German South-West Africa might have picked up the message if they had proper equipment.

Towards the north the signal would have actually reached the North Pole and had some 600 miles to spare. It could also have been caught in Brazil.

Taking Pisa as the pole of the sphere of the earth, and a point on the opposite side of the earth as a second sending station, and each sending wireless currents, 16,000 miles of the earth's circumference could be reached.

This would leave an untouched belt about 4,000 miles wide outside the influence of the current. The area of this untouched belt would be about 100,000,000 square miles.

Taking the total area of the earth as roughly 200,000,000 square miles, the two stations could cover about half the whole surface of the earth. The message that went out from Coltano covered about one-quarter of the area of the globe.

Marconi showed that these mathematical calculations were not far wrong. While his assistants hurled messages across Africa and over the South Atlantic, he intercepted them on the S.S. *Principessa Mafalda* up to 4,000 miles by day and 6,735 miles at night.

If a ship could hear a message that far, it ought to be safe almost anywhere on the Seven Seas. Fate was soon to test that theory.

Marconi was back on Manhattan Island again on March 16, 1912, to attend a dinner in the Tower Hall of The Times Building, celebrating three months of daily foreign news service by wireless.

Messages of congratulation were received while the dinner was in progress. From England, Earl Grey, former Governor-General of Canada, flashed:

London, March 16.—To Marconi and *The New York Times*: Heartily wish you success in your splendid endeavour to facilitate conversation between the English-speaking peoples separated from each other by distance only.

Sir Rufus Isaacs, Attorney-General of Great Britain, wirelessed:

London, March 17.—Please congratulate Marconi and my brother (Godfrey Isaacs, General Manager Marconi Company) on the successful development of a marvellous enterprise. I wish them all success in New York, and hope that by the time they come back the coal strike will be finished.

Marconi had by this time been caricatured and cartooned as a man with winged feet, sparks snapping out like lightning flashes from his finger-tips, so that some actually expected to see such a character—a man from Mars. Someone with a poetic turn of mind, who saw Marconi for the first time, described him as a human being unadorned with zigzag electric horns, and remarked that surely the stars must have conspired to put the vast power of wireless into his hands, because here was a wizard who could walk down Broadway, mingle with his fellowmen and never be noticed in the crowd because of any freak characteristics.

"What would you have done if you had been poor?" Marconi was asked.

"I don't believe I would have been an inventor," he replied with a whimsical smile. "I might have been a sailor."

"And you would not have starved for wireless?"

(Continued overleaf.)

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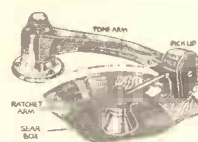
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MARCONI—THE MAN AND HIS WIRELESS

(Continued from previous page.)

"Oh, never," responded the inventor with a broad smile. "I have too good a digestion."

Pioneers on his engineering staff, however, grin at the thought of food surpassing wireless with this Gulliver of science, whom they referred to among themselves as "G.M."

"We would send food in to him when he was working long hours without interruption," said an associate who knew him at the turn of the century. "The tray would come out untouched."

"It was the same with Edison; I knew him, too. But both were human beings. They could not go on for ever without sustenance and recreation."

MY SHORT-WAVE ADVENTURES

(Continued from page 535.)

I promptly jumped to the conclusion the trouble was due entirely to their omission.

Fig. 3 shows how I added a 20,000-ohms resistance in series with the existing 100,000-ohms resistance for the low-frequency coupling, together with a 1-mfd. fixed condenser to earth. Almost needless to say, I could detect no difference at all.

And Fig. 4 shows a further stage in the gentle art of mucking about to no good purpose. I put a 5,000-ohms resistance in series with the screen high-tension lead of the pentode. Here again it made no difference to results—but as things did not seem any worse I felt I might as well leave these components in circuit.

I was suffering, as I later began to realise, from high-frequency instability, not low-frequency instability at all. Here again, a little intelligent guessing would have saved time, because there is no reason to suppose that if the low-frequency side was working well without the decoupling on 12 to 41 metres it would not work equally well on 50 metres.

A Curious Clucking Sound

What, then, was the factor causing the instability? It took the form of a curious clucking sound as the two circuits came into tune, making reaction erratic. Furthermore, backlash of a bad type was noticed on reaction adjustments.

It was those large coils interacting, undoubtedly. Their sheer physical bulk, being so much greater than the other coils tuning the lower wavelengths, was enough to create fairly widespread fields—and as there was nothing between the coils they naturally interacted.

At least, this is my supposition, based on what happened when I tackled the trouble on this diagnosis. I erected a right-angled piece of screening between the two coils and the two tuning circuits then came into step beautifully, without a trace of interaction, clucking noises or backlash.

Interested, I inserted the smaller coils, tuning 12 to 26 metres. Imagine my surprise when I found that signals were definitely stronger. Schenectady was, at 7.30 p.m., a full loudspeaker signal. So evidently a spot of screening is well worth

while when you are using a sensitive valve like a high-frequency pentode.

All the same, this set vaguely displeases me. I cannot blink at its greatest failing, which is lack of selectivity. It is all very fine to cut down volume by reducing the aerial input on the pre-set—but that is really running away from the problem, to my mind.

Daventry, G S G, on 16.86 metres, is on the next channel to Bound Brook, W 3 X A L on 16.87 metres—and at 7.30 p.m. the home station entirely blots out the American on this set.

I begin to suspect that the straight three is doomed for serious short-wave work—and, of course, we are deadly serious, aren't we? Its ratio of sensitivity to selectivity is too high, that's my feeling. The little one- and two-valve sets don't suffer to this extent from inselectivity, I find. Maybe there is a place in the sun for the simple straight set—but when you get to higher planes of endeavour it looks as though the superhet must be considered. I'm considering right now!

TELEVISION IN AMERICA

(Continued from page 542.)

A vastly better demonstration could in each case have been given if the material transmitted had been more carefully selected. The N.B.C. gave me a demonstration in New York of a film of a school of bathers under water (you may have seen this at the movies; I had already seen it, so I had an opportunity of making mental comparisons). The flicker and distortion of under-water photography hardly seem the best thing to demonstrate by television.

But engineers are universally honest and guileless folk and I appreciated the absence of any attempt to impress even by the legitimate choice of good material for television transmission.

There was never any trouble about synchronisation in any American transmission. Before I left for America I could hardly say the same for British demonstrations, but no doubt that has been improved. I was shown by Philco a movie of fishing. This was a film intrinsically boring and containing plenty of sun glare on the water, very heavy shadows caused by trees and much splashing of water. The results struck me as good as a B.B.C. newsreel, but no better. The dark patches often appeared patchy—which is not what they should appear. They looked grey and foggy and the film was much inferior to the studio direct-vision scenes.

Remarkably Good Detail

There was no flicker. An interlaced system was used, as was the standard (now adopted universally in America) of 441 lines and 30 pictures per second.

A "half-cousin" of the Iconoscope was used in the transmission room. The detail given by the Philco system was certainly remarkably good. I asked (by telephone) for a dollar note to be held before the "camera," and the serial number could be read. I then asked for a pocket watch to be shown. All the numerals were very clear and also the second-hand and the major markings of its small dial. The numbers (10, 20, 30, etc.) around the second dial could be seen but not read, but such detail

cannot be seen by most people at 2 feet, using the naked eye.

I then had them hold up different pages of a copy of the "Wireless Engineer." The words, "Editor: Hugh S. Pocock," were readable, while in an advertisement of Claud Lyons I could make out words like "Type" and "Catalogue," which were actually quite small print. Advertisements without small type were easily read, as were headings to articles. I give these actual details to enable any British television engineers to compare the detail they obtain with that given by Philco's arrangement. Newspaper headlines and sub-headlines were easily readable, but the ordinary type was not. A picture of Amelia Earhart in a newspaper was immediately recognisable. These tests were with the whole, or nearly the whole, front of the newspaper exposed and visible.

Philco's Special Claim

The 441 lines of American television is not, of course, the whole story. Ten per cent. of these are lost in synchronisation, while the uniform performance of the amplifier systems is a vital and very difficult matter. Philco make a special claim in this connection, saying they can cover 3.4 megacycles. A suggestion was made that the R.C.A. covered only 2.5 megacycles effectively. From another source the R.C.A. figure was admitted, but a suggestion was made that perhaps Philco were getting the advantage of a resonance effect and were not getting the full straight-line amplification claimed. I was unable to trot back to Philco and hear their rejoinder, but the important fact remains that of all the television I have seen in the States, that of Philco was undoubtedly the best.

But such a sweeping statement needs some qualification. It is quite possible that I did not see the very latest effort of the R.C.A.-Victor people. So progressive and secret is the work in television that probably no one outside these organisations ever sees the most recent results.

Lack of Enthusiasm

There is no great anxiety to show anyone anything. Any publicity to be gained thereby is almost valueless, as there is no service and there are no receivers. Beyond a general desire to show that America is not asleep as regards television, there is no enthusiasm about showing the television flag. For example, Philco told me that on only one previous occasion had they demonstrated their television.

Neither Philco nor any other television authority I met felt television for the public was imminent in America. The fact that in England television is cut, if not completely dried, interests but does not excite them. Television will come in due course to the American public, but I do not believe there is any prospect of wide-scale manufacture under two or perhaps three years. As far as I know, no one has made the slightest preparations for manufacturing sets. Even the communication band of wave frequencies is not allotted.

Mr. SCOTT-TAGGART
will continue his interesting chat on
TELEVISION IN AMERICA
in Next Week's "P.W."

The RADIO Bulletin

Up-to-the-minute news concerning the radio industry

MESSRS. TUNGSRAM inform us that they have now a special department devoted entirely to the technical service of high-power output and transmitting type valves and that a folder of circuits dealing with low-frequency amplifiers may be had from them upon application.

The above firm have recently introduced a new valve called the type APP4E. It is a high-efficiency output pentode, particularly suitable for push-pull amplifiers where the input voltage is limited. The filament volts are four and the filament current 2.1 amps., mutual conductance 8.5 m/a. per volt, and impedance 23,000 ohms.

Operating in Class A amplification an output of 5 watts is obtainable with an anode voltage of 250. With two valves in push-pull and the same anode voltage the output available is 19.5 watts (5% harmonic distortion). A standard English 7-pin base is fitted.

RADIO RELAY DEVELOPMENT

The use of radio relay equipment for supplying blocks of flats, hospitals, and large institutions has increased considerably during the last few years. Usually, however, these relay services have offered the choice of only one or two programmes, the reception of the more distant stations not having been considered sufficiently consistent in volume to make them really worth while.

In order to overcome these disadvantages the G.E.C. have produced a new radio unit employing a 9-valve superhet circuit having no fewer than seventeen tuned circuits. Four tuned circuits precede the first detector, and the A.V.C. is so effective that an input variation of forty decibels is reduced to 3.5 decibels in the output.

A special sensitivity control is incorporated in the circuit which automatically measures the volume of a station. Only if the signal strength is adequate is it "accepted." The sensitivity control is adjustable and the designers have incorporated a kind of "traffic light" control so that a station providing a programme which can be relayed at full loudspeaker strength causes a green light to flash. The light remains on as long as the station is in tune. When the set is tuned-in to a weak signal or where no programme is receivable, a red light warns the operator. The receiver covers all wavebands from 13-2,000 metres.

A COMPREHENSIVE INSTALLATION

The Marconiphone public-address equipment installed during the Plymouth Navy Week was one of the most comprehensive ever introduced for an event of this nature. Every display had its microphones feeding

into amplifiers and speakers so that the public could be kept fully informed of what was going on. One of the special features was the use of the new giant Marconi 8-ft. long projector which, under suitable conditions, has an audible range of over two miles.

Another important feature was a special telephone control system enabling the centre control point to keep in touch with remote parts of the amplifying system so that announcements for traffic control could be put out at any desired spot.

A VERY ATTRACTIVE PORTABLE

AN amazing little portable set has been produced by Messrs. British Television Supplies of Faraday House, Charing Cross Road, London, W.C.2.

It weighs only about seventeen pounds and is no larger than a smallish attaché case, yet it has a performance superior to many battery table models.

This is undoubtedly largely due to the fact that instead of the usual small output pentode one expects to find in such a compact instrument a Hivac-Harries valve is used.

This, feeding into a good if small speaker, results in first-rate quality with ample volume for outdoor work.

But perhaps the most spectacular feature of the "Little Princess" portable is its sensitivity. It is sold with a guarantee that it will receive twenty-five stations, and this it will do in many instances with the greatest of ease and at good strength.

Simple Control a Feature

Even in the heart of London it was found a simple matter to tune-in quite a string of foreign stations on it. Should a more ambitious performance still be required, there are sockets for the connection of external aerial and earth. Further, there is a telephone jack into which special telephone receivers can be plugged, a refinement which is, as far as we know, completely novel on a receiver of this type.

The controls of the set are simple and few in number. There is an off-on and wave-change switch, a sensibly large tuning knob, and a combined volume and reaction control.

These are neatly grouped on the recessed dial with plain-to-see indication lettering and a number of station names.

A turntable is fitted, enabling the little set to be swung round to any position in order to take advantage of its directional properties, or to swing it for comfortable listening.

The name "Little Princess" bears an apt relation to the appearance of the portable. The design is distinctly pleasing.

A 90-volt. H.T. battery and L.T. accumulator capable of providing up to about thirty hours of listening per charge are supplied.

Efficient in performance, easy to carry about and attractive from all points of view in its design, the "Little Princess" is a portable which we can very strongly recommend to our readers.

The price is 8 guineas, and it is our opinion that it is excellent value for money.

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"P.W." LIST OF EUROPEAN BROADCASTERS

This list contains the more important European medium and long-wave stations which are likely to be received in this country. There are some relay stations working on very low power and sharing common wavelengths. These have been omitted because their programmes are usually too weak or badly interfered with to be of value to British listeners.

WAVE-LENGTH.	STATION MEDIUM WAVEBAND.	COUNTRY	POWER KW.	WAVE-LENGTH.	STATION MEDIUM WAVEBAND.	COUNTRY.	POWER KW.
203.5	Plymouth	Gt. Britain ..	0.3	356.7	Berlin	Germany ..	100
203.5	Bournemouth	"	1	360.6	Kiev (No. 2)	U.S.S.R. ..	35
206	Eiffel Tower (Paris)	France	7	364.5	Bucharest	Rumania ..	12
215.4	Radio-Lyons	"	25	368.6	Milan (No. 1)	Italy	50
233.5	Aberdeen	Gt. Britain ..	1	373.1	Welsh Regional	Gt. Britain ..	70
236.8	Nürnberg	Germany	2		Penmon	"	5
238.5	Riga	Latvia	15	377.4	Lwów	Poland	50
240.2	Saarbrücken	Germany	17	382.2	Leipzig	Germany ..	120
242.9	Cork	Irish Free State ..	1	386.6	Toulouse (P T T)	France	120
243.7	Gleitwitz	Germany	5		Scottish Regional	Gt. Britain ..	70
245.5	Radio Marconi (Bologna)	Italy	50	391.1	Burghead	"	60
247.3	Lille (Radio P T T Nord)	France	60	400.5	Marseilles (P T T)	France	100
251	Frankfurt	Germany	25	405.4	Munich	Germany ..	100
253.2	Nice Cote d'Azur	France	60	410.4	Tallinn	Estonia	20
255.1	Copenhagen	Denmark	10	415.4	Kharkov	U.S.S.R. ..	10
257.1	Monte Ceneri	Switzerland	15	420.8	Rome (No. 1)	Italy	50
259.1	Kosice	Czechoslovakia ..	10	426.1	Stockholm	Sweden	55
	(Scottish National	Gt. Britain	50	431.7	Paris (P T T)	France	120
261.1	North National	"	20	443.1	Sottens	Switzerland ..	100
	(London National	"	20	449.1	North Regional	Gt. Britain ..	70
263.2	Trieste	Italy	10	455.9	Cologne	Germany ..	100
265.3	Hörby	Sweden	10	463	Lyons (P T T)	France	100
267.4	Newcastle	Gt. Britain	1	470.2	Prague (No. 1)	Czechoslovakia ..	120
269.5	Radio Normandie (Fécamp)	France	15	476.9	Lisbon	Portugal	15
269.5	Moravska-Ostrava	Czechoslovakia ..	11.2	476.9	Trondelag	Norway	20
271.7	Kuldiga	Latvia	10	483.9	Brussels (No. 1)	Belgium	15
274	Vinnitsa	U.S.S.R.	10	491.8	Florence	Italy	20
278.6	Bordeaux-Lafayette	France	35	499.2	Sundsvall	Sweden	10
283.3	Bari (No. 1)	Italy	20	499.2	Rabat	Morocco	25
285.7	West Regional	Gt. Britain	50	506.8	Vienna	Austria	100
288.5	Rennes-Bretagne	France	120	514.6	Madona	Latvia	50
291	Königsberg (No. 1)	Germany	100	522.6	Stuttgart	Germany ..	100
296.2	Midland Regional	Gt. Britain	70	531	Athlone	Irish Free State ..	100
298.8	Bratislava	Czechoslovakia ..	13.5	539.6	Beromunster	Switzerland ..	100
301.5	Hilversum (No. 2)	Holland	60	549.5	Budapest (No. 1)	Hungary	120
304.3	Torun	Poland	24	559.7	Wilno	Poland	50
304.3	Genoa	Italy	10	569.3	Viipuri	Finland	10
307.1	Northern Ireland Regional	Northern Ireland ..	100		LONG WAVEBAND		
312.8	Poste Parisien	France	60	1107	Leningrad (No. 1)	U.S.S.R. ..	100
315.8	Breslau	Germany	100	1153.8	Oslo	Norway	60
318.8	Goteborg	Sweden	10	1250	Kalundborg	Denmark	60
321.9	Brussels (No. 2)	Belgium	15	1293	Luxembourg	Luxembourg ..	150
325.4	Brno	Czechoslovakia ..	32	1339	Warsaw (No. 1)	Poland	120
328.6	Toulouse	France	60	1379	Novosibirsk	U.S.S.R. ..	100
331.9	Hamburg	Germany	100	1389	Motala	Sweden	150
335.2	Helsinki	Finland	10	1500	Droitwich	Gt. Britain ..	150
338.6	Linz	Austria	15	1571	Deutschlandsender	Germany	60
342.1	London Regional	Gt. Britain	70	1648	Radio-Paris	France	80
345.6	Poznan	Poland	16	1744	Moscow (No. 1)	U.S.S.R. ..	500
349.2	Strasbourg	France	100	1807	Lahti	Finland	150
				1875	Radio-Rumania	Rumania	150
				1875	Hilversum (No. 1)	Holland	150