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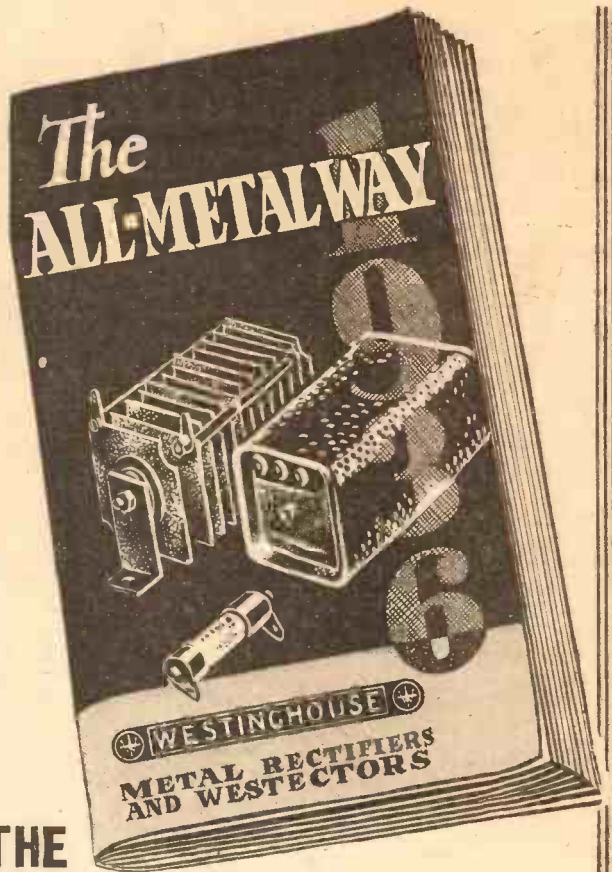


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ABOUT CROONING
AIR RADIO
WAR BROADCASTS
NORTH WALES RELAY

RADIO NOTES & NEWS

TALKING LIGHTS
CHINESE STYLE
A NOVEL DANCE
"PHONY" NOISES

The Season.

IF one swallow does not make summer, neither does one radio exhibition end it. But when you get a spate of exhibitions, when the eve is cool, when fellows shout "Football reports!" in your ear, and when the missus keeps on about your warmer woollies—well, you've got to face the facts.

And what a rosy set of radio facts there are to face at this time of year. Lashings of new stations, better sets to hear them with and what-nots galore ahead. After all these years you should be blasé about the wireless season, but how can you? Crumpets for tea, the first fires, the new set and the wide, wide world waiting on your aerial. Oh, boy, gimme radio and you can keep your other hobbies!

Plain Words.

THE good old virtue of plain words is still with us, as the following shows.

Extract from evening newspaper:

"As for the B.B.C., their much-vaunted reputation for taste apparently takes second place to the desire to cater for that large percentage of idiots who love to hear men moaning the most degenerate piffle that ever afflicted a civilised community."

Conclusion drawn from above:

Somebody is not enraptured of crooning.

Berlin's Big Lead.

BERLIN has just opened another public television centre—the tenth! It is situated at the Berlin-Eichtenberg post office, and people interested in television who look in can look on from 8.30 to 10 p.m. on weekdays, and from 10 till noon on Sunday mornings.

In addition there are a couple of what may be called matinées, on Monday and Friday afternoons, at 3 o'clock, at which all are welcome. Admission is free.

Scientific Sentinel.

THE development of amplifiers, photo-electric cells, and similar devices used in radio is always opening up new possibilities of application. The Ministry of Transport's latest idea is to ensure the safety of pedestrians by making an invisible ray operate a controlled crossing on the Kingston By-pass arterial road, in Surrey.

Hitherto, the pedestrian wishing to cross had to operate a switch, and many people were too diffident to do the necessary. Now the invisible ray controls the switch, and when a pedestrian crosses the line of the ray he unconsciously breaks an impal-

pable circuit, and his mere approach changes the lights in his favour.

The Narrow Path.

THE U.S. Bureau of Air Commerce has installed a new transmitting system at Pittsburg, Pa., to aid pilots on the American air lines. When the plane is flying correctly in the radio guide-beam there is a continuous dashboard indication, which changes accordingly if deviations to left or right are made. (Similar indications can be received by the earphones, or the 'phones may be employed for verbal instructions from the air-port.) If those U.S. aviators go wrong, it must be due to sheer cussedness, for everything has been done to keep them straight.



LARRY ADLER, the mouth-organ virtuoso, accompanying one of his own records on a Cossor table radiogram.

War Commentators.

WAR correspondents, once the envy of belligerently minded small boys, are now out of date. Their places have been taken by the war commentators, who will in future wars broadcast descriptions of hostilities from the actual front line.

One of the American broadcasting authorities has already sent, on spec., observers and commentators to Abyssinia to accompany the Ethiopian armies. The idea is that short-wave communication would be established from the battlefield to a short-wave transmitter at the base, which would link up with Addis Ababa, and thence, via ordinary channels, with the Rugby transatlantic service, to America's listeners.

Heard Him?

HAVE you heard the new Paris P.T.T. station on 431.7 metres? Early reports of the tests indicate that, although the power is only up to 80 kilowatts at present, instead of the full 120 kw. which is scheduled, the new station has definitely got IT where loudspeakers are concerned, and when the full power is developed the moving coils will dance with delight.

The new transmitter is situated some fifteen miles from the centre of Paris, at Villebon.

The Tie that Binds.

PAUSE with me for a moment to say "Bung Ho" to A. J. H. of Gt. Yarmouth, late of the King's Navee.

He is one of "P.W.'s" original subscribers, having been interested in radio for a matter of twenty years, and an inveterate radio reader. He frankly confesses that at one stage of his varied career he suddenly got fed up with something said in this journal, and severed all diplomatic communications with us. Yes, sir. No hanky panky about A. J. H.!

After a time, however, wiser counsels prevailed. He temporised. He took another scrutiny at the writings of Dr. J. H. T. R., W. L. S. and Co., and found them too good to miss. So, after weighing up one thing and another, he came back to the fold. Not being the chap to do things half-heartedly, he now writes to confess that he is one of us again, and jolly glad of it. Very handsomely said! "Put it there, sailor. All's well."

The North Wales Station.

THE B.B.C. recently announced that the site for the proposed North Wales transmitting station has now been acquired near Beaumaris.

Officially styled the North Wales Relay Station, the newcomer is to radiate on a wavelength of 373.1 metres, the same as that used by the West Regional. The intention is that the two programmes shall always be synchronised, and the Welsh listener will, therefore, tune-in either station, according to which preponderates at his aerial.

A few unlucky mid-Wales listeners will find themselves situated between zones on the aerial frontier where neither station is master, but both contend for the title. My advance sympathies go out to these

(Continued on next page.)

THE 'PHONE WITH AN INTERMITTENT HETERODYNE

martyrs; they are condemned to a permanent radio diet of bubble and squeak in order that other Welsh listeners should be well.

Talkative Traffic-lights.

THE police of Hartford, Conn., have recently installed wireless on the city's chief traffic lights. Connected to a headquarters information bureau, each radio-equipped traffic light helps to stop car-stealing, smash-and-grabbing and such like nefariousness.



The loudspeakers on the lights can be adjusted to talk quietly to the neighbouring policeman or to yell vociferously at the general public.

Missing car numbers can thus be announced before the vehicle is clear of the neighbourhood, and Gum-Shoe Dick and his gang are feeling mighty blue about it all.

The Chelmsford "Pimples."

MY recent note on the demolition of the old Chelmsford station's masts has brought me an interesting letter from an employee at the wireless works there. He tells me that the two 450-footers—which he disrespectfully refers to as the "old pimples"—were erected in 1912, and they supported the aerial from which Dame Nellie Melba made her famous first broadcast, two years before the B.B.C. started officially in this country.

Cricketers will be interested to learn that the masts stand on a site that was once the Chelmsford cricket ground, and the county team practised there a lot.

Bon Mot.

ALL the clever advertising that has been stirred up by the Radio Show has inspired a Tottenham reader to ask me if I heard of the famous *faux pas* displayed in a Copenhagen wireless dealer's window. The owner of the store had evidently been reading of the evils of self-capacity, with the result that he labelled a condenser "0005 mfd. Absolutely no capacity."



This was no worse than the Chinese dealer down Wapping way who got an early 2-volt power valve from some dubious source and evidently did not know quite what to do with it. After some hard thinking at the back of the shop, it appeared in the window with a huge notice: "WIRE VALVE.—2 VOLT.—4 FEET.—WHAT OFF.?" Days passed, and nobody made an "off."; so the notice was removed, and then reappeared with the fetch'em footnote, "POWER. HIGH HORSES!"

The New Crusader.

THE West Regional Programme Director, Mr. R. A. Rendall, who was formerly Assistant Talks Director at Broadcasting House, has been loaned for six months to the Palestine Broadcasting Commission.

He will act as adviser on broadcast programme organisation to the government of Palestine, where an official broadcasting service is shortly to be inaugurated.

Mr. Rendall, a nephew of Mr. Montague Rendall, former Governor of the B.B.C., is recognised as a master of his job, and so he shares the fate of many an Old Master. He is being lent out, to be looked up to!

BROADCASTING TOPICALITIES

In presenting "The Old Husking Bee" in the National programme on October 2nd, Bill Campbell will introduce an innovation in broadcast entertainment. In this programme the Rocky Mountaineers, who have twice previously broadcast a backwards entertainment from the Canadian Lumberjacks' Bunk House, will come down from the slopes of the mountains and take part with the homesteaders from the foothills in a barn dance in real Hill Billy style.

In this will be created the real atmosphere of such a Canadian gathering, where reels and other square dances are entered into with great zest, and the "caller" will be heard above the joyous noise describing the figures of the dances in progress.

In the autumn of last year listeners heard André Messager's musical play "Monsieur Beaucaire," and this autumn the same composer's even more famous light operetta "Véronique" will be heard in the National programme on October 3rd, and will be repeated for Regional listeners the following evening.

On September 25th, Northern listeners will hear a new type of radio play. It is called "The Round Trip," and tells the story in sound of the voyage of the steamship "Montezuma" from the Manchester Docks to Alexandria and back, giving an intimate picture of life on a tramp steamer.

Incidents of the broadcast will include the signing-on of a crew, a rescue in heavy weather of the crew of another vessel, and an adventure in the fog off Ushant. It is to be produced by Jan Bussell, and will include an interesting variety of sound effects.

Your Dance?

BY co-operation with the General Electric Company, who broadcast from the U.S.A. a special dance programme dedicated to the Anglo-American Radio and Television Society, members of the latter organisation recently danced, in Uxbridge, to the strains of an American band playing in New York.

This dance was so successful that a similar event is to be arranged in the near future. But whereas on the first occasion the music was limited to a New York band, the promoters now hope to rope in Chicago, Havana-Cuba, Rio de Janeiro and similar joyous centres of jazz and rumba for the next event.

In Brief.

IT is estimated that there are now 23½ million wireless sets in operation in Europe.

The Radio Society of Great Britain recently held its tenth annual convention, and among the speakers was Mr. L. McMichael, the No. 1 member of the society.

The establishment of a radio station in Newfoundland, near Grand Falls, is stated to be the object of a visit now being undertaken by Mr. Kirke, the B.B.C. engineer.

The Radio Touch.

ONE of the most curious results of the development of radio has been the unexpected application of wireless terms to other walks of life. There was, for example, the small boy who during a geography test was asked by a school inspector, "Where is Vienna?" and replied, "On five hundred metres."

Another surprising instance was that of the seaman working beside a big fog-horn which suddenly blared near his ear. He called to another choice spirit below, "Blimey, Bill! The bass response was awright, wasn't it?"

And, finally, there was the new office-boy who was told to get a certain telephone number, but received instead the "engaged" signal. "Zat my call?" snapped the boss. "No, sir," piped the new broom. "The 'phone seems to have developed an intermittent heterodyne!"



Two Extremes.

QUEENSLAND is claiming the proud distinction of having, in one city, both the eldest and the youngest licenced amateur wireless operators in the British Empire. This remarkable state of affairs has occurred in Brisbane, the capital city, where station VK4PH has a 78-years-old owner, while station VK4GK is operated by a young lady aged 12.

Mr. Philip Hardgrave, the veteran operator, was 76 years old when he qualified, and he achieved the remarkable award of 94 per cent marks for Morse, and 75 per cent in the technical test.

Miss Madeline McKenzie, with youth on her side, did even better in the Morse tests, being awarded 98 per cent for sending and 96 per cent for receiving.

Underground Surprise.

DID you hear about the young Oklahoma experimenter who has been experimenting with aerials? First it was a buried aerial, and the wire for that was left underground.

Then it was a *mains* aerial, and that must have got mixed with the former experimental wiring, for suddenly there was an agonising series of yells from the garden, and an excited junior came tearing up the path shrieking "Hi! Pa's spade has just struck an electric gusher!"



ARIEL.

The NORTHERN Radio Exhibition

ON September 20th the twelfth Northern National Radio Exhibition opens its doors at the City Hall, Deansgate, Manchester, and those northerners who were unable to get to Olympia will have the opportunity of examining the latest products of the ever-progressive British radio industry.

It is not so large in dimensions as Radiolympia, but it is in every way fully representative. The value for money represented by some of the new season's advanced designs will no doubt occasion the greatest interest among Yorkshire and Lancashire folk.

For example, Cossor will be showing their three remarkable supers. The Cossor Battery Model 366A retails at nine guineas and includes a pentagrid frequency changer and H.F. screened pentode I.F. amplifier and a double-diode detector with an economy pentode output. It has an eight-inch moving-coil speaker and is built into a very handsome cabinet. And all for nine guineas!

Better Sets—Lower Prices.

And then there is the A.C. mains model 364 at eleven guineas, which embodies thermometer tuning and other up-to-the-minute refinements. The third set in this particular Cossor range is a fourteen guinea A.C. super (model 365) which has A.V.C., visual tuning and numerous other features. These are sets which it is worth while going to see, if only to gain an impression of the continued advancement which is being made by the great radio concerns, in an endeavour to give listeners better and better sets at lower and lower prices.

As in previous years arrangements have been made to supply the stands with a standard input with which to operate loudspeakers, and we would particularly recommend visitors to make a point of listening to the new W.B. Stentorians which are being shown by Whiteley Electrical.

An Ingenious Speaker.

We have already had a great deal to say about these instruments in "P.W." for they undoubtedly do form one of the most interesting innovations of the year. Particularly the Stentorian Duplex. This is two speakers in one, but not in the usual form of a couple of units having dissimilar diaphragms.

The main structure comprises a cone-type instrument, but there is a "tweeter" in the form of a small horn construction concentrically placed. The purpose of the "tweeter" is, of course, to render the high

The third great wireless Show of the year—the 12th Northern National Radio Exhibition—opens on Sept. 20th at the City Hall, Manchester at 2.15 p.m. The Show will be open from 11 a.m. to 10 p.m. each day until the closing day, Sept. 28. The price of admission will be 1s. 2d., children 6d.

one or two of the models they conform to a distinctive style of design, the main motif of which is the full circle. Some people may prefer cubist and other straight line styles, but we must say that we find the softer curving styles more pleasing.

The Ekco sets have moulded bakelite cabinets, and there will be many in the industrial north able to appreciate the really wonderful workmanship and art which they evince.

But the insides of the Ekco sets reveal just as much advance as do their exteriors. The eight-stage radiogram includes the original "three-way sound diffusion" principle. By arranging for the sound waves to be emitted from the sides of the cabinet as well as from the front resonances are eliminated, and there is a balanced response free from the more or less sharp focusing effects which are normally encountered.

Fourteen Models Available.

Probably one of the things which visitors to the City Hall will especially note is the wide range of models which the various firms are offering. At one time it did look as though there was going to be a tendency towards the restriction of types. A few of the leading firms seemed to be concentrating on just one or two models.

(Continued on next page.)

notes clearly, the bass being looked after very efficiently by the main reproducer.

Messrs E. K. Cole are displaying their notable receivers at the Manchester Show, and these undoubtedly are extraordinarily fine productions. With the exception of

A COSSOR RECEIVER



This receiver, the Cossor 369, works from A.C. or D.C. mains and is typical of the large and attractive range made by this firm.

FIRMS EXHIBITING AND THEIR STAND NUMBERS

	Stand No.		Stand No.
Aerodyne Radio, Ltd.	44	Grampian Reproducers	22
Adey Portable Radio	27	Hacker, H., & Sons	65
Ambassador Radio Gramophones	99	Halcyon Radio, Ltd.	43
Beardsall, W.E., & Co.	69	Hartley Turner Radio, Ltd.	5
Balcombe, A. J., Ltd.	53	Hellesens Radio, Ltd.	32
Beethoven Radio, Ltd.	55	Hobday Bros., Ltd.	12 and 13
Belling & Lee, Ltd.	26	Hollingdrake & Sons, Ltd.	95
British Blue Spot Co., Ltd.	62	Lissen, Ltd.	52
British Pix Co., Ltd.	79	Lampex Radio	27B
British Television Supplies, Ltd.	24	Marconiphone Co., Ltd.	50 and 51
Britannia Batteries, Ltd.	2	Mullard Wireless Service	14 and 15
Brown Bros.	40 and 56	Park Wireless Depot, Ltd.	92
Celestion, Ltd.	57	Partridge, Wilson & Co., Ltd.	60
Central Equipment, Ltd.	71	Pye Radio, Ltd.	16
City Accumulator Co., Ltd.	4	R.W. Products	75A
Clarke, H., & Co. (M/CR) Ltd.	28	R.A.P., Ltd.	66
Cole, E. K., Ltd.	29	Regentone Products	54
Cossor, A. C., Ltd.	30	Siemens Electric Lamps & Supplies, Ltd.	31
Cecil (Leicester), Ltd.	77	Star Radio Products, Ltd.	96
Dawes, F.	98	Stirling Batteries, Ltd.	70A
Dulcetto-Polyphon, Ltd.	58 and 59	362 Radio Valve Co., Ltd.	78
Decca Gramophones Co., Ltd.	65A	Trader Publishing Co., Ltd.	23
Econasign Co., Ltd.	74	Tannoy Products, Ltd.	25
Epoch Radio, Ltd.	75	Ultra Electric, Ltd.	42
Ever Ready Co. (G.B.), Ltd.	41	Universal Electric Supply Co., Ltd.	72 and 73
Ferranti, Ltd.	19	Welworth Wireless Co.	93
Frys (London), Ltd.	70	Westingh's Brake & Saxby Signal Co., Ltd.	3
General Electric Co., Ltd.	17	Whiteley Electrical Radio Co., Ltd.	39
Gramophone Co., Ltd.	64		

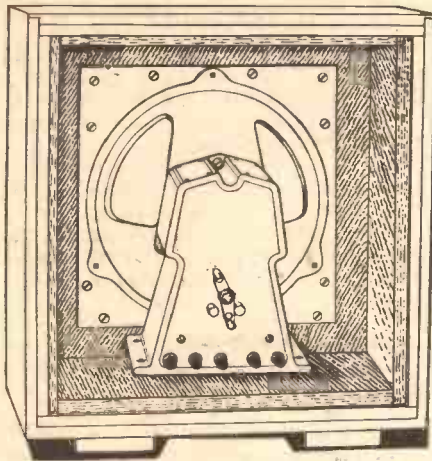
THE NORTHERN RADIO EXHIBITION

(Continued from previous page.)

There are arguments in favour of such a policy, but these are greatly outweighed by the obvious advantages of presenting wide ranges of models. Not only is it then possible to give full value at graded price levels, but also to cater for a diversity of tastes.

In the Marconiphone range there are no fewer than fourteen models, and it would certainly be a captious listener who could not find one to give him full satisfaction. The Marconi sets ascend the whole tempting scale from a battery set at £7 19s. 6d. to a nine-valve mains super at fifty-two

FOR W.B. SPEAKERS



This special cabinet made for W.B. loudspeakers is lined with a non-resonant or "dead" material.

guineas. This magnificent instrument has an automatic record changer, a multi-functional loudspeaker, variable selectivity and a host of other features.

As at Radiolympia there is to be no television on show at Manchester. This, in our opinion, is a pity, for television is too close to its first stages of practical realisation for it to be ignored without occasioning some discontent on the part of an exhibition-visiting public.

Ultra-Short-Wave Parts.

Many visitors to Radiolympia were, we know, quite staggered to find that television was completely excluded.

However, even if television sets themselves are not to be seen in the Manchester Show there will be some ultra-short-wave apparatus on view on the stand of Messrs. British Television Supplies, Ltd. It should be mentioned in passing that this firm is very actively engaged in television development work, and as their ultra-short-wave components reflect their enterprise in this direction, you should make a special point of examining it if you go to the Exhibition.

Westinghouse are exhibiting their "Life Test." This is an intriguing feature. Some seventy or eighty thousand hours ago it was decided to connect up some of the then still rather new metal rectifiers for a continuous life test on full load. Those now somewhat rusty-looking rectifiers are still going strong, as good as ever, in fact!

The reliability and lasting powers of the Westinghouse Rectifier have been proved up to the hilt.

Ferranti, Ltd. is a Manchester firm, and Mancunians should be proud of that, for the Ferranti sets represent the most advanced radio practice. They should particularly note the Arcadia, for it is a reasonably priced instrument embodying the most attractive refinements.

For instance, it has A.V.C. which—and we speak from experience—operates very satisfactorily indeed, almost uncannily so.

A Great Advantage.

There is also visual tuning which enables the stations to be tuned-in exactly by means of the eye. One of the advantages of this is, that you don't have to wait for a station to start its programme before it is possible to adjust the set for its reception. So long as its carrier is "on the air" you can tune it in. We do not remember having seen this point brought forward before, but from the listener's point of view we believe it is almost as valuable an application of visual tuning as the preservation of quality.

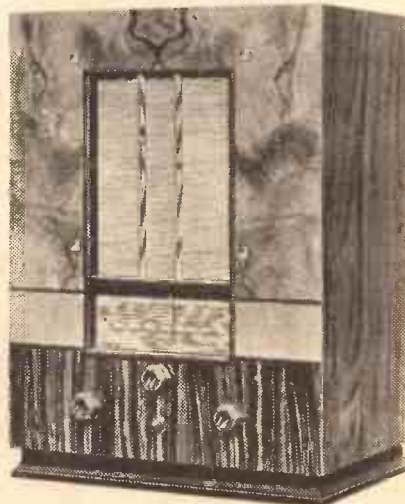
This Ferranti set is also equipped with the "All-In" dial, another refinement of great practical value. When the set is switched on the station dial is illuminated, and this shows not only the names of fifty stations (which can all be tuned-in with the greatest of ease) but also volume and tone indicators and the visual tuning needle. You can see at a glance exactly the setting of all the various controls at any particular moment.

Besides producing first-class sets Ferranti cater for the home constructor, both with a large range of components and with constructor charts. Their stand always attracts big crowds at exhibitions.

Constructors will have much of interest to see at the stand of Messrs. Belling and Lee, whose extremely comprehensive ranges of such items as terminals, plugs, sockets and fuses have ensured their products places in the majority of home-constructed sets.

Of equal, if not greater, importance are their interference devices. Probably no other firm has done more towards the reduction of electrical interference in a really practical manner than Messrs.

MADE BY FERRANTI



A feature of Ferranti sets is the all-in tuning indicator which shows the settings of all controls. This is the "Lancastria" Console model.

Belling and Lee. Truly what they do not know about this subject can hardly be worth knowing.

Whatever the thing may be which causes electrical interference they can supply suitable suppressors; whatever the intensity of interference experienced by a listener this same firm can provide apparatus which will at least very considerably reduce it.

A firm which can invariably be depended upon to put up a rattling good show at any exhibition in which it takes part is H.M.V. But we expect you will already have read about their efforts at Radiolympia, and these are to be repeated at Manchester.

The H.M.V. range of sets is a grand one. If you are rich there is the High Fidelity Autoradiogram at one hundred and ten guineas, but if, like most of us, your finances are not so good you can still enjoy the benefit of all-mains H.M.V. radio with fluid-light tuning and A.V.C. at thirteen and a half guineas.

Or there is a universal H.M.V. super with A.V.C. at eleven and a half guineas. Such things as these give vitality, interest and importance to an exhibition. Whereas hundreds might go to a show for the purpose of goggling at H.M.V. products priced out of their reach, surely thousands will want to see sets at such low prices bearing such highly-reputed names and incorporating so many attractive refinements.

NOTES ON TELEVISION

By L. H. THOMAS.

THIRTY-LINE TELEVISION is no longer with us. It has, according to those who say these things, "served its purpose," and has now been quietly faded-out. Two little questions immediately spring into my mind: (1) Will there be no conceivable use for such a low-definition system in the future? and (2) What is going to happen to all the 30-line gear that is in existence?

I don't know how many thousands of 30-line discs and mirror-drums there are in the country at the moment. Nice little electric motors that have been used for driving them will, doubtless, find other uses, but it seems a pity about all those discs and things.

What About It, Amateurs?

Thus was I ruminating the other day, when suddenly I had a kind of dream. Think of all the amateur transmitters who are perfectly content to work with each other, on telephony, over comparatively short distances, and to whom the DX-itch means nothing at all.

They must still be thrilled by hearing the other fellow's voice every Sunday morning, or every night at 11 o'clock, or they wouldn't go on doing it. How much more thrilling it would be for them, and for all of us, if they would experiment with simple television transmitters (even if only of the 30-line order).

Television licences are obtainable from the G.P.O.; the only snag is that the one

(Continued on page 46.)



With the

EXPERIMENTER

WHEN NOT TO USE AN INDOOR AERIAL

IT is a truism that atmospheric are as old as wireless itself—but what has come to be known as “man-made static” is a curse that only the widespread increase in the use of domestic and commercial electrical apparatus is responsible for.

Probably the various forms of “man-made static” are much more of a nuisance to broadcast reception than is even generally realised. The reason being that thousands of listeners suffer in silence, imagining that the crackles, grunts and groans forming an irritating background to reception are inevitable, unescapable and irremediable.

In my perambulations of Radiolympia this year I came upon a significant sign that the noise-makers are at last coming up against an organised resistance. I refer to the R.M.A. Bureau on Electrical Interference, where engineers from the Post Office, the B.B.C., the Electrical Research Association and the R.M.A. were giving free advice to anyone—or everyone—suffering from “man-made static.”

“Innocent” Noise Makers.

Their exhibits provided a vivid illustration of the wide front upon which listeners are beset with possible “noises off.” In the home, for instance, such innocent appliances as fans, vacuum cleaners, refrigerators, sewing machines, and the like, are constant sources of crackles. In a larger way, trolley-buses, lifts and electrically worked petrol-pumps cause widespread distress.

It is the contention of the Bureau—and rightly so—that wherever possible the interference should be cured at source—but where this is impracticable the listener is advised that his troubles may be minimised by simple filters costing a reasonable amount, and by a better disposition of the aerial and earth systems.

Just how much improvement can be brought about by rearranging the aerial is not, probably, very widely appreciated. I am therefore going to extract what I regard as the “meat” of the B.B.C.’s own contribution to this awful business of “man-made static.”

The Effective Height.

Most of you who gaze fondly—or with loathing, even—at your outdoor aerial soaring some twenty to thirty feet high would resent the idea of that height being suspect.

Yet to look at the matter another way, the effective height of an aerial is always very much less than its mere physical height—unless positions are postulated so ideal that they would not be of this troubled world at all.

Without going into technicalities only understandable by high-domed savants, I might remind you, gentle reader, that the effective height of an aerial is expressible by the figure found by dividing Little E by Big E—that is, e but you must be fur-

E

ther informed, if you do not know, that “E” represents the millivolts-per-metre field strength of the wanted signal in free space near the aerial, while “e” represents the actual voltage induced into the receiving aerial by the wanted signal.

Local Screening.

Now the most important point to note about this effective height figure is that, by taking into account the necessity for “free space” it implies that local screening will materially affect height. Effective height, anyway.



MICRO-WAVE VALVES



Two of the latest Telefunken valves for micro-wave work. The small size of the valves will be readily appreciated by comparison with the match-box.



It thus follows that an indoor aerial put up, say, in the top flat of a four-storey building would probably have had a very much less effective height than a short wire erected only a very few feet higher but on the roof of the same building.

Many folk who have come into the radio game since ultra-sensitive superhets were the prerogative of the plutocrat must harbour the idea that there is a lot of blather talked about the need for an efficient outdoor aerial. For these folk will have discovered that even with a small indoor wire they get overpowering volume from the locals and quite enough volume, thank you, from the foreigners.

It is not easy to argue that an outdoor wire with a greater effective height might be preferable and would certainly give a higher ratio of signal to noise, making for more pleasant reception of everything but the background-drowning locals.

Indeed, it is only when such listeners come up against the bugbear of locally generated electrical interference that they will listen at all to advice on aerials. I don’t blame them. For I never was one to listen slavishly to text-book theory I could confound by opposite practice.

And now, what is all this fuss and bother about effective height? Assuming that it is perfectly true and easily proved that a short outdoor wire is effectively higher than the highest and most carefully planned indoor wire, what then?

Just this. That if you are suffering from local “man-made static” you can reduce the nuisance by a very simple method—by increasing the ratio of wanted signal strength to the strength of the obviously unwanted background crackles, fizzes or whatnot.

No Legislation at Present.

In their efforts to find a basis for possible legislation against makers of ether noises, the International Electrotechnical Commission has been trying to decide just what the tolerable signal to noise ratio should be. I will not bother you with their exact work—important though this has been—because if and when the question is settled it will be for the makers of the offending apparatus to note, not you individual listeners.

Meanwhile, though, you are up against the fact that there is no legislation in this country preventing anyone making in one department of his factory apparatus to listen-in, and in another department of the same factory apparatus that will effectively spoil your attempts to listen-in.

So you have to be up and doing—and, assuming the noise cannot be stopped by friendly getting together, and remembering that there is a law against using a coke hammer for practically everything except breaking up coke, your aerial is about your greatest white hope.

Inside Aerial a Drawback.

Compare, then, the relative merits of even a short outdoor wire, which can, so to speak, see the wanted electrical field, and a long indoor wire heavily screened from the same field. Then again—and this is a point very seldom understood—the long indoor wire will probably be much more closely coupled to the interference than the outdoor wire, especially if the source of the interference is a domestic appliance.

Nor must you assume that all the interference comes direct from the vacuum cleaner or other gadget. The conduit of the house wiring circuits and the steel in

(Continued on page 50.)

BARRY KENT CALLING

News and Views from the "Big House"

A Crooning Choir.

THE Variety Department of the B.B.C. has adopted in principle, and is now working out in practice, a novelty programme in which all the most popular crooners in London will combine in a choir for a specially chosen programme. I understand Mr. Eric Maschwitz himself is the originator of this idea. The choir of crooners will be ready early in November.

Tackling Those Silences.

I am glad to hear that someone at the "Big House" is thinking about ways and means of reducing the long breaks between programmes. True, it is the Empire end that is first on the job; but what they do to-day the home people may imitate tomorrow. Anyway, the Empire Department has legislated that a fifteen-minute talk shall not be less than fourteen minutes without the announcement.

On top of this the announcer will have freedom to change the length and nature of the announcement in order to deal with any gap that occurs. Also more care is to be taken about the accurate timing of musical items in rehearsals. But the really salient reform is the flexibility of announcements.

Emergency Accompanists.

I hear there are two or three jobs going as emergency night accompanists for the B.B.C. These opportunities arise from the complaints of producers of the occasional non-appearance of accompanists booked for the short-wave programmes, thereby upsetting special productions. The snag will be that those chosen as emergency people for this work will have to be available at any time of the night and early morning at short notice.

"The Use of Man."

On September 26th and 27th listeners will hear repeat performances of Lord Dunsany's delicate satirical phantasy "The Use of Man." This play, which the author wrote specially for broadcasting, was first presented in 1933, when its originality created a profound impression.

Many artists who were in the original production will again be heard, including Philip Wade, Florence McHugh, Harold Scott and John Rorke. A newcomer to the cast will be Russell Thorndike, who recently scored a pronounced success as Humpty Dumpty in "Through the Looking Glass." Lance Sieveking will be the producer.

Maida Vale Trouble.

There is an unexpected amount of resonance in the large Maida Vale studio. The result is that both conductors and

players have complained that their work is rendered much more difficult. A strong protest has been made to the technical authorities. It seems odd that the acoustic properties of a new studio should not have been accurately anticipated by the now widely experienced B.B.C. engineers.

Colour at St. George's Hall.

The professional decorators of the B.B.C. proposed to use yellow and green for the new St. George's Hall scheme. As soon as news of this reached the Variety Department and the producers there was a



Miss Thelma Reiss, the well-known 'cello player, who was heard recently as soloist in one of the Promenade concerts.

tremendous row. Producers got together and represented that yellow and green would be fatal to good variety.

Not only would these colours be "cold." They were actually "out of the tradition" of the music-hall, and would "put off" all the best artists. The protest was so vehement that the scheme is to be changed.

Drill at the B.B.C.

I am told that quite a good-sized squad of recruits turns out for drill regularly at Mottspur Park, the sports ground of the B.B.C. Some time ago there was a stock-taking of all members of the staff with military obligations. Afterwards it was made known that those who desired elementary military training could have it at the "Park."

Things are shaping so well that it looks as if the B.B.C. would be able to put at

least two companies of fairly well-trained men in the field in case of war.

New Music Director.

The B.B.C. will appoint a new Music Director about the end of the year. Dr. Adrian Boult has decided to concentrate his whole time and energy on conducting, and therefore has insisted on giving up his administrative work. It is not known yet who will be the new Director.

"WELL DONE, BIRMINGHAM!"

Praise for "Main Street of Song" which deserved its all-wavelength broadcast.

"MAIN STREET OF SONG" was put on all wavelengths at once at 7 p.m. It was good. It was a good story and topical, although it may have disappointed the apostles of high-browism to find (in the story) what they consider vice triumph over virtue. "Main Street Of Song" was a Martyn Webster production, which is in itself good recommendation.

The cast was more than adequate, chief honours going to Hugh Morton who, as Freddie Flick, was always in the picture. He gave a spirited performance, and sang his many songs well. Marjorie Westbury gave him good support. She impressed me as a very charming actress. Other attractive though smaller parts were those of Sigismund Entwistle, played by John Lang, and Cyrus K. Snoop.

Good Musical Numbers.

The best feature of the production was undoubtedly Julian Wright's music. The best numbers were: "Down the Charing Cross Road," "There Must be Apple in an Apple-pie," "What a Wonderful Day," "Why Does the Trumpet Wear a Bowler Hat?" All were unusually good numbers. The libretto was remarkably good for this type of thing, for which Peter Lansdale was responsible. This production proved once again that the Midlands can offer good light entertainment, and that the essential of good light entertainment is not necessarily a galaxy of stars. Congratulations to the Birmingham cast and others responsible are thoroughly well deserved.

"Black Vengeance"—a tale of fear by Mrs. St. Loe Strachey—that was intended to curdle our blood or make our hair stand on end, tried desperately hard to fulfil its purpose. While it did neither of these things to me, it certainly did cast some sort of spell. I listened with fair attention. There was atmosphere about the play, and for this Carlton Hobbs as Perkins the butler was responsible. I thought he played his part magnificently, and was really the only one among the living characters who inspired any sort of real fear in me. Leon Quartermaine as Sir George Fellowes hadn't the opportunity to. The Black (D. A. Ward) only had half a dozen words to say. James Fellowes (George Sanders) by his virility and importance destroyed any hope he may have had of petrifying us.

How Effects Helped.

In this job of terrifying, the effects helped to a degree, and the most eloquent of these was the silence that enveloped Sir George's country house during the visitation of the Black, when the birds refused to sing, the pigs to grunt, and the dogs to bark, etc. The scene, too, when the shadows of a sugar plantation in the West Indies over a hundred years ago took over the action, to the accompaniment of tom-toms and black incantations, had a suggestion of fear in it. On the whole, "Black Vengeance" was an interesting broadcast, though I couldn't help wondering why Sir George didn't call in the police and have the Black removed. But then there would have been no story, and unrealities don't seem to worry some people.

The best thing of the Nut Club's mad melange of jokes and jazz was Pat O'Malley singing an Irish song about his faithless Molly. I wish there had been more of these Irish songs and less jazz. The harmony singing was well balanced and restrained.

The eye-witness account from Leeds of the Yorkshire v. M.C.C. match introduced a new style in these broadcasts. I liked the style. Perhaps because I sympathised with this particular eye-witness in his complaint that Scarborough "Festival" cricket

(Continued on page 48.)

ON THE SHORT WAVES



"Random Ramblings"
W. L. S. gives some practical hints on various aspects of short-wave reception

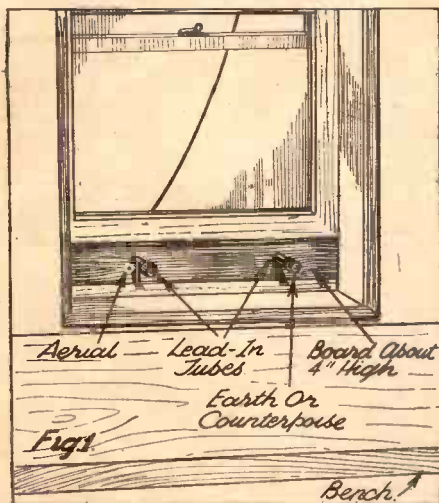
I'M sorry about the non-committal title to this page, but these little breaks are necessary to enable me to clear up all the thousand and one small points that occur to me from time to time. And, in any case, one or two readers have been kind enough to tell me that they like reading my off-handed remarks on "nothing in particular" better than my carefully-thought-out masterpieces on specific subjects.

Incidentally (before I really start rambling), I should like to know just what kind of thing readers really do want on this page. It's your page, and I'm here to fill it with whatever you want most. I can write on

else who is similarly interested. You may not be the type that likes to join the local society, but you might, at least, be a good "mixer" with one or two other fellow-enthusiasts, such as there must surely be in your town.

The interchange of personal ideas that goes on when even three short-wave fans meet is like the breath of life. I don't see how anyone can be really successful without some of it. I'm not ashamed to say that I picked up more than one valuable tip from a youngster of thirteen who, without knowing who I was, asked me to go and look over his receiver. Admittedly, the tips were of the "how not to do it" order, but they are every bit as useful as the others—sometimes more so.

A GOOD SCHEME



This is a scheme W. L. S. saw when on holiday. It does away with the necessity of boring holes in the window frame for the aerial and earth leads.

almost anything connected with short waves without becoming too incoherent, so please tell me what you would like and, afterwards, whether you liked it. Thank you, customers!

This year I have had two short holidays. The first was spent in a mountain fastness, far from radio in any shape or form, and most decidedly sans portable set. That was the real holiday. The next was by the sunny sea, in a town fairly well populated by radio amateurs and keen listeners, many of whom I met. Whenever I reflect upon how much I learn by mixing with fellow-enthusiasts, I wonder how on earth some of these unsociable listeners get on.

There are, I know, quite a lot of readers who just plod away with their own short-waver and never bother to go and see anyone

Galvanised-Iron-Wire Aerial.

For one thing it would simply never have occurred to me that anyone would put up an aerial of galvanised iron wire with twisted joints in it and hope to get away with it. But having seen one I'm willing to bet that at least three people who read this page are doing something similar and wondering where the crackles come from in wet or windy weather.

Fig. 1 shows one little arrangement that I saw on my travels which strikes me as being quite neat. If the master (or mistress) of the house doesn't approve of holes bored in window-frames for a lead-in, don't bore them. Open the window a shade and insert a board which you can ill-treat as much as you like. True, you may get a little draught in through the middle, but fresh air's good for you, and the average short-wave fan doesn't get enough of it, anyway.

Fig. 2 is on quite different lines, merely being a suggestion for knocking up something neat in the way of "quench coils" for a super-regenerative receiver. "Super-regens" aren't only meat for ultra-short-wave folk, as I hope to demonstrate to you very shortly. But when they're knocked up with huge slab coils or plug-in honeycomb types, they take up far too much room and look simply awful.

An Easily Provided Former.

You can probably find the former of an old-fashioned H.F. transformer in the junk-box, or possibly you can make a former like that in the sketch from a piece of ebonite, or even wood.

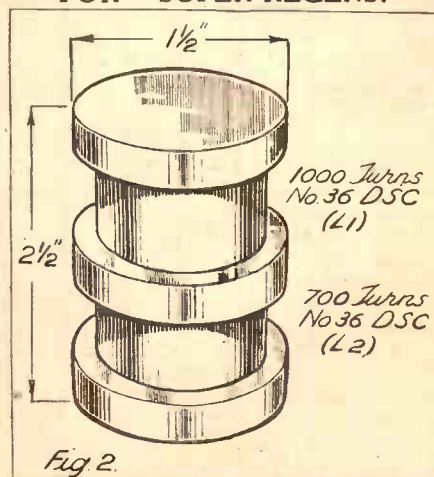
Thirdly (see Fig. 3 on next page), those who suffer from "pongy" receivers—whether it's the valves, wiring or variable condensers that cause the trouble—may comfort themselves exceedingly by using one of the many flexible gang-couplers

in series with their condenser spindle. I've been doing this for a long time, and may have mentioned it before, but as several of these universal-jointed affairs were to be seen at the Show this year, the time seems ripe to mention it once more. You can wobble your tuning-knob about in all directions without causing the receiver to behave like a gongster and, apart from this, it has a very comfortable feeling about it.

Be Comfortable When Listening.

You can rest your forearm or wrist on the bench while tuning, even if the actual condenser shaft is some little distance up the front panel. This business of getting comfortable while operating simply can't be overdone. It is terrifically important. It covers more than the mere mechanical part.

FOR "SUPER-REGENS."



A suggestion for home-made "quench" coils for super-regenerative receivers. The finished coil is much more compact than the old-fashioned slab type.

of the set, too. It means getting rid of instability in all its noxious forms, and having a set that you can almost handle in your sleep.

Tense muscles and strained nerves are bad in any pursuit, and it's stretching things altogether too far to bring them into the realms of radio, which ought to be a lazy man's job. Believe me, it isn't—not by a long way—with some of the short-wavers that I've come across in my travels.

Just ask yourself whether you can flop into a comfortable chair, perfectly relaxed and natural, and twiddle your dials, quite casually bringing in the stations the while. If you cannot, you haven't got a real set—not yet!

ON THE SHORT WAVES.—Page 2.

WHAT READERS ARE SAYING

F. G. (Old Lenton) recently asked for the full address of the Argentine station LU8VR, which I could not trace for him. His letter has called forth two more. First, R. D. E. (Standon) suggests that it was LU8DR, from whom he has a verification. Secondly, C. D. D. (Tipton), who is LU6CY, home from the Argentine on holiday, thinks it must have been LU8BR.

Many thanks to these two gentlemen for their trouble, and when F. G. has made up his mind I'll send him the appropriate address!

Working Without G.B.

R. T. (Bingley) has made the "Simplex" Two, and is rather alarmed to discover that "stations come in at terrific strength when I am not using the grid-bias." I don't know whether he means that he is connecting the negative and positive G.B. plugs together, or whether he is simply leaving one of them free. Nothing to be alarmed about, R. T., but you might put a milliammeter in the plate circuit of that valve.

Re your other queries, VP6YB's QRA is T. A. Archer, "Verona," Bank Hall Road, Barbados; and the 5-metre receiver will appear, glorified and in greater detail, later on.

R. R. W. (Northampton) tells me that he holds me entirely responsible for the development of his back-room into a workshop, and also thinks I am to blame for the establishment of a new post office in his neighbourhood. Among the interesting things he mentions is a chess match run by three stations on the 40-metre band. One was acting as relay and-commentator.

He also heard a call which he thinks was DB2KN on about 40 metres, but can't make head or tail of it (neither can I). He wants to get into touch with a fellow enthusiast in his district, but not the chap who oscillates on 20 metres every evening! Eligible persons should apply to Mr. Raymond R. Waite, 61, Broadway, Northampton.

A Great Responsibility.

D. M. (Rutherglen) sends a photograph of his very neat station, G6MD, which I hope to publish later on, and also holds me responsible for the "whole works." My burden is beginning to feel heavy when I hear from fully fledged transmitters who say they have been fed entirely on my outpourings!

J. E. O. (Bournemouth) is anxiously awaiting the description of a really noisy superhet, which, he says, I have been promising for a long time. Sorry for the delay, J. E. O., but it will be all the better when it comes. No, I don't think I shall use A.V.C.

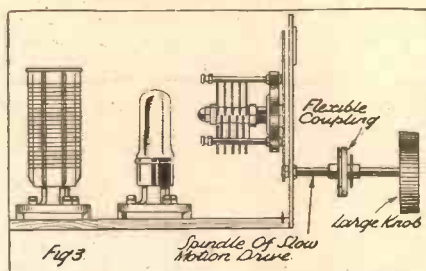
J. M. (Sherborne) would like to correspond with readers in distant parts of the world. Will somebody so situated please write to Mr. J. Morcombe, Kingsbury, Milborne Port, Sherborne, Dorset? Thank you. J. M. sends in an interesting log on a four-

valve superhet, but seems to prefer a straight set.

V. R. C. (S.E.19) is a reader who took out his first licence in 1921, thereby beating me by one year! He's never bought a set since then, and has never been satisfied with a home-constructed one unless it has done all that the designer claimed for it. Now he wants to know about this QSL-card racket. Simple, V. R. C.—simply send a plain report on a plain post-card to any transmitter you hear, if you imagine he will value a report from you.

Then by easy stages you will find yourself turning out a kind of stereotyped report on a post card, which may become even standardised enough to be printed. You then have a primitive QSL card which, no doubt, will rake in for you innumerable

TRY THIS DODGE

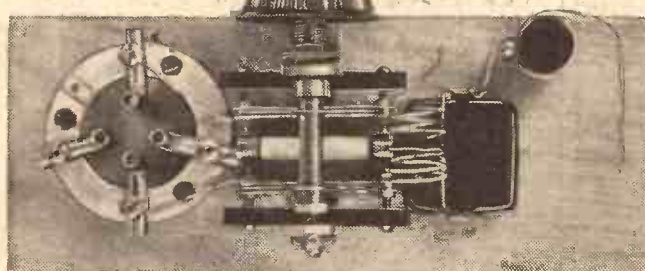


The use of a flexible coupling to eliminate micro-phonetic effects due to vibration from movements of the tuning knob.

specimens of the breed from the transmitters whose signals you report.

H. T. H. (Bolton) has done a funny thing. Feeling a little fed-up with his detector-and-pentode receiver, he simply changed the valves over, using the output pentode as detector. With the priming-grid taken to a 60-volt tap on the H.T. battery, he found that he was taking 18 milliamps, which

EASILY CONSTRUCTED



A very neat super-regenerative receiver for use on 21-5 metre waves.

seemed a bit heavy. So he transferred it to the 9-volt tapping, and now all is beautiful!

I am using an H.F. pentode as detector in my present receiver, and I find that it works best with something between 9 and 12 volts on the priming-grid. It is beautifully quiet in operation under these conditions.

R. W. R. (Southport), a very old correspondent of mine, tells me that he is now fully licensed as G6YR. He adds that he has already discovered that hearing DX is very much easier than working it! We all get that feeling at first, R. W. R. But think of the satisfaction you do get when you start making real contacts.

THE OVERSEAS LISTENER

SINCE a surprisingly large proportion of my letters come from overseas listeners, it is only fair that I should occasionally deal with some of them separately. The man who listens in Outposts of Empire has his own special problems to contend with, chief among them usually being the difficulty of obtaining components quickly.

Furthermore, his requirements are so completely different from those of the average short-wave man at home that he is apt to be rather neglected, I'm afraid. I would like to quote part of a letter from O. E. H. (Singapore).

Something Bigger Wanted.

"Dear W. L. S.," he writes, "I am adding my plea to the many you have doubtless already received from overseas readers for you to give us something better than the little two-valve short-wave receivers, of which you and the other experts in England seem so fond. I realise that you are catering for the majority of your readers who are resident in England, and who already have sets for the medium-wave stations which they rely on for their daily entertainment.

"But we in the Colonies are dependent upon direct reception of Daventry and the other short-wave stations in Europe for our wireless entertainment, and although we love hooking up those excellent little sets we have to depend on ourselves for the design and construction of receivers which we can install for the entertainment of the whole family."

In a nutshell, the overseas man wants a biggish loudspeaker receiver, and won't worry if it only brings in the more powerful stations, so long as they are strong and really reliable.

Too Much Morse.

H. B. M. (Pegu, Burma), in the course of a long and very interesting letter, points out that the chief bugbear is the constant purchasing of large-capacity H.T. batteries, since big sets must be used. He also says that it is about time that some of the commercial Morse was cleared off the short-wave broadcast bands. He would like a really efficient headphone receiver capable of receiving any short-wave station in the world, and also a large battery-operated superhet, for purely entertainment purposes, giving really excellent loudspeaker results.

G. F. L. (Nigeria), who is home on leave, also stresses the same points. Big commercial sets are fine, he says, but cost far too much for the average overseas fan's pocket.

It is obvious from these few representative letters that I simply *must* hurry up the design of my overseas receiver, which, I am afraid, has been stagnating somewhat owing to summer activities and lack of time. In its present rough form it is a five-valve superhet. It may, however, be necessary to add a sixth valve. W.L.S.

Stars in the Making

Alan Hunter visits the London School of Broadcasting, where aspiring radio artists can learn the whys and wherefores of microphone technique.

IF I were Director-General of the B.B.C.—or even a mere sub-controller of This or That—I would start, as an indispensable adjunct to broadcasting, a school for budding stars.

At the moment it is difficult enough to get an audition unless you have, as the saying goes, arrived. And even if you do get an audition—the most easy path being through the ever vigilant Director of Variety—you might very easily be turned down because you hadn't the essential "microphone manner."

It is just this method of standing up to Mr. Mike that the school would expound, thereby drawing out many an embryonic star whose hopes are now liable to be dashed at the outset of an all-too-terrifying audition.

Many an Aspirant to Microphone Fame.

Treading the Milky Way along Regent Street to Portland Place must be many an aspirant to microphone fame. In the Spiral Nebulae of unknown talent lying submerged in various parts of the country must be many latent stars, and it is a crying shame they are not in the making.

It is so easy to criticise the B.B.C. programme-makers for giving us the "same old gang" of artists. But the truth is that one can count the real stars of the air on two hands—by real stars meaning those who rely entirely on broadcasting for their living.

The rest are recruited from the Entertainment World outside the portals of the "Big House"—from the music-halls, theatres, films. And we all know how often established artists in these older branches of entertainment fail to get across that intangible void, the ether.

"Tried on the Dog."

All these good people ought to go through the school before they come on the air. A week or so of learning the subtlety of Mr. Mike—and there is a subtlety all too often discounted by outside stars—would immeasurably add to their broadcasting value.

Already the Variety Department has taken on Talent Seekers, showing a laudable desire to bring out such latent talent as may exist but is at present unexploited.

Some potential stars will be found, of course. But they will be tried on the dog—the long-suffering listening public. They will not be schooled or coached up to a fully acceptable standard.

As a matter of fact the idea of a school

for broadcasting stars has already materialised, outside the "Big House" it is true, but within a stone's throw of Portland Place, and run by a one-time B.B.C. programme executive of long experience.

It is just a year since Mr. Bertram Fryer opened the London School of Broadcasting in a suite of studios in New Bond Street. There, would-be radio artists can—for a very moderate fee—surround themselves with an atmosphere almost identical with a Broadcasting House studio.

There they can face the dread microphone, watch the winking red and white lights, learn to overcome "mike fright," and gradually acquire a technique preparing for the real job of broadcasting.

Mr. Fryer tells the brutal truth to those who will never make microphone artists. He may save aspirants hundreds of pounds spent on fruitless attempts to gate-crash the ether. On the other hand, with his experience of the stuff that stars are made of, Mr. Fryer, late of the London station, can immediately spot real talent, even when it is submerged beneath an entire

school the correct microphone technique, the right phrasing, the special needs to be observed by those who want to sing to us over the air.

W. R. Collins, who broadcasts a great deal himself, is there at the school as musical director, teaching piano accompaniment and syncopation and all the rest of it.

Some idea of the broad scope of the teaching offered can be gauged if I cite a few of the lucky ones who have gone via the school on to the air.

Some Successful "Scholars."

Anna Ginn, a New Zealand soprano, was able to broadcast to her home town through the Empire stations. The fourteen-year-old Henderson twins, after an engagement on the air, are now well on their way with harmony and syncopation numbers. Curtis and Ames, another example of success with rhythm and harmony.

Authorities asked to give broadcast talks on their special subjects are keen to make their delivery as effective as possible. C. B. Fry, for example, added to the lustre of his inimitable style by taking a short course of lessons at the school before he talked on cricket.

Elizabeth Ryan, the tennis star, came to the school to improve her delivery, and afterwards admitted what a lot there was to learn about the microphone manner.

All these and many others have profited by the use of an absolutely indispensable adjunct—the disc-recorder system invented by Mr. Watts. This is a system of instant "play-back" whereby an artist, having made a record of his turn, can hear what it actually sounds like from the loudspeaker end.

Plenty of Faults.

I myself have just made two records to learn the full value of the system. Mr. Fryer and I stood before the pedestal microphone in the talks studio and discussed the aims and progress of the school while a young engineer in the control room was busily putting our immortal words on record.

As soon as the light winked we hurriedly drew our chat to an end, and within a few seconds we were hearing our voices "played back" through the large moving-coil loudspeaker in the studio.

It was an uncanny experience and, I must confess, a very salutary one. Dozens of faults simply howled for correction. But, as Mr. Fryer pointed out, that was just where this recording system was so

(Continued on page 50.)

HEARING YOUR OWN VOICE



Mr. Bertram Fryer, late of the B.B.C., runs a school for broadcasters and is here seen at one of the gramophone turntables during a play-back of an artist's recording.

lack of understanding of the special needs of the microphone.

His general course of twelve lessons for 10 guineas is enough to show whether an at present unknown singer, comedian, raconteur or any other kind of broadcast artist, has a chance to make good on the air, or no chance at all.

Dale Smith, the well-known singer heard so often by listeners, teaches pupils of this

"VARIETY WILL BE MORE VARIED!"

Says Eric Maschwitz, B.B.C. Variety Director, in an interview with "P.W.'s" Special Representative.

VARIETY—perhaps because it is the spice of life—comes in for more universal criticism than anything else broadcast by the B.B.C. It is a good thing the B.B.C. has in Eric Maschwitz not merely a Variety Chief of seemingly inexhaustible energy, but an executive who is never afraid to try new experiments.

It was Mr. Maschwitz who introduced the large studio audience—oft-criticised as the "claque" by those who never took the trouble to look up the offensive meaning of the word—at a time when real entertainment by so-called variety acts over the air was at a very low ebb.

And now it is the same Mr. Maschwitz who, after two and a half years as Variety Director, pronounces the virtual end of variety shows relying on an audience.

Studio Audiences an Exception.

In future, he tells me, it will be the exception rather than the rule for a variety show to be heard by any other audience than the unseen millions for whom it is broadcast. A producer will have to advance very special reasons as to why he should break the new "no-audience" rule.

Why, then, this *volte face*? Has the studio audience failed? Has the criticism of the studio audience finally daunted the ebullient director? On the contrary, the studio audience is being scrapped because it succeeded in its object.

And that object was, quite simply, to enlarge the scope of the material upon which broadcasting might draw. By bringing in the music-hall atmosphere Mr. Maschwitz brought a breath of fresh air into the frigidity of studio performances.

Music-halls, over the air brought in a vast number of outside "turns"—hitherto frightened away from the microphone because it was not their technique. Now, of course, there is a danger of the music-hall atmosphere being overdone.

Not that the music-hall idea is to be abandoned altogether. In future, though, it will be restricted to the presentation of really first-class turns.

"We have now reached the stage where we have enough turns who do not rely on an audience to put themselves across," explained Mr. Maschwitz. "I never did imagine that the music-hall idea was pure 'radio'—not real radio variety. But it was a necessary expedient at a time when I was confronted with a terrible dearth of broadcasting material."

Combining Straight and Light Turns.

Those Jubilee programmes also taught Mr. Maschwitz a very important lesson—and the charm of the Variety Director is that he is always willing to learn, and profit thereby. The Jubilee gala programme showed that essentially straight musical turns could be combined with lighter turns; Albert Sammons side by side with George Robey, for example.

And so it comes about that, after what is after all a relatively short experimental period of just over two years, the Variety

Director has achieved his synthesis—real radio variety.

In his own words, as told exclusively to me for your benefit, I will give you an insight into some of the treats in store for you during the coming "season."

"For a start, we are at last going to have a regular feature on the air—a feature occurring at the same time every week," began Mr. Maschwitz.

The "Saturday Magazine."

"This will be called the 'Saturday Magazine'; and it will include, among other things, the popular 'In Town Tonight' idea.

"We shall follow Mr. Gielgud in bringing excerpts from West End successes to the microphone—musical shows with the leading artists broadcasting.

"John Watt has made arrangements with Walt Disney for the radio presentation of many of the famous Silly Symphonies and Mickey Mouse episodes; and this time

their share this season. We have already decided on quite a number of shows, including 'Veronique,' 'The Cat and the Fiddle,' and 'Waltz Dream.' Betty Balfour will appear in a radio version of 'Squibs' and Gitta Alpa in Kalman's operetta 'The Countess Maritza.' And there are others."

B.B.C. producers will be responsible for two other shows, not at present finally fixed up. One will be a collaboration, between Denis Freeman and Mark Lubbock, a promise of witty and tuneful lines assuredly. And John Watt will combine with Harry Pepper in another original show.

Dance-Session Modifications.

Now that the late night dance music sessions have come under the control of the Variety Department, Mr. Maschwitz will modify the usual arrangements.

"By the end of six months," he hinted, "we shall have introduced more variety into these dancing sessions. There will be no more ninety-minute shows. Two bands will take the place of one. As you have heard, Paul Askew takes over the job of co-ordinating the actual numbers, so as to avoid repetition.

"Looking perhaps a little ahead, there will be another two-hour Christmas Party on Christmas Day. Sandy Powell will also do another show in the near future.

"Fifteen-minute shows by famous artists will be broadcast from time to time. Gracie Fields and the Street Singer have already shown that this type of thing is worth while. Naturally, this feature can only be a success with artists of outstanding talents.

Summing Up.

"How would I sum up my programme? Well, I should say that my aim is to give more varied variety—so that all publics will find something or other to appeal to them.

"My shows will stress the personalities when they are big enough to stand alone, but when they are not the programme will be the thing. Only in this way can we hope to give sustained enter-

tainment when using material that obviously differs very widely in standard."

BROADCASTING IN ESTONIA



A group of Estonian State radio engineers with the car used for obtaining measurements of field strength in connection with the erection of a new 60 kw. transmitter. Note the curiously shaped aerial at the back of the car.

we are having the advantage of the original musical scores direct from Hollywood.

"Then we are planning a new kind of show—an intimate variety show with a very small and select audience, not perched up in the gallery in the old way but sitting around the performers. It will be interesting to watch the psychological effect of this intimacy on the artists.

"A gala programme once a month—along the lines of the Jubilee shows—will bring celebrities to the microphone and generally constitute a variety 'highlight' of the month.

"We are also going to renew the very successful monthly revues; putting them over, as before, late at night—say 10 o'clock. And there will be a fortnightly cabaret, also on the air fairly late at night.

"Stage success revivals will come in for

FOR BATTERY USERS.

It is a good plan when fitting a new H.T. battery to the receiver to place the plug, not in the maximum socket, but in one about 12 volts lower, i.e., 108-volts in the case of a 120-volt battery. In most instances the change will hardly be noticeable, but what will be easily apparent will be the increase in volume and purity when, after a few months' use the plug is inserted in the maximum socket. The fresh section coming into use really does make an amazing difference.

If only one H.T. tapping goes to the battery it is immaterial whether the reserved section be at the negative or positive end; but if more than one, then the portion of the battery held in reserve should be at the negative end.

W. N.

"Sounding" the STRATOSPHERE

The upper atmosphere has a great effect on the behaviour of radio waves, and recently the various ionized and "hot" layers that exist miles above the earth have been closely investigated. How tests are carried out is described below.

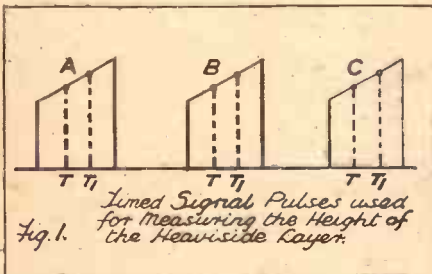
By CARDEN SHEILS.

IN the beginning, radio theory kept well in advance of radio practice. Clerk-Maxwell, for instance, foretold the existence of wireless waves twenty years before Hertz discovered how to produce them, and nearly forty years before Marconi transmitted his first wireless signal across the Atlantic.

Practice Ahead Of Theory.

But for many years after the last-named achievement the position was reversed, and practice forged ahead of theory. The scientists of the day were convinced that wireless waves could only travel through space in a straight line, and that it would be impossible—at least without using enormous power—to transmit signals over really long distances. Marconi, however, showed that in some mysterious way the waves managed to "cling" to the earth and bend themselves around its curved surface. Neither he nor any other scientist of the day could explain why this should be so—but the fact remained.

THE TIME LAG



Heaviside and Kennelly were the first to suggest the idea that an ionized layer in the upper reaches of the atmosphere would assist the passage of the waves by reflecting them back towards the earth. For a long time this was looked upon with suspicion as so much pure speculation. It was ingenious certainly, but not convincing.

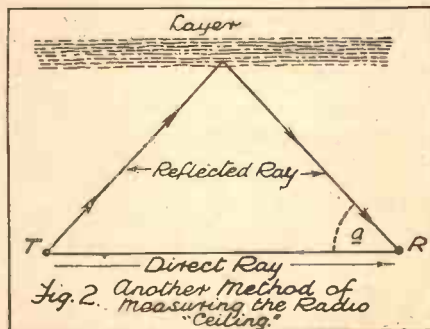
Corroboration Of Ionized Layers.

Then ten years ago positive corroboration was found. Appleton and others proved the existence of a down-coming wave which was a counterpart—except for some difference in polarisation—of the direct wave, which travelled from transmitter to receiver along the ground. The second wave arrived from some point far above the ordinary limits of the atmosphere. Later on the presence of a second layer was established, high above the first or Heaviside layer; and we have since found traces of intermediate layers.

The evidence for all this is based upon the behaviour of radio waves which are

deliberately sent out on a voyage of exploration to the upper reaches of the sky. A series of signal "pulses," ABC, Fig. 1, are transmitted at carefully timed intervals, the carrier frequency being varied slightly during each pulse as shown by the sloping top of each curve. The wave radiated at time T, which travels via the reflecting layer, is found to reach the distant receiver at the same time as the wave radiated a

MEASURING THE HEIGHT

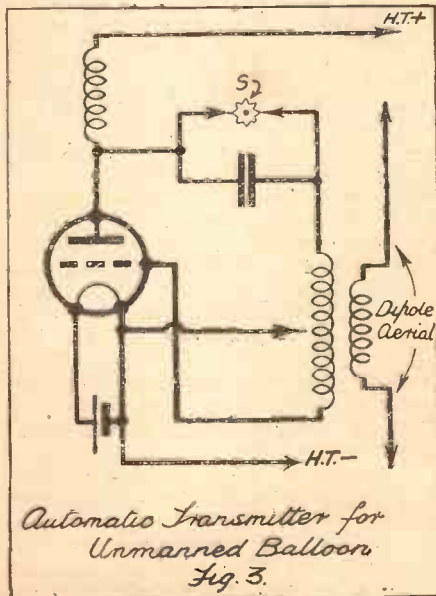


On the left (Fig. 1), is a diagrammatic representation of the varying frequency signal and the difference of time, T and T₁, between reception of direct and reflected rays.

Fig. 2: Shows how the height of the layer is calculated by means of the reflected ray.

Fig. 3: The circuit of the compact transmitter used for balloon tests of the upper atmosphere.

Fig. 4: As height is increased above the earth's surface the temperature drops till, at about 30,000 feet, it begins to rise again.



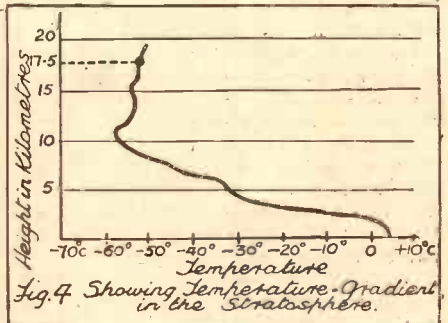
fraction of a second later. The latter travels at T₁, direct, via the ground.

The two waves being of different frequency produce a "beat" note of a certain frequency. From this it is possible to calculate the difference between the two paths and hence the height of the layer. The path taken by the reflected wave varies according to the time of day; actually the layer shrinks farther back from the surface of the earth at night, so that the reflected ray has a longer distance to travel, and therefore falls more out of phase with the direct wave.

The Effect Of Wavelength.

By using a frame aerial to measure the angle, a, at which the downcoming ray reaches the receiver R, Fig. 2, we can again, knowing the base-line distance between T and R, estimate the height of the reflecting surface whether it be the Heaviside or Appleton layer. The former reflects only the longer wavelengths, but

A PECULIAR CURVE



passes the shorter ones (less, say, than 7 metres) on to the uppermost layer, so that short-wave signal-pulses must be used for calculating the position of the latter.

The reflection of the wave depends upon the density of the free electrons in the layer. That is to say, upon the amount of ionization which, in turn, varies with the height of the layer and also with the prevailing temperature. It is therefore possible, by observing the changes in the intensity of the signals received on the reflected wave, to estimate the maximum ionization per unit volume of the layer and to calculate the temperature existing at heights up to 400 kilometres above sea level. The latest measurements show that the atmosphere temperature at a height of 300 kilometres reached the surprising figure of 1,000° C. on a summer day, though it drops to the neighbourhood of the boiling-point of water in winter.

(Continued on page 46.)

Cathode-Ray Circuits, No. 3

USING GAS-FILLED VALVES

Moving a step nearer the final circuit needed for high-definition television, we will now consider the requirements of the simplest form of time base that can be used for television.

By K. D. Rogers

WE have long waited on the threshold of knowledge regarding the high-definition service that we have been promised; but, though there are still all sorts of flies in the ointment of commercial equanimity, we do know what we shall get in the way of lines and the wavelengths on which transmissions will take place.

We know that the service will not have fewer than 240 lines and not fewer than 25 pictures per second, and also that much of the transmissions will be on the "interlaced" system, so we can get on the track of what sort of apparatus is likely to be required, and we can study the technical points of such gear.

Before we can understand the final circuit we must go a step or two farther on the road we commenced last time, and to do that it is convenient to take a simple type of time base circuit, and to go from that to our circuit for the coming television service.

I am not going to put frills on the circuit, for you will not want to use it, and as it is only to aid explanation no good purpose would be served by garnishing the dish.

"Brass Tacks."

And so you must forgive me if I seem unduly long-winded and slow in coming to the "brass tacks"—the final television receiver design—but I want to make sure that the fundamental principles are well understood before we get to the "heavy stuff."

If you understand the basic requirements of television reception, you will not find it very hard to grasp the working of the final circuit.

We have seen what a time base is and how the scanning of the cathode-ray tube is achieved. Now

THE SAW-TOOTH

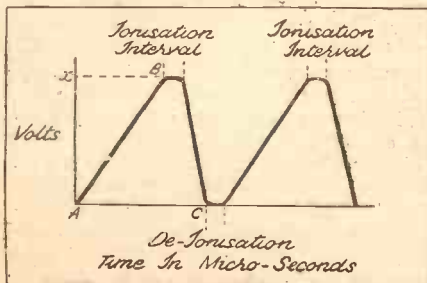


Fig. 2.—With proper bias the gas-filled valves can be charged in a reasonably linear manner until the voltage is great enough to cause ionisation.

we will put together a circuit using the discharge valves mentioned last time and the associated parts for running them.

The circuit (Fig. 1.) consists of a power pack with its rectifier and smoothing choke and condensers and the two discharge valves. The power pack provides from 1,000 to 1,500 volts, and this is applied to the anodes of the two valves through the resistances. Across the anodes of the valves are the charge or deflecting condensers, and it is by building up the voltage across the condensers that the scanning takes place (as you will remember). When the voltage has risen sufficiently to cause the discharge valves to "fire," they will ionise and the condensers will be discharged.

Adjusting Ionisation Voltage.

The voltage at which the ionisation takes place can be determined by the grid bias on the valves, and the rate at which the condensers are charged by adjustment of the resistances R_1 and R_2 . Now, if you notice, the anodes of the discharge valves,

A SIMPLE TIME BASE

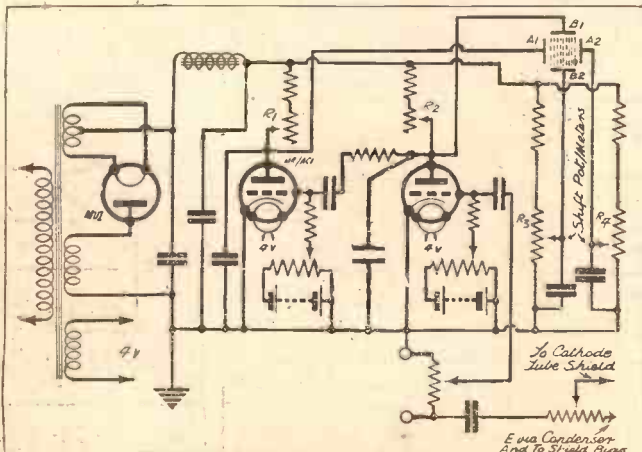


Fig. 1.—A soft-valve time base using battery bias. It is shown connected up to the deflectors, and arranged for vertical-line scanning.

or perhaps it is better to say the un-earthed sides of the charge condensers, are connected to the deflectors A_1 and B_1 . That is to one of each pair. The opposite numbers are connected to the potentiometers R_3 and R_4 , which apply positive bias to the plates to pull the spot towards the inner corner of the screen.

I have actually marked the appropriate position of the spot for vertical scanning and the paths of the scanning lines.

Producing the Scanning.

With the spot pulled over to the place marked before the scanning starts, we can visualise the effect of the condenser charging. As each charges, the potential on A_1 and B_1 in relation to earth is raised and the spot is pulled across and up the

tube. As the condenser controlled by R_2 is smaller than the other condenser it will charge more quickly up to the point when the valve is ionised. Suppose it is arranged that the plate B_1 pulls the spot upwards 100 times for every once that A_1 pulls the spot across. Then the whole apparatus is timed to work so that 100 pulls up and 100 discharges take place while one pull across and one discharge takes place on the other section of the time base. The whole apparatus is called a double time base because it carries out double, or two-direction scanning.

You will now have a fair idea of the action of the time base, its spot deflecting powers and also the placing of the spot

SYNCHRONISING

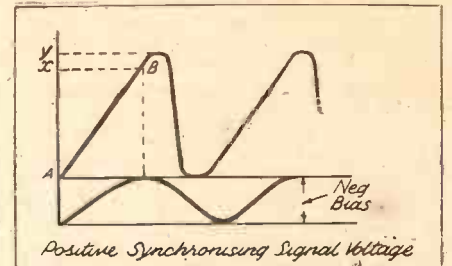


Fig. 3.—How the synchronising impulse trips the gas-filled relay, which is just reaching its ionisation voltage when the signal reduces the bias and "fires" the tube.

initially by sliding the potentiometer taps on the "shift" potentiometers, but the question of synchronising has yet to be discussed.

In a time base of this type synchronising is a simple matter. Its detailed practice we can leave, for not quite the same method will be employed when we get to our final time base.

If you look at Fig. 2 you will see the charging curve of one of the gas-filled discharge valves in conjunction with its associated condenser. The charge starts at A and goes on to B. At this point ionisation takes place, and after a slight lag of time the valve discharges the condenser to C, when the de-ionisation takes place and charging commences again.

The Effect of Grid Bias.

In practice the valve is set with a grid bias which would not allow ionisation to take place until the voltage Y had been reached, whereas we want it to take place at a potential of X (Fig. 3).

But the positive impulses of the syn-

PENTODE FEED

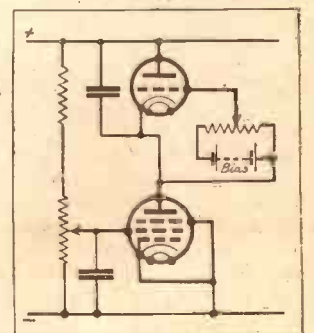


Fig. 4.—Here is a pentode-fed discharge condenser. This method of voltage-rise control allows almost perfect linearity to be achieved.



chronising signal are applied, and these have the effect of reducing the bias at the critical moment, with the result that the

(Continued on page 49.)

How to Make A Complete "Gramo" Unit

Powerful output and first-class quality are provided by this unique and economical battery electric-gramophone which has been specially designed and described by A. SMITH:

THE majority of modern battery receivers are fitted with pick-up terminals for the electrical reproduction of gramophone records. No doubt many readers have been very disappointed with the volume obtainable as compared with that from a reasonably good acoustic gramophone.

The average battery receiver is fitted

referred to as Class B and Q.P.P. amplification.

It is for the foregoing reasons that the playing desk to be described in this article has been designed. Q.P.P. amplification has been chosen rather than Class B owing to its greater economy in H.T. current and greater sensitivity. Indeed, had Class B been used another valve would probably have been necessary.

The amplifier consists of only one amplifying valve of the "L.F." class, coupled by means of a special Q.P.P. intervalve transformer with a ratio of one to eight to a Q.P. 240 output valve. This valve is actually two pentode valves in one envelope.

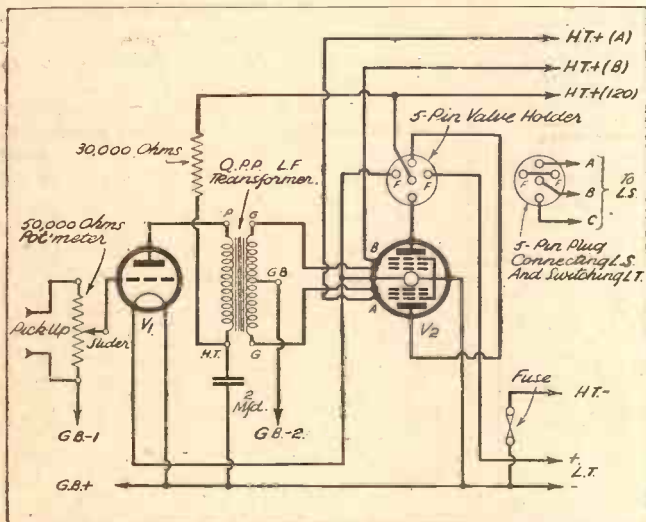
A volume control is fitted across the pick-up to control the input to the amplifier, and consequently the output from the loudspeaker. The control knob of the volume control is on the front of the cabinet, so that volume may be adjusted with the lid closed, i.e., the normal playing position.

The L.S. and L.T. Plug.

In order to reduce the number of controls the on-off switch is incorporated in the loudspeaker plug and socket. The socket is a standard 5-pin chassis mounting valve holder fitted in the back of the cabinet. The anodes of the output valve are connected to the normal grid and anode sockets of this holder, and H.T. positive to the centre socket. The two filament sockets are connected in series with the L.T. positive lead.

The loudspeaker itself is connected to the
(Continued on next page.)

THE SPECIAL CIRCUIT



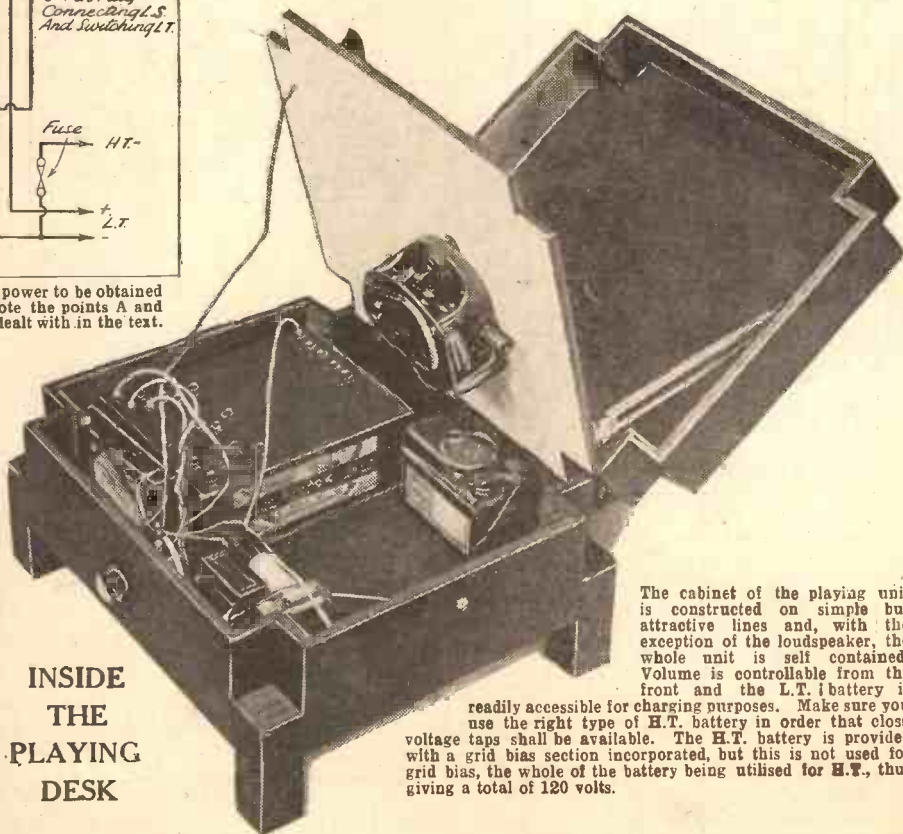
The Q.P.P. valve enables 1.5 watts of undistorted output power to be obtained with a remarkably low H.T. current consumption. Note the points A and B on the valve V2, they are important and are specially dealt with in the text.

with a triode output-valve, giving only 150 to 300 milliwatts output; or a pentode, giving some 500 milliwatts. Although the quality of reproduction is probably better, especially as regards frequency response, the volume is not equal to that obtained from a modern acoustic gramophone.

Keeping Down Running Costs.

Before electrical reproduction becomes worth while an output of at least one to one-and-half watts is necessary. Of course, this is easily obtained with mains apparatus, as practically every mains receiver has an output of two or three watts.

The battery user, however, has to use rather special means to obtain a large output economically. There are two common methods of obtaining an output of between one and two watts when using battery-fed apparatus. These methods are commonly



INSIDE
THE
PLAYING
DESK

The cabinet of the playing unit is constructed on simple but attractive lines and, with the exception of the loudspeaker, the whole unit is self contained. Volume is controllable from the front and the L.T. battery is readily accessible for charging purposes. Make sure you use the right type of H.T. battery in order that close voltage taps shall be available. The H.T. battery is provided with a grid bias section incorporated, but this is not used for grid bias, the whole of the battery being utilised for H.T., thus giving a total of 120 volts.

How to Make A COMPLETE "GRAMO" UNIT

(Continued from previous page.)

5-pin cable plug. Assuming that the loudspeaker specified is used, A is connected to the grid pin, B to the centre pin, and C to the anode pin. The filament pins are joined together. Consequently, when the plug is inserted in the socket, not only is the loudspeaker connected but the L.T. circuit is also completed.

Constructional Details.

Everything is contained in the cabinet, including batteries, but it was considered desirable to use an external loudspeaker, as it is not always convenient to have the loudspeaker situated close to the amplifier.

The actual output obtainable from this playing desk is rather more than 1,500 milliwatts with the 120-volt H.T. battery which is used. The static H.T. consumption is only some three to four milliamps, while the average working current is approximately seven milliamps. Thus an H.T. battery of standard capacity is easily

capable of supplying the necessary current. The L.T. current is half an amp., and is supplied by a small unspillable 2-volt accumulator.

So much for the circuit arrangement and general design, and we now pass on to the construction.

It is necessary to construct the cabinet first of all, as the components of the amplifier are actually fixed to the inside of the cabinet. First obtain the following pieces of plywood $\frac{3}{8}$ -in. thick. Three pieces 15 in. \times 13 in.; two pieces, 12 $\frac{1}{2}$ in. \times 7 $\frac{3}{8}$ in.; two pieces, 10 $\frac{1}{2}$ in. \times 7 $\frac{3}{8}$ in.; four pieces, 7 $\frac{3}{8}$ in. \times 1 $\frac{1}{4}$ in.; four pieces 7 $\frac{3}{8}$ in. \times 1 $\frac{1}{8}$ in. Four pieces of wood 1 $\frac{1}{2}$ -in. square and 4 $\frac{1}{2}$ in. long are required for the feet, and also some small glue blocks. Half-inch quadrant may be used for these.

The method of construction of the cabinet may be seen from the diagram of the motor board. It is made up as a completely enclosed box, and then cut in two to form the body and the lid. It should be cut so

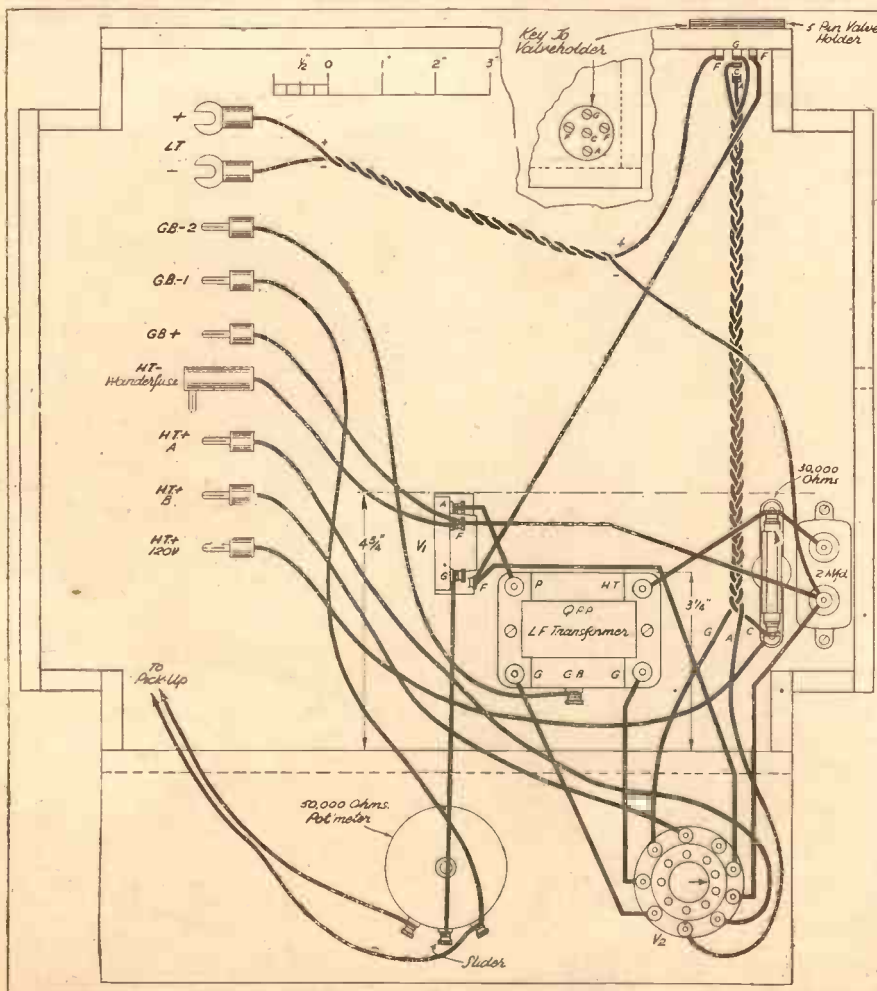
that the lid is 3 in. deep overall. It should be pointed out that the top of the lid and the bottom of the body are fitted inside the sides.

It is advisable that the whole thing should be pinned and glued and allowed to set before cutting through. When this has been done, the glue blocks may be

THE COMPONENTS REQUIRED

- 1 Benjamin 4-pin "Vibroder" valve holder.
- 1 Graham Farish 9-pin valve holder.
- 1 Ferranti Q.P.P. L.F. transformer, type A.F.12C.
- 1 Varley 50,000-ohm volume control, type C.P.159.
- 1 "Clix" 5-pin chassis-mounting valve holder, with screw terminals.
- 1 Bulgin 5-pin cable plug, type P.3.
- 1 Dubilier 2-mfd. fixed condenser, type B.B.
- 1 Graham Farish 30,000-ohm "Ohmite" resistance in horizontal holder.
- 1 Garrard single-spring gramophone motor, No. 20.
- 1 Graham Farish pick-up, without volume control.
- 1 Coil B.R.G. "Quikon" connecting wire.
- 6 "Clix" wander-plugs.
- 1 Belling & Lee wander-fuse.
- 2 Belling & Lee accumulator spades.
- Flex, screws, etc.
- Wood, hinges, and stay for cabinet.

HOW THE PARTS ARE DISPOSED AND CONNECTED



glued inside. The glue blocks in the corners of the body should finish $\frac{3}{8}$ in. from the top edge, thus forming a stop for the motor board.

The feet are fitted in the four corners of the cabinet so that they raise it 2 $\frac{1}{2}$ in. These should be glued on the outside and pinned from the inside. The remaining piece of plywood, 15 in. \times 13 in., is the motor board.

This must be cut to fit in the top of the body of the cabinet, drilled to take the motor and pick-up, and finally hinged to the inside of the back of the cabinet. The lid is fitted by means of back-flap hinges. The support arm for the lid is fitted to the right-hand side looking from the front.

That concludes the construction of the cabinet, and it only remains to cut the hole for the winding handle, which is 1 $\frac{1}{2}$ in. down from the top edge of the cabinet, and also the one-inch diameter hole in the back for the loudspeaker socket.

The lid and motor board should now be removed, and the components mounted in the cabinet and wired up. There is nothing complicated in the mounting or wiring, but it must be pointed out that it is essential that the components should be mounted exactly as in the diagram, otherwise the motor may foul the other components. Make sure that the loudspeaker socket is wired correctly, as it has both H.T. and L.T. connected to it.

Arranging the H.T. Taps.

Having completed the wiring the lid and motor board may be replaced, the batteries placed in position, and the pick-up connected to see that everything fits. If everything is in order the batteries may be connected up and the finished job tried out.

The battery voltages must be carefully arranged. The L.T. is quite normal, and the G.B. connections are G.B. + to G.B. + on grid-bias battery, G.B. - 1 to G.B. - 3 volts, and G.B. - 2 to G.B. - 9 volts. The H.T. connections, however, are rather abnormal.

On the Mazda Q.P.240 valve used you will find that on one side of the base it has the letter A, whilst on the other side is the letter B. It is these letters to which H.T. + A and H.T. + B refer in the

(Continued on next page.)

Very few parts are required and the whole construction is a simple matter. The actual mounting of components and wiring should take but a few hours.

How to Make A COMPLETE "GRAMO" UNIT

(Continued from previous page.)

diagrams. Above these letters on the base are letters on the glass envelope, and it is these letters which decide what voltage to apply to H.T. + A and H.T. + B. These voltages are obtained from the leaflet supplied with the valve, and must be correctly applied. The other valve (V1), by the way, is a Marconi or Osram HL2K.

ACCESSORIES

LOUDSPEAKER:

W.B. Stentorian Senior (in cabinet).

BATTERIES:

H.T. 120-volt Drydex H.1059.
L.T. 2-volt Exide P.O.2.
G.B. 9 volts.

The battery specified has a total voltage of 120-114v. H.T. and 6v. G.B. Actually the whole is used as H.T. So connect H.T. - to G.B. - 6, and H.T. + 120 to 114v. on battery. The intermediate tapings will then be six volts more than the markings. Allowance must be made for this when deciding the voltages for H.T. + A and H.T. + B.

For example, if the specified voltage is, say, 96 volts, the tapping used on the battery will be that marked 90.

It is important that these voltages should be correct to within two or three volts, and consequently it is essential to use a H.T. battery which is tapped at frequent intervals. Even with the battery specified it may not be possible to apply the exact voltage recommended by the valve manufacturers, but it is possible to obtain a voltage correct to within 1½ volts, which is perfectly satisfactory.

Provides Easy Matching.

The whole object of each individual Q.P. 240 having different screen voltages recommended is to obviate the necessity of matching by means of a milliammeter, which a large number of constructors do not possess. Some of those that do would possibly find some difficulty in matching by this means.

Although the L.T. switching arrangement has already been mentioned, the connections of the 5-pin cable plug will now be given in detail. Connect the two filament pins together by means of a short length of well-insulated wire. Connect a black flexible lead to the grid pin and another black flexible lead to the anode pin of the cable plug. Connect a red flexible to the centre pin. These leads

should, of course, be of sufficient length to connect to the loudspeaker, wherever it might be situated. The free ends of these leads are connected as follows: One black lead to 'A' terminal of loudspeaker, the remaining black lead to 'C' terminal of loudspeaker, and the red lead to the 'B' terminal of loudspeaker.

The upper switch arm on the loudspeaker should be set to 'D,' and the lower one to 'H.R.' This gives the approximate impedance for the output valve.

If a loudspeaker other than that specified is used it will be necessary to connect it according to the maker's instructions for Q.P.P. output. It should be pointed out that the correct load for the Q.P. 240 is 16,000 ohms.

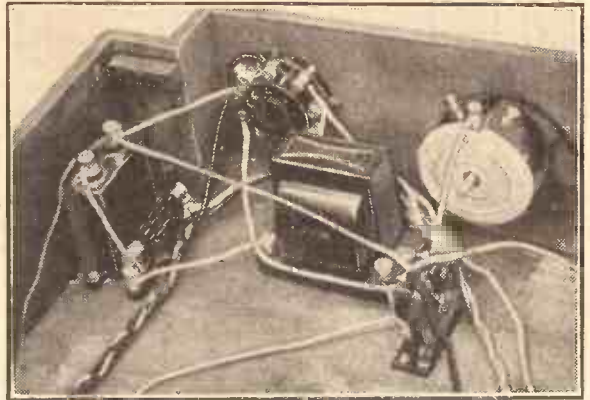
Excellent Quality.

Everything should now be in order to obtain a surprisingly large output of really excellent quality. In our opinion the balance of the output is just right without any top cutting devices across the output. However, if the "top" is considered too pronounced, the usual condenser and resistance arrangement may be used to suppress it.

The volume control works in the normal way. That is, volume is increased by

turning the control knob clockwise. Such is the reserve of power, that, with the majority of records, it will be necessary to keep the volume control well back to prevent overloading. Even the quietest

ONE CORNER OF THE AMPLIFIER

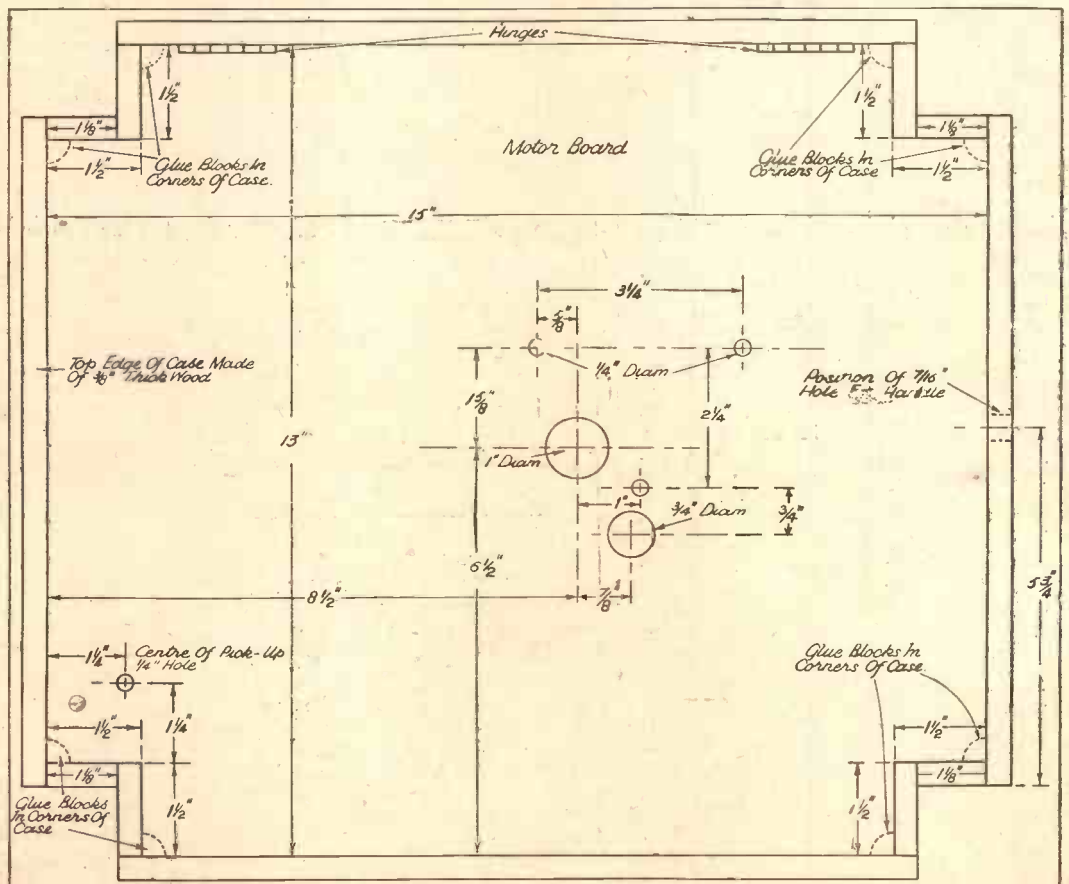


Most of the parts are fitted in one corner, as shown in this photograph. The nine-pin valve holder is for the Q.P.P. valve.

records will give an output more than sufficient to load the output valve.

It should be pointed out that the amplifier is suitable for use with a pick-up only, and is not suitable as an amplifier following other valves, as the input circuit is unsuitable. It would be necessary to alter the grid circuit of V1 in such an instance.

THE BUILDING OF THE BOX IS NOT DIFFICULT



The cabinet dimensions are clearly shown above, together with the drilling details for mounting the clockwork motor. The corner glue blocks should be so fitted as to form supports for the motor board.

A NEW SHORT-WAVE DEVELOPMENT

[Details of Major Armstrong's latest system for use on wavelengths of the order of six metres.

By J. C. JEVONS

SHORT-WAVE enthusiasts in the neighbourhood of New York have been puzzled recently by certain weird manifestations in the ether, on and near the six-metre mark. The mystery has recently been solved by the announcement that Major E. H. Armstrong, the well-known radio pioneer, has perfected a new system of ultra-short-wave signalling.

The signals are transmitted as frequency-variations on a six-metre carrier wave, and for that reason cannot be heard intelligibly on the standard type of set, which is, of course, only intended to handle ordinary modulated signals. Hence the mystification of the local short-wave "fans."

THE FREQUENCY SPREAD

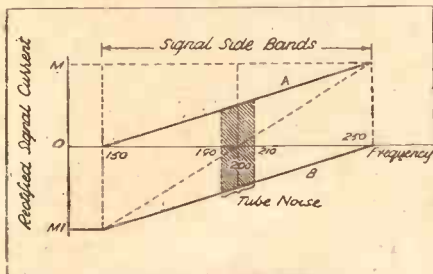


Fig. 1. Illustrating the frequency spread of an incoming signal after it has passed through the intermediate frequency stage of a superhet. The shaded portion corresponds with "tube-noise".

Although Major Armstrong's plan involves the use of a special kind of receiver, this should prove no bar to its success, provided it does in fact provide a definitely better service. The waveband below ten metres is the future home of high-definition television and will, almost certainly, also accommodate the corresponding sound programmes, so that one must expect it to be the field of intensive development in the near future.

The Valve Noise Problem.

It is not possible, for instance, to reproduce high-definition pictures on the same type of receiver as we use for medium-wave broadcasting and, in the same way, it is likely that the introduction of ultra-short-wave sound-transmissions will bring other special kinds of circuits in its train.

As already mentioned, Major Armstrong has thrown over the usual method of transmission by amplitude-modulation in favour of a new system of frequency-modulation. Naturally his receiving circuits are also designed to respond to variations in frequency instead of to variations in amplitude.

The object of all this is to increase the normal "reach" of wavelengths of the order of six metres. In the ordinary way one would attempt to do this by boosting up the amount of H.F. amplification used at the receiving end. But the solution is not so simple.

Suppose for a moment we transfer the problem to medium-wave broadcasting, and attempt to bring in a station a little

beyond the ordinary reach of the set. As we all know from bitter experience, the point soon comes when further amplification simply increases the general background of "atmospherics" until it completely blots out the desired signal.

Strangely enough, the same trouble does not arise on wavelengths below the ten-metre mark, because the amount of static in this part of the ether is comparatively small. But unfortunately we meet another kind of trouble, namely that due to "tube" noise, which is caused by the irregular way in which electrons are liberated from the filament inside the valve. Instead of coming off in a perfectly smooth stream, they are produced in a series of spurts, which give rise to amplitude variations in the output current.

Up to a certain point these only make themselves felt as a high-pitched "hiss," but as the amplification is pushed up and up the hiss gradually develops into a pronounced "roar," which in the end completely masks the distant signal.

Wide Sideband Coverage.

As is well known, signals transmitted in the ordinary way produce side-bands which we will assume for purposes of illustration spread for some 10 kc. on each side of the carrier wave and no more. But by using his system of frequency-modulation Major Armstrong produces side-bands which cover a much wider area. Actually they spread for no less than 50 kc. on each side of the carrier.

SECOND DETECTOR STAGE

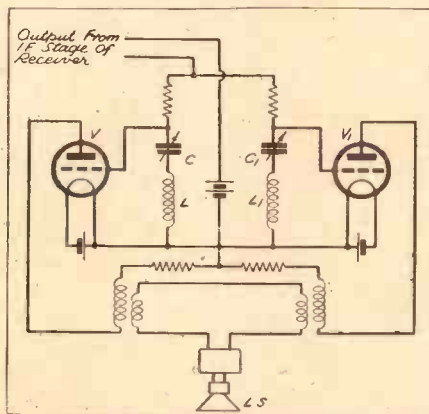


Fig. 2. The second detector stage of the Armstrong superhet receiver. The two valves are so arranged that they "add" the signals due to frequency variation over a range of 100 kc.

Without going into the process of modulation in detail, it can be stated that once the microphone signal has been converted into a frequency-modulated wave, the spread of the resulting side-bands can be increased to any desired extent simply by passing the modulated wave through a series of frequency-multiplying valves.

Fig. 1 shows the frequency spread of the incoming signal after it has passed through

an intermediate-frequency stage of the superhet receiving set. It will be seen that the signal extends from 150 to 250 kc., that is, it covers 50 kc. on each side of the 200-kc. mark to which the I.F. circuit is tuned. The narrow "shaded" portion corresponds to "tube noise," which being of the nature of an amplitude-modulated signal—or rather disturbance—is shown limited to a 10-kc. side-band spread.

Fig. 2 shows the second detector stage of the Armstrong superhet receiver. The valve V has an input circuit LC, which is tuned to 150 kc. so that its reactance, i.e., its rectifying action, is zero at this frequency. But for higher frequencies its reactance increases, as shown by the curve A in Fig. 1, until it reaches a value O M at 250 kc. Similarly the input circuit L₁, C₁ of the second valve V1 is tuned to 250 kc. so that it does not build up any signal voltage at that point. But, as will be seen from the curve B in Fig. 1, its reactance increases in the opposite direction to that of the first valve, until it reaches a value O M 1 at 150 kc.

Cancelling Out the Background.

The two valves are so arranged that they "add" the signals due to frequency-variation over the whole range between 150 and 250 kc. But for the undesired amplitude-variations caused by tube noise (shown by the shaded area in Fig. 1) the two valves V, V1 rectify in push-pull, i.e., in opposition, so that this source of trouble is almost completely wiped out.

By so arranging matters that the desired signal produces a much greater effect on the receiver than any disturbance (more especially tube noise) that can arise from any amplitude-variation, Major Armstrong succeeds in removing the limit normally set on the use of intensive H.F. amplification.

IS THE B.B.C. POPULAR?

The Editor, POPULAR WIRELESS.
Dear Sir,—Your contributor, L. Marsland Gander, who writes in "Popular Wireless" on "Is the B.B.C. Popular?" is certainly on the target when he attributes the general feeling of dissatisfaction with the B.B.C. to their "take it or leave it" attitude; but certain other of his remarks are not, in my opinion, quite so near to the mark.

The suggestion that listeners should telephone to Broadcasting House and give their views after a broadcast would not result in a representative opinion; telephone subscribers are in the minority—being mostly business and professional people—and I cannot visualise Bill the Dustman leaving his hearth to dash round the corner to the nearest telephone kiosk with "tuppence" in his fist; and what about the provincials?

Similarly, the postcard idea fails; the very people (rare enthusiasts) who now send the futile letters will send the postcards.

The present dictatorial attitude of the B.B.C. can be overcome only by the withdrawal of the monopoly and the creation of a competitive claim to the licence revenue; and I believe this can be successfully achieved without resort to the system of propaganda and advertisements.

When the present charter of the B.B.C. expires, in 1936, it should be renewed, with the present policy and directorate, with the proviso that, in 1937, the amount of their share of the licence revenue will be governed by the votes of licence-holders. At the same time another broadcasting system to be inaugurated, subject to a charter identical with that of the B.B.C.; but—and this is the principal point—with a director who holds views on public entertainment requirements in absolute antithesis to those of Sir John Reith—C. B. Cochran is my suggestion.

The plebiscite could be easily and economically operated through the machinery of the present licence system. A ballot form, with the estimated revenue to be apportioned thereon, could be printed on the back of the licence, on which the holder would be required to record his vote relating to the percentage to be allotted to either system, and surrender to the Post Office when purchasing a new licence.

The extra expenditure on service, of course, implies that the Treasury will have to remove its voracious tentacles from this source of revenue.

Yours truly, A. E. Josc.

75, Brendon Street,
Long Eaton, Notts.

ONCE an aeroplane is in the air the only link between the pilot and the aerodrome is through the ether. Wireless brings him the latest weather reports, keeps him informed of any sudden changes to be expected along the route, and generally serves as guide, counsellor and friend throughout the flight.

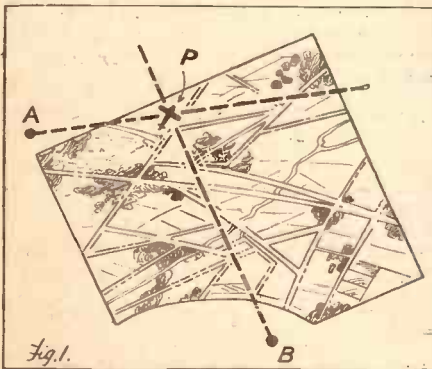
Thanks to recent developments in the art of direction-finding wireless is beginning to take over more and more of the duties of navigating officer. It is possible, for instance, to map out the whole of the airway with long-distance radio beams, which serve to keep the machine automatically on its proper course by giving audible, or visible, warning signals of any deviation to port or starboard. Such a scheme is particularly useful at night or during fog, when the usual navigation lights are blacked out.

Special Guiding Beams.

One of the biggest risks any pilot has to face is that of landing in a bad fog. Here he can be helped by 3-metre radio "beams," which are transmitted vertically to mark out the boundaries of the landing field. Immediately after crossing this "wall" of short waves the approaching plane picks up a short-wave "landing" beam which is inclined at such an angle that it automatically brings the machine safely to the ground. All these operations are performed "automatically" in the sense that the pilot steers entirely by the readings of radio indicators mounted on the dashboard of the plane. The method is so reliable that hundreds of "blind landings" have been made with the pilot seated inside a "hooded" cockpit, so that he cannot see outside the machine.

In the absence of long-distance

ON THE MAP



The intersection of the lines, from the two beacon stations A and B, indicates the position of the plane P.

"guiding" beams it is very easy for a pilot, when flying in fog, to lose his way en route. The usual procedure then is for him to "call" for his bearings.

His transmitted signals are promptly "analysed" by a frame aerial at one of the recognised D.F. land stations, so as to get the "line" of the machine from that particular station. Meanwhile, a "cross bearing" is being taken from a second D.F. observation post, which telephones the result to the first station. Here the

SHOWING THE WAY HOME

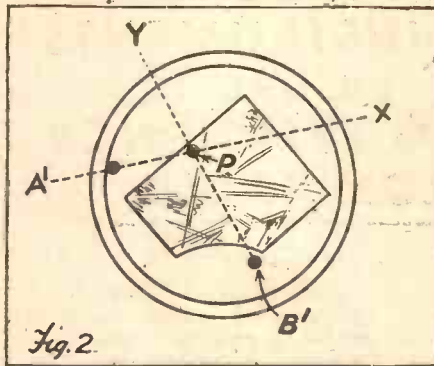
The latest recruit to the ranks of aircraft aids is the cathode-ray tube. In this article it is shown how recent research has enabled the tube to be used to provide immediate indication of his position to the pilot of an aeroplane.

two bearings are set out on a map so that their point of intersection shows where the aeroplane is located, and the required information is then transmitted back by wireless to the pilot.

The whole observation naturally takes some time to complete. So that before his "position" is transmitted back to him the pilot may be many miles away.

The method is quite practicable for sea navigation, because the speed of a ship is

ALWAYS VISIBLE



Here a transparent map has been placed on the cathode-ray-tube screen, and the position of the plane is shown by the intersection of the scanning lines A'X and B'Y. The position of the plane is thus constantly visible.

comparatively slow; but for air navigation time "is the essence of the contract," and the required information must be available quickly if it is to be of real service.

Experts of the Radio Research Board have tackled this problem from a new angle, and, by bringing the cathode-ray tube to their assistance, have developed a scheme which allows a pilot to ascertain his position in the air automatically at any time.

The bearings are taken in the air instead of on land, and the two readings are simultaneously combined on a map or chart mounted on the dashboard of the machine, so as to show the actual position of the craft as it flies through the air.

Using The Cathode-Ray Tube.

This very useful result is obtained by using the ordinary principles of wireless direction-finding in combination with a new and ingenious application of the cathode-ray tube. As we all know, the electron stream passing through the tube can be made to trace out a "line of light" on the fluorescent screen if an A.C. voltage is applied to one set of the control electrodes. This is, in fact, part of the ordinary scanning process in television.

Two frame aerials mounted on the aeroplane pick up signals from two fixed beacon stations on land, the pick-up voltages, after amplification, being applied in rapid succession to the two pairs of deflecting electrodes in a cathode-ray tube. In this way the signals produce two "lines of light" on the fluorescent screen corresponding

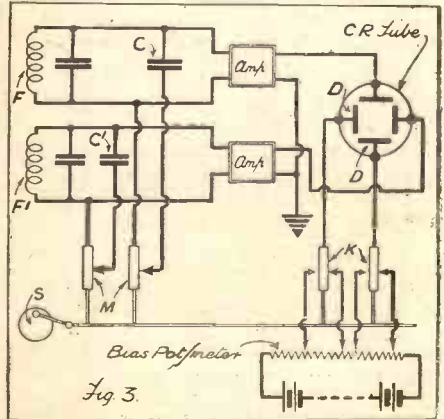
with the respective directions of the two land beacons. The "lines" are repeated so quickly that each "persists" on the screen, and their point of intersection gives the pilot his required position.

The arrangement will be made clear by referring to the three sketches. Fig. 1 shows an aeroplane P flying over an area of country covered by the radiation from two land "beacons" or transmitters, marked A and B. Fig. 2 shows a transparent map of the same area placed over the fluorescent screen of the cathode-ray tube on the dashboard of the aeroplane. The points A', B' on the screen represent the actual positions of the land beacons A and B in Fig. 1.

How The Device Works.

The electron stream in the cathode-ray indicator is so controlled that at one moment it is zeroised at the point A' and the next moment at point B'. Although it is being continually changed over from one point to the other, during the short time it is zeroised at A' it is subjected to the incoming signals from beacon A, Fig. 1. These deflect it along a line A'X which indicates the "bearing" of beacon A relative to the aeroplane. Similarly, when the spot is zeroised at the point B', it is subjected to signals from the second land station B, which deflect it along a second line B'Y, corresponding with the "cross bearing" of that station relative to the plane.

THE TUBE CIRCUIT



The fundamental cathode-ray indicator circuit is shown above. F and F' are the two frame aerials fitted in the plane.

The pilot sees both lines A'X and B'Y simultaneously, and therefore knows that his position is at the point P where they cross on the map.

Fig. 3 shows the circuit arrangement of the cathode-ray indicator. A constantly rotating switch S operates contacts K to alter the initial bias applied to the deflecting electrodes D of the tube, so that the spot of light is alternately centred first at the point A', Fig. 2, of the fluorescent screen, and then at the point B'. Simultaneously contacts M shunt condensers C C' across the two frame-aerials F F', so as to change the tuning alternately from the transmitter A to transmitter B.

"SOUNDING" THE STRATOSPHERE

(Continued from page 39.)

It is perhaps more important, from the meteorologists' point of view, to secure information of atmospheric conditions somewhat nearer to the earth's surface.

But the construction of a balloon designed to carry passengers to an extreme height is necessarily a costly affair, and the trip itself involves a considerable risk to life. Radio, however, comes to the rescue and furnishes the required information at comparatively small cost and without danger.

In the first place, small "unnamed" balloons fitted with automatic-recording instruments were sent up until the decreasing atmospheric pressure burst them. The

instruments were attached to small parachutes which brought them down to earth, where readings were taken.

But this method of sky-sounding has definite limitations. For instance, it can only be carried out in clear weather, since it is necessary to measure the maximum height reached by the balloon by telescopic observation from two or more stations on the ground. Also, in unpopulated districts, the parachutes often drift out of sight and are difficult to recover.

Automatic Transmitter.

Most of these difficulties are now being overcome by fitting the "sounding" balloon with a miniature radio-transmitter.

The circuit used for the transmitter is shown in Fig. 3, the main feature of interest being the small rotating star-wheel S, which

is used to modulate the carrier-wave with signals indicating the climatic conditions experienced. The valve feeds a 10-metre carrier-wave to a suspended di-pole aerial.

The modulating wheel is driven at constant speed by a small spring motor. It is linked to a cylinder fitted with contacts which periodically "explore" the position of the indicating-needles of the recording instruments, such as a thermometer, a barometer, and a hygrometer. Each movement of the needles alters the effective tuning of the circuit, so that a distinctive signal is sent out which can be continuously followed and interpreted by the ground observer.

Fig. 4 is a graph showing the recorded variation in temperature up to an elevation of 17.5 km., or roughly 60,000 feet. It will be seen that the temperature falls steadily to a height of about 10 km.—the beginning of the stratosphere—and then starts slowly to increase.

NOTES ON TELEVISION

(Continued from page 32.)

waveband allotted is in the region of 10 metres. But only short-distance work would be practicable on low power.

Is this a conceivable use for all these 30-line discs and mirror-drums? I don't mean to say that the amateurs should only just play at what the B.B.C. has been doing for all these years, but I suggest that it is not impossible that real improvements in television technique might easily come from an amateur, and the number of scanning-lines he happens to be using at the time doesn't necessarily matter.

At all events, a few 30-line transmissions in the 10-metre amateur band would give some of us a chance of testing out our ultra-short-wave superhets and cathode-ray equipment, even if they don't necessitate anything like the band width that the high-def. transmissions are going to do.

The amateur transmitter has a fine record behind him when one surveys the development of short waves. What a pity that he doesn't figure at all (so far) in the history of television!

The Design of Suitable Supers.

During the past few weeks I have met many people who are all ready with ultra-short-wave superhets, but simply don't know whether they are going to be good enough, because they have no regular transmission to play with. Where such people gather together, almost the sole topic of conversation is the design of suitable I.F. couplings.

At the present I am using ordinary tuned-anode couplings with a tremendous L/C ratio, the "C" being little more than the self-capacity of the coil and the "strays" in the wiring. Others favour the band-pass scheme, which is more complicated to construct and adjust.

My own receiver gives a tremendous output on local ultra-short-wave transmissions, but the noise-level seems disappointingly high. No long-distance signals have yet been heard on it, in spite of these amazing reports that the German station on the Brocken has been received in the U.S.A., and that Argentina and Norway are in regular communication on 7 metres.



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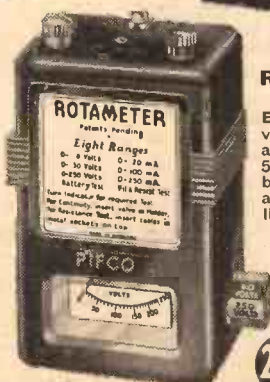
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RADIOTORIAL QUESTIONS AND ANSWERS

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

SQUEALS FROM THE PICK-UP.

R. A. (Canterbury).—"Fitting the pick-up proved no difficulty at all, so far as getting it working was concerned. And we are delighted with the records played this way. But, oh, how it squeals when the pick-up is touched! "I cannot think there is anything really wrong, as it works so well when reproducing the records. But why does it squeal so? And what can I do to stop it, for at present the pain of the "accompaniment" is greater than the pleasure of the music!"

To get rid of such squeals is usually quite a simple matter, provided that the metal-enclosed type of wire is used for the pick-up leads. There are various kinds of screened wire, but if you can, use the sort that has two leads, insulated, inside a metal coating. The two leads then act as the respective wires for the pick-up, and the separate coating should be earthed. All the pick-up wiring, including even the short switch leads, is best enclosed in this manner. In addition the frame of the pick-up should be earthed, and any "troublesome" metal casing, this

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

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

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

generally being easily managed by means of a short flex lead slipped under a screw, or soldered.

The method, in fact, is simply to bring all the stray metal parts that cause the squealing trouble to earth potential (the same as your body's), so that there are no stray capacity or conductive effects caused by touching them. You should find it quite easy, and possibly interesting, to achieve complete freedom from hand effects.

WHY DOES IT NOW RUN HOT?

S. E. F. (Wallington, Surrey).—"Can you suggest any reason for a mains set, formerly quite normal in every way, now becoming hot soon after it is put in use?"

"It was built by an amateur set-builder, but was a wonderfully good job, and for power and quality quite equal to any manufactured set of the same number of valves (three). And for eighteen months or so this trouble of hot running never showed itself.

"For the last couple of months, however, the back of the set gets noticeably hot (and smelly) at the place near where the lead from the wall-plug goes into the metal box thing. But everything looks as usual, as far as I can tell.

"There has been nothing whatever wrong with the actual working of the set, which is, as I say, as good as anyone could wish for, or could buy. But why does it now run hot?"

"I am afraid to leave it for long in anybody else's charge, and as a matter of fact they are a bit nervous of it, so we do not use it as much

as we should like to, because of this. I have enquired of neighbours, and there is nothing wrong with their sets, so it cannot be anything to do with the electricity company, as I thought it might. What ought I to do about it?"

You should not neglect it, as such symptoms definitely point to something wrong, and needing attention.

There is a possibility that one of the mains voltage adjusting-tappings has been moved, and if so you could probably put this right yourself.

Look at the leads going to the "metal-box" (after you have pulled out the mains plug, of course) and see if anything there appears to be accidentally touching where it should not: or if the connecting plugs which go to the figured tapping-points have been misplaced. (If, for example, your mains are 250 volts, and the plugs have accidentally got placed in the "200" position; that would account for the extra heat.)

Similarly, without the plugs themselves having been altered, a heating effect might be caused by the covering of a wire being broken, allowing "protected" wire to come into contact with something from which it should be separated by the rubber coating.

You may spot something of the kind at once, and if so, and if it can obviously be remedied simply, that

should be tried. In which case there should be no more bother.

But if you cannot see anything of this kind, or if when you find something you are a little puzzled by it, get an expert to look over the set for you. In fact, that is the only safe course to pursue if you cannot find something that can easily be put right, since it is definitely imprudent to continue to run a set which gets abnormally hot.

LOUDSPEAKER EXTENSION CAUSES VALVE TROUBLE.

S. J. (Derby).—"My set is H.F., Det., and Pentode, and since I have put in an ordinary loudspeaker extension to another room, I have had trouble. Three times the pentode has become faulty, which it never did before.

"I never heard of a loudspeaker extension making any difference before, but it is only since I put this in that there has been any trouble. I use the same speaker in both rooms, so it cannot be that it is unsuitable, as it is the only one I have ever had, and was quite O.K.

(Continued on next page.)

THE DECIDING FACTOR

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RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

before. Can you suggest what may be doing it?"

We know of one thing which is likely to ruin a pentode—and that is *breaking its loudspeaker circuit when the set is switched on*. Have you been doing that? If so, that is your trouble. You must not undo a pentode's loudspeaker leads unless the set is off.

So the shifting of a loudspeaker plug, or the alteration of leads while the set was on, may be the explanation of your trouble.

SHOULD REACTION DECREASE THE ANODE CURRENT?

C. D. P. (Mansfield).—"When trying the stunt of a milliammeter in the detector's anode lead for sharp tuning, I was surprised to notice the effect of reaction on the readings given."

"I find on all stations that if the reaction is increased to make the programme louder, the current reading on the milliammeter decreases. Should it not have the opposite effect, and show greater current for the louder response, due to reaction being increased?"

Whether there will be an increase or a decrease depends upon the type of detector used. The ordinary grid-leak-and-condenser type of detector shows a decrease of mean anode current when it is detecting strongly, but the anode bend type—even if using the identical valve, as before—causes the current to increase.

This is true whether reaction is applied or not. The effect of properly applied reaction is merely to accentuate the grid voltages that are causing the valve to detect; in fact, that is the merit of reaction, that it *strengthens* the set's input without radically altering its nature.

It is to be expected, therefore, that whatever type of detection is employed, the effect of reaction will be to increase its characteristic indications on the milliammeter. On an anode-bend set there will be greater increases of current when reaction is applied to a station tuned-in; on a grid-leak-and-condenser detector set, the tuning-in of a station will cause the usual decrease in anode current.

POWER VALVE TAKING TOO MUCH CURRENT.

J. N. (Amersham, Bucks.).—"I took the opportunity of checking the current consumed from the H.T. battery, trying each H.T. lead in turn. The S.G. and the detector leads were both right, but the remaining lead showed excessive current."

"As this supplied both the L.F. valve and the power valve it looked as though we should have to do a bit of temporary re-wiring, until I remembered the stunt of pulling out the L.F. valve, leaving only the power valve to measure. It read exactly half as much again as it should have done!"

"Thinking it might be a dud smoothing condenser or something passing the extra current, I switched off, and watched the milliammeter needle, which went right back to 0. So it seems it must be the valve itself passing the extra current."

"Yet the G.B. battery voltages are up to scratch (and a new battery gives exactly the same results), and the power valve works perfectly in my friend's set, and does not appear to increase his anode current reading, though to be sure, we have not tried it separately in his set, but only in conjunction with the other valves."

"Can you suggest anything that might cause an increased reading in my set, but not in his?"

It seems obvious that it is a question of grid bias voltage, and you certainly did right in checking the battery to see if it was up to scratch. But because it shows no fault, that does not prove that the valve is properly biased.

Is there a possibility of a dud resistance or lead in the grid circuit? Anything that prevented the proper application of the battery bias would account for your trouble. Also, is there a coupling condenser? If so, suspect its insulation, for if this is faulty, and permits H.T. to get on to the grid, that explains the excessive current.

SPOILT BY A CRACKLING NOISE.

F. E. (Grantham).—"I cannot understand what is the matter with my set since we moved

into this house. It seems as though the move-in had disturbed something, but I feel sure this cannot be, because the greatest care was taken to get it all packed very carefully."

"It travelled on my father's lap all the way, and was taken more care of than some eggs which came through at the same time without a crack! But it does not work like it did before. It is spoilt by a crackling noise."

"This is very disappointing as I have got a better aerial than I was able to put up before. I wish you would help me, as it is very disappointing, and I cannot see anything wrong with it. Every single wire and joint seems perfect."

The crackling may not be anything to do with a fault in the set, but it may be coming in from outside somewhere. Possibly your new aerial is too close to other wiring, or to leads from electrical machinery.

A quick test for this possibility may be made by disconnecting the aerial and earth from the set, and noting whether the crackles continue. If the noises cease when the set is working without the external wiring it will be proved that the set is all right, and the interference is coming in from outside.

Crackles are sometimes caused by defective contacts in this part of the wiring, so examine the insulators, and any joints in aerial or earth that may not be all that they seem.

If the set is run from the mains it may be that these are not so "clean" as were your old ones—"clean" being used in the sense of freedom from extraneous noises. In such cases the local electrician is usually able to suggest a cure from experience with other listeners using the same mains, a very usual cure or palliative being some form of H.F. filter in the mains leads.

For a D.C. set, two fixed condensers of say .001 to .01 mfd. capacity and high test voltage may be connected in series across the mains leads. The centre point of the two condensers, connected to earth, completes this simple form of filter.

Other types of sets, where the interference is more serious, may demand the use of special mains chokes. Usually one of these is connected in each mains lead, near the meter, and then condensers are used in various ways to complete the filter. But, as we said, much depends on previous experience with these particular mains, so the advice of the local man is generally invaluable.

When interference on a battery or a mains set is thought to be due to adjacent electrical apparatus the best plan is to write to the B.B.C., and give details of the trouble.

The Post Office and the B.B.C. work in conjunction to remove this form of nuisance, and you will find they will gladly render you all the help they can.

"EATING AWAY THE ACCUMULATOR TERMINALS."

G. P. (Long Stratton).—"What with holidays and one thing and another, the set had been standing uncared-for for a couple of months, and when it was examined there was a kind of white deposit eating away the accumulator terminals."

"I have tried to scrape it off, but am afraid of more damage. Is there an easy way of removing it?"

Yes. Dissolve a couple of tablespoonfuls of ordinary washing soda in hot water, and soak a rag with this. Then wipe the terminal thoroughly with the rag, taking your time about it, so as to give the soda a chance to dissolve the "rust."

You will find it possible to get the terminal quite clean again without any trouble, and after that a liberal coating of petroleum jelly, renewed when necessary, will prevent a recurrence of the trouble.

"WELL DONE, BIRMINGHAM!"

(Continued from page 34.)

isn't altogether "Festival." I, too, have found it "funereal" in the past.

The excellent acoustic qualities of the Kelvin Hall, Glasgow, were very apparent, I thought, in the Marius B. Winter's 5.15 p.m. relay of dance music.

In Henry Hall's stead we have been hearing a variety of first-class dance bands, and it is inevitable that we should compare them. I must say that Charlie Kunz has pleased me most, while Marius Winter runs him a close second.

What a fine selection of good dance tunes there are these days! I don't remember a period when there were so many good tunes going at once.

I was pleased to see, after my comments about its inactivity, the Mobile Unit van busy again. It was the British Association that aroused it from its lethargy, strange as this may sound.

C. B.

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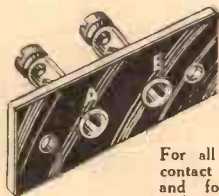
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CLIX

USING GAS-FILLED VALVES

(Continued from page 40.)

valve fires and discharge takes place just when required. In practice the valve is set to run slightly slow so that the arrival of the synchronising signal trips the relay and provides discharge or fly-back of the spot at the right moment.

The synchronising is applied to both valves, in the first case being at 2,500 times a second, and the valve discharges at this rate (giving 100 lines 25 times a second), while in the other the synchronising is 25 times a second and the valve discharges at this rate. In practice the two valves are linked to a certain extent, so that the added kick of the 2,500 valve discharging on its 100th discharge will be added to the 25 impulse on each picture scan. The 2,500 impulses are said to be the line scan impulse and the 25 the picture or frame synchronising impulses.

The Synchronising Pulses.

The synchronising is obtained from the output of the radio set used for vision reception, the output being divided into two parts, one for the synchronising and the other to modulate the shield of the cathode-ray tube to control the brightness of the spot and so to produce the picture.

So much for the basis of the resistance-fed time base. As we explained last time, the resistance-fed condenser can be pretty linear in its charging rate, but in practice it is found that there are other methods. For instance, if the discharge condenser is fed through a screen pentode the result can be made much more linear, and control of speed is obtained by altering the screen voltage. (Fig. 4.)

As before, the grid bias of the discharge valve controls the voltage at which the discharge takes place, and therefore the maximum voltage provided across the deflectors, or the distance of spot travel.

The rate of charge—that is, the speed of travel of the spot—is controlled by the screen potential of the screen pentode valve.

Deflector-Voltage Requirements.

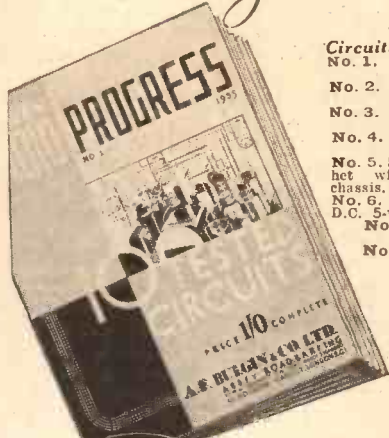
It is interesting to remember when discussing the voltage regulation of the scanning circuit that a representative cathode-ray tube requires a deflector voltage of about 4 volts per millimetre movement of the spot.

Tubes vary in sensitivity, of course, but for an average picture scan of some 8 inches we should want 800 volts.

The pentode-fed discharge valve time base is the basis on which we shall produce the final time base in a future article. The time base for high definition on 240 lines will not be quite so simple an affair as that just discussed, but if you get quite *au fait* with the working principles of the one just dealt with you will not have any great difficulty in understanding the more involved time base to come.

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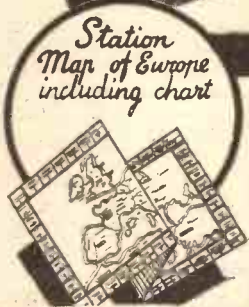
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WITH THE EXPERIMENTER *(Continued from page 33.)*

large town flats and buildings are mighty good conductors of the pestilential radiations you curse as "man-made static."

An indoor aerial is not merely screened from the wanted signals, but, in addition to that potent cause of a high noise level, is apt to pick up the much nearer at hand interfering radiations. Is it any wonder, then, that a simple change over from an indoor to an outdoor aerial so often works a magical improvement in static-ridden reception?

One reason why more folk do not adopt this simple remedy, or at least palliative, against local static background is, I strongly suspect, due to the enormous field strength of the most tuned signal—the local. A really high field strength signal, even when heavily screened from the aerial in which it is setting up a voltage, will still drown out the static—because it is all a matter of ratio, and the ratio of wanted to unwanted radiations is then high.

But what about foreigners? Even the B.B.C. admits that much of the fun of owning a wireless set is lost if the listener is forever prevented from tuning-in foreigners free from heavy background. In sticking to a highly screened aerial you are paying a much heavier price than you need.

Using a Screened Down-Lead.

Of course, if the interference is coming, like the signal, from an outside source, the change over from indoor to outdoor aerial may actually worsen conditions. The thing to do then is to put up the aerial well outside the admittedly limited field of baneful influence of the machine, and to bring in the "clean" signals via a modern screened down-lead, such as you have read about many times.

But all I wanted to do in this little article—and I hope I have succeeded—is to draw renewed attention to the unnecessarily fierce sufferings of those who, plagued with "man-made static," insist on using the worst possible form of aerial for their condition—the indoor aerial.

If you want to know more why not write to the B.B.C.'s Engineering Information Department? And to the Post Office Engineering Department, of Armour House, St. Martin's-le-Grand, London, E.C.1.

THE EXPERIMENTER

A HIGH-SELECTIVITY BAND-PASS TUNER

THE full results which are obtainable, using the latest advances in component technique, with a mere three valves arranged in the familiar H.F. det., L.F. formation are really quite extraordinary, though they are seldom fully realised by constructors. This is largely because of the difficulties of obtaining maximum efficiency in the H.F. section. Particularly does that apply when single-dial tuning is attempted. It is true that ganged coils skillfully matched are available and also that condensers of the ganged type are extraordinarily well made these days, but there still remains the teaming of these individual items with the others required.

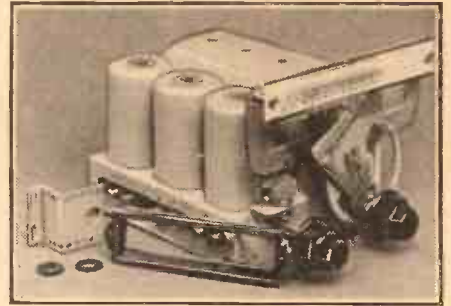
The difficulties are even greater when band-pass tuning is tackled, although the merits of the system are beyond question when it is properly applied.

But all this does not mean that the constructor cannot hope to achieve the higher degrees of efficiency in his home-assembled sets. He can do so just as easily as it is possible for him to arrange a single L.F. stage to give as good a performance as any which may be included in a factory-built set.

The device which renders it possible for him to build a band-pass H.F. det. L.F. with great facility but without the necessity of special care or knowledge in the disposal of H.F. circuits, is the J.B. "Linacore" Band-pass Tuner, made by Messrs. Jackson Brothers (London), Ltd.

This forms in one unit practically the whole of the H.F. section of a set. There are the three modern iron-cored coils tuned by a J.B. "Nugang"

WELL DESIGNED



The J.B. "Linacore" Band-pass Tuner forms in one unit practically the whole of the H.F. section of a set.

condenser having a fine horizontal scale and a smooth slow-motion action. Concentrically with the knob of this is the knob for controlling reaction. Another two knobs concentrically arranged give the on-off and wavechanging control and radiogram switching.

The complete outfit is contained in the one neat and extremely well-engineered unit. All the wiring is complete internally, and there remain only the terminals to connect to the few other parts required for the complete set.

Messrs. Jackson Brothers have three full-size blue prints showing the practical application of the unit and these include full explanatory details of all the wiring, and so on. They are available for fourpence, post free, on application to that firm at 72, St. Thomas's Street, London Bridge, S.E.1.

The results given by a three-valve set using the "Linacore" New Model Type B.P.U. are most impressive. The selectivity is definitely of a very high order and, just as is claimed, is comparable with that of a super. There is, in addition, a first-class response so long as, of course, the L.F. stage is a good one. The reproduction given by a properly designed band-pass set such as is possible with the "Linacore" wants to be heard to be believed. It certainly shows up very well against all but the most expensive supers.

You will shortly see in "P.W." a practical expression of our opinion of the component, for we are at the moment designing a new set around it.

STARS IN THE MAKING

(Continued from page 37.)

wonderful. He and his assistants might be ever so helpful in telling pupils where they were wrong, but such efforts could not possibly compare with the irrefutable proof offered by an instant "play-back."

Indeed, it is because everything a novice does wrong is so vividly brought home to him that the length of time taken in the coaching is so greatly shortened.

If ever I were asked to broadcast—or offered to do so—I should remember many "don'ts" of delivery even after making those two records. For, quite frankly, I sounded appalling. I spoke too quickly, I interrupted when I should have remained quiet, I was much too voluble in my remarks, and altogether I was a complete "frost" as a radio turn!

Towards the end of the record Mr. Fryer was saying that he had even cured someone of an American accent; and I suggested that he ought to meet all Americans when they landed at Plymouth or Southampton and do the same for them.

This, curiously enough, sounded quite funny. But I came away with the feeling that, while I personally shall not inflict myself on listeners, here at the L.S.B. is a way for others to do so—and with much less subsequent pain at the receiving end.

TECHNICAL JOTTINGS

Items of interest to every radio enthusiast

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

Testing Electrolytic Condensers.

I said something in these Notes the other day about electrolytic condensers, and several readers have asked me how it is possible to test the capacity of these condensers, since they are only intended for polarised voltage and cannot be tested by methods which apply to the ordinary paper or mica condensers.

As a matter of fact, electrolytic condensers have to be tested by special methods owing to the fact, amongst other things, that they normally pass a small leakage current and so would not hold a charge for any appreciable length of time. As you know, the simplest of all methods of testing an ordinary condenser is to charge it up to known potential difference between the plates and then to discharge it through what is called a "ballistic" galvanometer, the discharge giving a swing of the needle from which, knowing the characteristics of the instrument, the capacity of the condenser can easily be calculated. This depends, however, upon the condenser holding its charge for an appreciable time, and is not applicable—at any rate not in any reliable way—to an electrolytic condenser.

Alternating Voltages.

Another method is to use alternating voltage and to measure the current through the condenser; but this, again, is not really suitable because, as you know, an electrolytic condenser allows current to pass quite freely in one direction and the application of alternating current really treats the condenser as a rectifier and is liable to damage it.

A method which is generally adopted is to apply an alternating voltage, but with a battery or other source of steady D.C. voltage in series with it, in such a way that the alternating voltage varies in amount but never changes its polarity. The current through the condenser is measured and the voltage is also checked up by means of an alternating current voltmeter. From these readings and, of course, the frequency of the applied voltage, the effective capacity of the condenser can be determined.

Bypassing Cathode Bias Resistances.

Someone has asked me if it is necessary to bypass the cathode bias resistance in a mains L.F. valve.

Personally I think a bypass condenser should always be used in this position, although I have often been told that it is possible to do away with the condenser. I advise amateur constructors to use the condenser, however, although one can quite understand that manufacturers, anxious to keep down costs in every detail, would be glad to be able to leave out a condenser of this size. I should mention that the condenser must be large, something like 50 mfd., but it can be an electrolytic type, of course, with positive to cathode.

(Continued on next page.)

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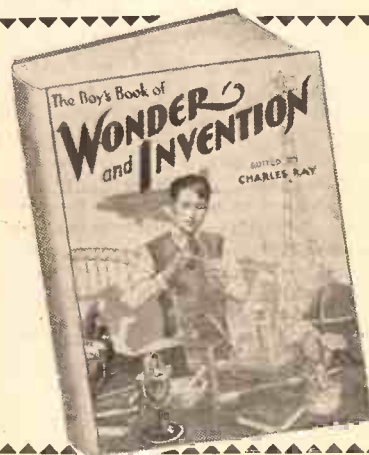
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TECHNICAL JOTTINGS

(Continued from previous page.)

Smaller Sets.

The trend of modern set designs has been not only to make sets smaller and more compact, but also to reduce the current consumption and so to make it possible to use a portable set, for example, with much smaller batteries. I have often been asked whether it would not be possible to design a set, giving quite a good respectable power output, and consuming not more than perhaps 6 milliamps of H.T. current. It is, if the static current only is meant in this figure. Q.P.P. output can be used and a great saving achieved.

Transformer Screening.

A reader asks me what is meant by a screened transformer or, rather, a transformer with screened primary. This is not the first time I have been asked this question and it is evident that some people think that if the primary of the transformer is screened this will prevent the inductive effect from passing between primary and secondary and will prevent the transformer from functioning properly.

At first sight you might think this, but the fact is that the screening is not for the purpose of preventing the passage of low-frequency impulses but for preventing H.F. currents from getting into the circuit, usually from the mains leads. For the screening a thin sheet of copper foil, or even a single winding of copper wire, is included between the primary and secondary of the transformer. The effect of this on the normal working of the transformer is practically negligible, whilst it has the effect of keeping out very largely the unwanted stray high-frequency impulses.

Keeping Out H.F. Currents.

So, you see, it is really a special kind of screen intended for special purposes. It is usually connected to earth, by the way. If it were a thick iron screen, or even if it were a completely closed conductor, it would have a very definite effect on the ordinary working of the transformer.

Oscillation.

I don't know whether you have noticed that we do not hear nearly so many complaints nowadays about sets oscillating and causing trouble to neighbouring set users.

In the early days of broadcasting this was one of the main troubles, and many of you will remember P. P. Eckersley's almost pathetic entreaties to the listening public, in his capacity as Chief Engineer of the B.B.C., to avoid this kind of interference, which at one time threatened to be a very serious drawback indeed to radio reception.

As the power of broadcast transmitters has increased, and as the sensitivity of high-frequency amplifying stages has increased also, the need for reaction has been reduced, and with it the oscillation nuisance has for all practical purposes disappeared. It is curious how these problems have a way of solving themselves, in the natural course of events, as it were.

Discharge Lamps.

Some very interesting information has just been sent to me by the G.E.C. with regard to the new street lighting which you have noticed on many of the arterial roads. Although not directly a wireless matter, these lamps have a close similarity, in some respects, to radio valves, and the principle of thermionic emission has been made use of in the development of the lamps.

No doubt you know that in an ordinary electric lamp the amount of energy which is dissipated in the form of heat is

NEXT WEEK

HOW TO BUILD A SELECTIVE D.C. SET

Full details will appear in "Popular Wireless" on Sale Sept. 25th.

enormously greater than that which is converted into useful light. Consequently the efforts of the research engineers have been devoted for many years to increasing the percentage of the total energy consumed by the lamp, which is turned out ultimately in the form of light radiation; in other words, to reducing the heat wastage and so increasing the efficiency of the lamp, reckoned as input energy against light output.

Heat Wastage.

The theoretical ideal, of course, is the "cold" light, which is all light without any heat wastage. This has never been achieved artificially and the nearest approach appears to be the gas discharge tube,

The new G.E.C. "Osiri" lamp, which is the one referred to above, is a development of the gas-discharge lamp and involves three different principles ingeniously worked together. It consists of a glass tube about 6 in. in length, at each end of which a piece of special wire as sealed in.

The Picnic Flask.

This tube is mounted inside another larger tube, and the space between the two is evacuated in order to minimise the loss of

heat from the inner tube, in the same way as in a picnic flask. The inner tube contains argon gas and also a little metallic mercury. When the tube is switched on a current flows through the argon between one end electrode and a small starting wire located near to it, the principle of the gas discharge being here involved. This little wire warms up and begins to give out electrons, this being the second principle, of thermionic discharge, which is used.

The electrons then shoot through the tube, under the effect of the mains voltage of some 200-250 volts, and collide with odd atoms of mercury and knock the stuffing out of them to such an extent that they begin to be luminous. Presently the whole tube begins to be lit up in the same way, and the heat produced evaporates some of the metallic mercury, giving more mercury atoms available for collisions.

When working in the final "steady state," the lamp emits an enormous amount of light per unit of current, as compared with other types of lamp. The light comes from a fairly large area, about 6 in. by $\frac{1}{2}$ in. diameter, and is, therefore, much less "glaring" than arc lamps, high-wattage filament lamps, or even gas mantles, and this is considered to make it ideal for street lighting.

"COPPER DATA"

THE title to this short item is the name of a recent publication which I have been perusing. It is rather a novel little book, both in regard to its contents and its appearance.

Its covers are of stiff cardboard with a layer of burnished copper foil on the outside, and the binding takes the form of a copper spiral of wire which passes through a number of holes along the back edge of the leaves. In view of the important part played by copper in the radio receiver, the contents of this publication will prove of interest to readers of POPULAR WIRELESS.

Full of Information.

The book is divided into three sections: the Properties of Copper, the Treatment and Working of Copper, and Commercial Grades and Applications. Of special interest to radio enthusiasts is the information on the electrical properties of copper and on the tinning and joining of copper.

Just one of the interesting facts given is that cold-drawn copper wire may be obtained in sizes up to $\frac{1}{2}$ inch in diameter.

Any reader who is interested in this publication may obtain a copy free of charge by applying to the Copper Development Association, Thames House, Millbank, London, S.W.1.

A. S. C.

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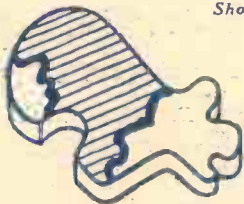
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