POPULAR WIRELESS September 29th, 1934.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

A NEW TELEVISION DEVELOPMENT

Popular Wireless

AND TELEVISION TIMES

No. 643.
Vol. XXVI.
September 29th, 1934.

SOLVING THE DROITWICH PROBLEM

BUILDING THE DOUBLE-PENTODE THREE

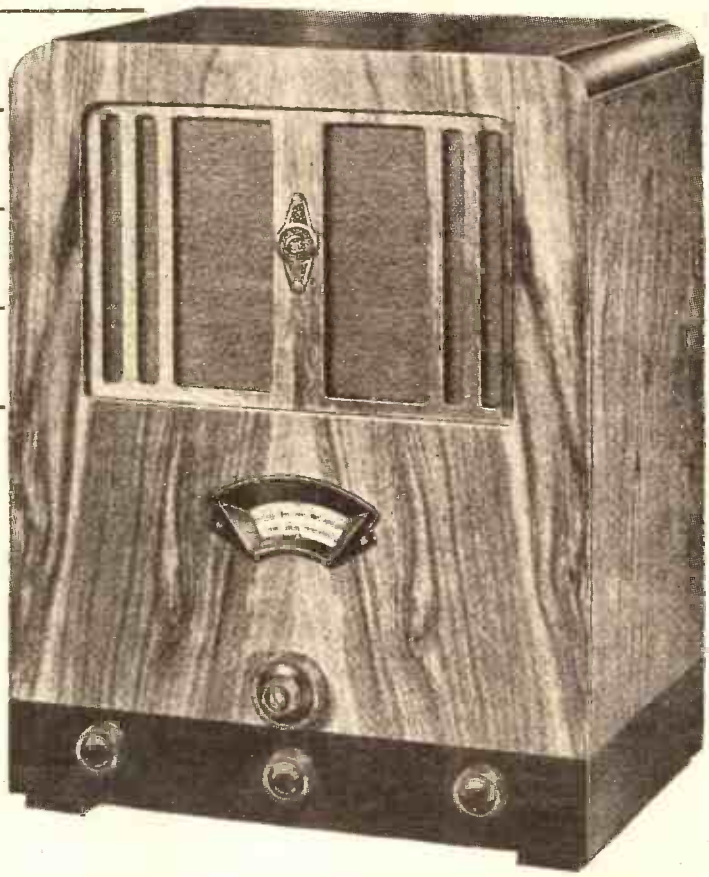
LATEST B.B.C. NEWS

EVERY WEDNESDAY PRICE 3D

Great New Feature

"P.W.'S" LISTENERS' SERVICE

VARIABLE-Mu SCREENED GRID CIRCUIT • SUPER SELECTIVE IRON-CORED COILS • MOVING COIL LOUD-SPEAKER



The

COSSOR MELODY MAKER KITS

TWO MAGNIFICENT MODELS

BATTERY MODEL 352 Complete Kit of Parts including 3 valves (Variable-mu S.G.—Triode Detector—Pentode Output). Latest type 8" P.M. Moving Coil Loudspeaker. Super-selective Iron Cored Coils. Handsome walnut finish cabinet, 18" high, 14" wide, 9½" deep.

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Prices do not apply in I.F.S.

KINGS OF THE AIR

SEND THIS COUPON FOR CONSTRUCTIONAL CHART

With every worth-while radio development incorporated, including a modern Variable-Mu S.G. Circuit working in conjunction with the new Super selective Iron-cored Coils, the Cossor Melody Maker has a performance equal to that of many factory-built receivers costing much more. The up-to-date circuit and coils ensure an exceptional wide range of programmes, whilst the matched-to-output Moving Coil Speaker provides remarkably good reproduction . . . . and remember all these up-to-the-minute radio developments are yours for the bare price of the parts.

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

Please send me full-size constructional chart of the new Cossor Melody Maker.

State which model required.....

Name.....

Address.....

P.W. 29/9/34.

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MANAGING EDITOR: N.F.EDWARDS. TECHNICAL EDITOR: G.V.DOWDING ASSOC., I.E.E

A TITANIC MEMORY
THE P.M.G. HELPS
U.S.A. RECEPTION
FIXING THE TIME

RADIO NOTES & NEWS

AERIALS AND VINES
HOW MANY SETS?
"MILKMAN STATION"
WORD-COINING

All Set.

MANCHESTER'S Wireless Show, which ended last week, was the last of the big National Radio Exhibitions, and so concludes the prelude to the 1934–35 season. What is in store for us between now and the spring?

Some are hoping for television. (And there's no harm in hoping, is there?) Others are cannily marking time till October 24th, waiting for the new "S.T." design—and I must confess that I am in this crowd myself, confident of a winner.

But for all of us there's a wonderful prospect ahead of last-minute goals, celery for tea, glinty fires and the world's greatest hobby, radio!

Toll of the Sea.

THE deplorable loss of life on the liner Morro Castle recalls that super-tragedy of the sea, the loss of the Titanic, at 11.40 p.m. on April 14th, 1912, when about 1,500 lives were lost. But 700 or so were saved—entirely through radio.

Somewhere in Guildford, I believe, there is a memorial to Jack Phillips, the Titanic's operator, who lost his life through keeping in touch with other ships to the last moment. When passing through the pleasant Surrey town I have looked for it—so far without success—as I should like to pay a hearty tribute to the outstanding figure of Britain's greatest sea tragedy.

Untaped.

THE Postmaster-General has made a sporting offer to wireless listeners on Bardsey Island. It has no telegraph service or phone, but the P.M.G. suggests that if there is a wireless experimenter on the island who could adapt his set to the required wavelength, it might be possible to have telegrams to the island sent out by wireless telephony from the P.O.'s station at Seaforth.

Probably the greater need is for a service in the reverse direction—island to mainland—but this would present some difficulty. Anyway, the offer shows a refreshing freedom from Governmental red tape.

Well done, Sir Kingsley Wood!

Stork Tragedy.

WARSAW is one of Europe's most reliable stations, but not long ago listeners heard a speaker's voice stop in the middle of a word, and then—silence. Many supposed that some political intruder was at work, but actually it proved to be a big stork!

ON OTHER PAGES

It had decided to seek a warmer climate for the winter, but it quite overlooked some 35,000-volt power lines near the wireless station and flew slap into them. Ohm's Law did the rest, and the engineers found the feathers!

Wait for It.

ALL the portents point to this being a grand season for long-distance reception, and I don't know when I have had so many early reports of trans-atlantic reception.

But you've got to be wide awake to get the Yanks now, for the old law of frequent announcements of the station's name has been relaxed.

They used to give the name and wavelength every fifteen minutes, but now you wait for it, and wait for—and it fades right out just when the announcer comes on! ("*And so to bed, right vexed at my lost sleep, with nought to show.*")

New Fashions in Masts.

ENGINEERS who design transmitting stations' masts do not yet seem to agree as to the best shape to use.

Not long ago we had the "cigar" type, as used at Vienna (in which the metal mast is its own aerial), standing on one of its points. Now a "tubular" mast is to be tried instead, which will taper from a wide base to a two-inch top.

It is known as a "flagpole," and is to be tested by Philadelphia, K Y W. Germany, on the other hand, likes "topped" wooden masts, whilst the B.B.C. believes there's nothing to beat the vertical wire.

MAKING A RADIO RECORD

An interesting sidelight on broadcasting is brought to mind by this photograph of H.M.V. engineers busy recording on its wax blank one of the records that will later be broadcast. Note the care with which the cutting of the groove is watched through a magnifying glass. Every cut must be perfect or the record will be ruined.

Madrid's New Stations.

THE Spanish Government is moving fast in the matter of Madrid's new stations.

There are to be three—on long, medium and short waves. The medium-waver, "Madrid-Centro," is to be erected within a year. Power, 50 kw.; wavelength, 293·5 metres.

The "Nacional" station, on 1,639 metres, is to use 140 kw. within the next eighteen months.

The short-waver will handle relays to America, and is to be called "Hispano-Americano."

A New Use for Radio.

ONE of the strangest uses to which radio has been put is reported by the Geological Survey of India. They were investigating the Bihar earthquake, and it was important to fix the *time*, but in the confusion following the first shock nobody on the spot thought about such a detail.

(*Continued on next page.*)

THE STATION THAT FORGOT TO SWITCH OFF

But it so happened that one survivor remembered that he was listening to a certain item of the Empire transmission from Daventry when the earth quaked, so a letter to the B.B.C. enabled them to give the exact time of the occurrence from Daventry's log.

Will It Hurt?

A SUSSEX reader asks me, apparently in all seriousness, whether it will hurt a valuable vine to run an aerial over it. No, sir! So far as I know, there has never been a case of a vine, or indeed any other botanical specimen, being harmed by proximity to an aerial.

Keep away all representatives of the slug and schoolboy tribes, by all means! But aerials won't hurt.

Roumania Goes Ahead.

EVER heard of Bod? Probably not, but we are all going to hear a lot of Bod before long.

For Bod is the site chosen by the Roumanian Government for their new super-station. It is to be a blood brother to Droitwich, with a power of 150 kilowatts.

There has been a good deal of radio shouting across the frontiers of South Eastern Europe, and Roumania has come to the conclusion that the still small voice is inadequate. Hence Bod!

A Rude Awakening.

THE big outcry recently because for ten minutes or so the music played was different from the B.B.C. announcer's statement prompts me to ask what is the biggest known brick ever dropped upon the listening public.

I remember once that a day-dreaming Spanish announcer was fined 500 pesetas because, instead of playing the Republican Hymn, he closed down with the wrong gramophone record—a Royal tune, formerly used, but now taboo! But was even that the worst-known *faux pas* of the air?

Set Statistics.

HOW many wireless sets would you say were in use in the whole world?

Out in Geneva an industrious Swiss has worked it all out from the latest trade information; and as nobody knows enough to contradict his estimate, he's probably as close as we shall ever get to the total.

He puts it at nearly 185,000,000. And I suppose the performance of all of these sets has given many hours of pleasure to their owners.

Nature's Wireless.

BEFORE the late summer goes out of mind, let us pay tribute to its freedom from lightning troubles. In 1934 Nature's wireless behaved like a gentleman.

True, there were one or two incidents, including a hit on one of the masts of Radio Toulouse. Vienna, too, had to close down several times, which is not to be wondered at, considering that their mast is the tallest thing in Europe.

But last summer has proved again that lightning-on-the-aerial apprehensions are usually groundless.

In the Small Hours.

BRESLAU'S very-early-morning broadcasts, which earned for it the name of "The Milkman Station," are not the only ones which enliven the wee sma' hours.

The new Portuguese station at Barcarena, Lisbon, for instance, recently broadcast *continuously* for over 100 hours—for testing purposes!

But the world's record divertissement was that afforded by a certain transatlantic station which forgot to switch off one night when a strictly unofficial bachelor party was being held at the studio. Twenty minutes of outrageous songs and stories were broadcast before the omission was noticed!

"Newscasting."

WHEN an ingenious American described the broadcasting of news as "newscasting" I thought it was a well-coined word. But that led to "advercasting," which is not pretty, but nevertheless has a certain merit in the country that hears everything "by the courtesy of"—some trader or other.

Finally, I see they have arrived at "musicasting" for bands, etc. Anybody in favour? No, I thought not!

Another Cure!

I KNEW that it was about time somebody invented yet another cure for atmospherics—and, sure enough, the news has come. Apparently it is a young Filipino gentleman who has done the trick this time, and the report says he uses "a rotating aerial, costing one dollar."

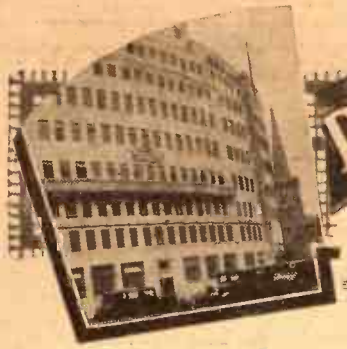
I once drank a liquid which made the whole earth (and heaven!) rotate for less than a dollar, so I shall want more than a rotating aerial to convince me that radio's oldest problem has been solved at last!

Anti-Fading Aerials.

THOSE anti-fading aerials that the German stations have been trying seem to make for excellent long-range results.

Frankfurt is fitting one, and should be coming back on the air with full power by the time you read these words. Tune down to 251 metres and see what you think of him.

ARIEL.



P.W.'s LISTENERS' SERVICE

The most comprehensive weekly guide to modern receivers

In this, the first of an entirely new series, it is the aim of "P.W." once again to lead the way by providing readers with an authentic listeners' guide on a scale never before attempted.

ALTHOUGH there are thousands of sets on the market, there are few, if any, absolute duds. Nevertheless, full enjoyment cannot be gained from the radio programmes if the listener is not unconscious of the instrument while it is working.

And it simply cannot be out of his mind if there are mysterious "somethings" in it and on it which he does not understand, and which leave him vaguely dissatisfied as to their operating and adjustment.

That background of "set consciousness" will be greatly exaggerated if all the time the listener is reminded by the mere presence of the receiver either that he made a bad bargain or that there are things about it which he finds, after a close association with the instrument, that he does not like.

It is the object of this special new section to save the listener from all sources of irritation of this nature: to make radio a pleasure for him from the moment he begins to think about a new set, right on through the hours and hours of listening he will eventually experience.

Our Elaborate Plans.

Although the form of the section may vary from time to time in order to give variety to it, the general policy will remain unchanged.

In this "P.W.'s" Listeners' Service we are going to give the most comprehensive guide to the modern sets that has ever been attempted. Not just lists of technical jargon which the listener could not be expected to understand, not dry-as-dust specifications, not technical reports in which experts reveal their pedantry with superficial catch-phrases, but interesting articles which all who buy "P.W." will want to read, even though they may not be considering the immediate purchase of a set.

There will be articles on the various features to be found in "technical specifications." The first article in this series is "What is A.V.C.?" which appears on another page. These articles will be simply written, but not fatuous.

Every week one set will be selected for the POPULAR WIRELESS Triple Test. The sets will be selected from those we know to be above a certain fairly high standard. We do not propose to devote space to telling readers about sets we would not like them to buy!

We want to make sure that within a few weeks the whole listening public will get the idea firmly implanted in its collective head that a set which has passed the "P.W." Triple Test is one which can be confidently purchased by anyone.

"TRIPLE-GANG" LISTENING!

Hughie Green, and two other members of his popular broadcasting "gang," photographed during an interlude from rehearsals with one of the new "Portadyne" receivers.

The "P.W." Triple Test is something quite original.

It is a series of tests for listeners, and it takes this form: There is first a strictly musical criticism by a well-known musician, whose name, for obvious reasons, must remain anonymous, but whose reputation as a judge of such matters is beyond reproach.

Then comes the technical test: a straightforward, absolutely impartial test by "P.W." experts conducted in the "P.W." research laboratory.

And, by the way, ours really *is* a "laboratory." You hear quite a lot about laboratories nowadays, but we wonder how often the term is rather—well, overworked, shall we say?

Our set-testing plant is probably more complete than that possessed by any other radio journal in the world. For instance, we have a copper-lined cabinet, providing complete screening, in which the engineer can conduct certain of his tests.

There is a complete artificial broadcasting station for any depth of modulation on any wavelength; input attenuators, valve voltmeters, standard input and output measuring instruments, 200 and 400 volt D.C. mains, a 5-kw. conversion plant providing any A.C. voltage or frequency and plenty of other gear.

So much for the second test.

The third test is an absolutely unrehearsed and unbiased test by "a man in the street."

Representatives of the public from all walks of life will be selected quite haphazardly to assist us in this innovation.

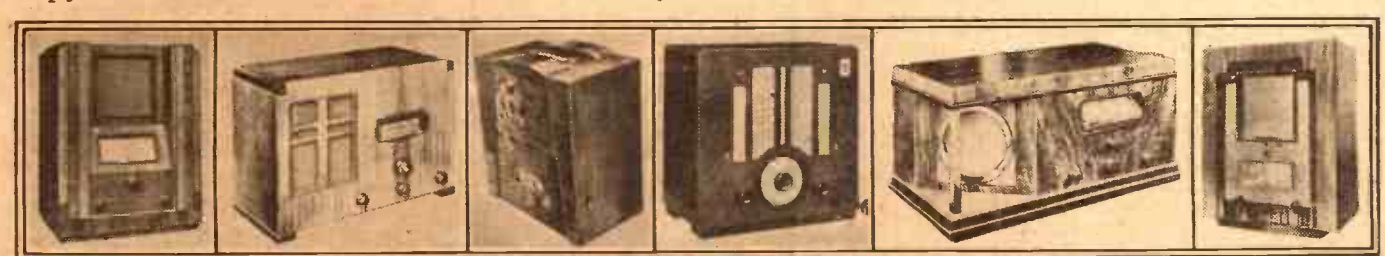
To ensure that those taking part have absolutely open minds they will not be given any details of the sets that they are to examine until they are actually confronted by the instruments, and invited to handle them.

Manufacturers' Co-operation.

The case of the "set of the week" is therefore presented to the listener from three angles: that of the musician, that of the impartial expert, that of any ordinary person.

There will be other features in the section, and we feel sure that it will prove as fascinating to read as it will be useful.

Already we can provide evidence of enthusiastic co-operation on the part of manufacturers. On another page you will find an open invitation to "Popular Wireless" readers from the great H.M.V. concern to visit their huge factory at Hayes in order to see H.M.V. sets being made.



Here are some of the fine modern receivers which are now available at prices within the reach of all. From left to right they are the Telsen six-valve all-electric superhet; the Cossor Model 415 B—a four-valve de-luxe Class B battery receiver; the famous Pye "P/B" battery portable; the K.B. Model 381; the Clarke's "Atlas Five 7-5-8" table-model superhet, and the new Ferranti "Arcadia" model.

By the Press Department, "His Master's Voice."

PRACTICALLY the whole of the population of Hayes, Middlesex, and of neighbouring towns and villages work in the great "His Master's Voice" factories and laboratories. The research building itself is as large as many other factories and has more than five hundred engineers, each a specialist in his own sphere, seeking after the latest developments in radio.

The factories cover more than eighty acres, and in them practically every part of a "His Master's Voice" radio receiver or radiogramophone, from the smallest screw to the complete cabinet, is made. More than 12,500 operatives are employed, and many of these are only allowed to participate in the construction of "His Master's Voice" instruments after having undergone special training to make them fit to produce the models which bear this famous trade mark.

The factories are completely self-contained; they have their own artesian wells, foundry and canteens. The power station generates enough electricity in a year to supply a town the size of Reading. All the buildings have been constructed with a view to making employees comfortable whilst working.

Cabinet Craftsmanship.

"His Master's Voice" have always been famed for the fine craftsmanship of their cabinets, and timber from all quarters of the globe is seasoned in the open in giant yards outside the cabinet factories.

In the machine factory many millions of metal parts are stamped and turned out by highly intricate machinery each day, whilst in the bakelite pressing shop volume controls, pick-ups and the many other bakelite parts of a radio receiver are produced by powerful presses.

After a visitor has inspected the factories he leaves with the impression of a giant manufacturing organisation in which careful inspection of every process is a predominant feature of all that he has seen.

The staff who are responsible for designing and installing the test gear throughout the factory alone numbers more than a thousand men, and at every stage of manufacture each part undergoes many tests. Before each complete instrument is sent out to the trade it is subjected to the most stringent acoustic tests from broadcasting and specially chosen gramophone records.

Offer to "P.W." Readers.

For 36 years "His Master's Voice" engineers have been experienced in the design of sound-reproducing equipment, and now the H.M.V. factories are working night and day, but all the time with most painstaking care, to produce the radio receivers and radiogramophones for the 1934–5 season.

New cabinets which are a delight to all eyes, "Fluid-Light" tuning, which first appeared on a "His Master's Voice" instrument, simplified automatic record-changing mechanisms, and conveniently placed controls are features of "His Master's Voice" new instruments.

The Manager of "His Master's Voice" will be very glad to make arrangements for any readers of POPULAR WIRELESS *to be shown over their factories, which are the largest of their kind in the Empire. Intending visitors should write direct to the Factory Visits Dept., "His Master's Voice," Hayes, Middlesex.*

"...EXCELLED FOR THE TIMBRE OF THE VIOLIN"

says "P.W.'s" Music Critic.

Here are his impressions of the H.M.V. Model 570 Autoradiogram.

JUDGED as a musical instrument pure and simple, I consider the receiver extremely pleasant. It is probably too much to expect one instrument to provide every tone and nuance that one gets from a full orchestra, but this receiver certainly goes a long way towards fulfilling that ideal.

Whether tuned to wireless or playing gramophone recordings, the brilliance of the strings was very satisfying, and the tuba and tympani also were reproduced remarkably faithfully. On string quartets the instrument, I think, excelled, for the timbre of the violin and the viola on one record I heard was well maintained. The piano and violoncello were both very realistic. Solo vocal items, especially of tenors, were likewise most gratifying.

"P.W.'s" Triple Test this week is of the "H.M.V. Fluid-Light Autoradiogram Model 570." With the simple controls seen above it is possible to select broadcast entertainment from the very finest that Europe has to offer.

. . . . The moulded cabinet of the new Ekco Model AD65 can be supplied to special order in onyx green, pearl ivory and French grey (with chromium-plated fittings in each case) for an extra charge of 2 guineas.

* * *

. . . . A Marconiphone Model "273" is putting up a "peak" performance on the top of Mount Snowdon, where it has recently been installed in the Summit Hotel.

* * *

. . . . The new G.E.C. "Tuneon" visual-tuning indicator, which is at present creating such widespread interest, is likely to be incorporated in their various commercial receivers eventually.

* * *

. . . . We may expect another development of first-rate importance to listeners from the laboratories of the General Electric Company in the near future.

* * *

. . . . Consequent upon increased production facilities, attractive price reductions have recently been made to certain of the sets in the well-known Amplion range.

* * *

. . . . With the recent extension, the Cossor factory at Highbury is now claimed to be the largest self-contained radio factory in the whole of the British Empire.

* * *

. . . . Lotus have just introduced a new three-valve battery receiver, with circuit consisting of variable-mu H.F., detector and pentode output, at 7 guineas, and that it is to be known as the Model "B."

* * *

. . . . A table-model instrument is shortly to be added to the range of all-wave receivers which are at present being manufactured by the British Radiophone Co., Ltd.

* * *

. . . . This new instrument, which will be available in about three weeks' time, will be known as the Model AWT501, and that the price will be 45 guineas.

WHAT IS A.V.C.?

AUTOMATIC volume control is of great benefit in the reception of distant stations, but is not necessary for the local B.B.C. programmes.

Stations which are a long way away are subject to fading during the hours of darkness. The volume rises and falls, sometimes slowly and at other times more rapidly.

Even if the listener kept his hand on an ordinary volume control all the time, turning it up as the station began to grow weaker and down as it became stronger again, it would be impossible to preserve an evenness of volume. The hand could not keep absolutely in unison with the variations.

Automatic volume control, as the term indicates, does this (more or less perfectly) quite automatically. The circuit of the set is so arranged that as the station weakens there is greater amplification, and vice versa.

A.V.C. is to a wireless set something like what an automatic gear change is to a motor-car. Imagine the speed of the motor-car to be equivalent to the volume of the radio set.

As the motor-car reaches a hill the gear ratio automatically rises; it falls again when the top of the hill has been reached.

The amplification of a set with A.V.C. rises and falls in exact proportion to the amount of work it has to do to keep the volume from the loudspeaker at a constant level.

"Amplified A.V.C." merely means that steps have been taken to ensure that the automatic volume controlling is adequate in its operation—that the set's amplifying powers rise and fall sufficiently to balance completely the variations in the strength of a station.

Explaining Delayed Action.

The term "delayed A.V.C." describes the precaution of ensuring that the amplifying powers of the set are not reduced by the arrival of a weak station's programme—that, in fact, the A.V.C. operates only to bring the weakest up or push the strongest stations down to the one level of volume. In other words, the set goes "all out" for the weak stations without a restraining influence of the A.V.C. Beyond that it can do nothing with a station which at the best is heard on the set only very weakly.

If the station fades to a lower level than the background noises that are always to be heard, then no amount of further amplification would make it comfortable to listen to.

A.V.C. cannot guarantee a clean background. When A.V.C. is working hard to cope with fading it is inevitable that background noises should tend to rise as the amplification of the set increases.

A.V.C. does not do away with the desirability of some kind of manual volume control with which to set the volume at a predetermined level that suits the listener's own requirements.

TECHNICAL TESTS

NUMBER ONE:

THE "HIS MASTER'S VOICE" FLUID-LIGHT AUTORADIOGRAM

(MODEL 570)

IN order that the full significance of the technical part of "P.W.'s" Triple-Test service may be appreciated at something more than just its superficial value, it is, we feel, desirable that the introduction to this, the very first of the series, should tell you something of the procedure which is to be adopted to ensure absolute reliability.

As a result of observations over an extended period it is patently obvious that an aerial test alone is no criterion these days of the performance to be expected of a particular instrument under the widely differing conditions in which it is likely to be used.

Nor is that the only drawback. Reception conditions vary tremendously from day to day and from season to season, and one logical outcome of giving a verdict based solely on an aerial test is that an instrument so tested in the summer months might be classified as very ordinary by comparison with another, and probably inferior instrument, tested during the "peak-performance" months!

So to remove all such obstacles, and to provide "P.W." readers with a Listeners' Service far in advance of anything which has previously been attempted, special facilities have been arranged in our already elaborate Research Department for the rigorous testing of commercial receivers, in addition to the detailed and comprehensive research which ordinarily goes on here.

The Procedure Adopted.

An aerial test is of value to a certain degree, and for its use in conveying to the ordinary listener an idea of the practical capabilities of a particular instrument, it will be included as part of our report.

But for *comparative* standards, and in order faithfully to record the degree of amplification in the instrument under test, there is nothing to compare with a signal generator and a ready means of meter-testing the set's output. And so that is how we are going to do it.

In one corner of the lab. a modulated oscillator with marked degrees of control provides a synthetic transmission of known characteristics. Elsewhere is provided a screened cabinet into which the set and the output-measuring equipment are placed. The mere fact that the test cabinet is screened and earthed obviates direct pick-up and ensures absolute reliability of readings on the output instrument.

This is the equipment with which all subsequent tests in this series will be made—the equipment with which the "H.M.V. Fluid-Light Autoradiogram" has set the ball rolling. And what of the results?

On the scale of our wide-deflection output meter are a series of red marks against which are various letters of the alphabet. Those tell-tale marks indicate the deflection of the needle for certain standard circuit combinations, and it is thus instantly possible to gauge whether the overall amplification of a set under test is below, equal to or actually above the standards set for good modern receiving apparatus.

The cabinet work of the "H.M.V. Fluid-Light Autoradiogram"—the first instrument to be subjected to our Triple Test—is of a very high standard indeed.

The mark to which the "H.M.V. Fluid-Light Autoradiogram" was expected, by virtue of its circuit combination, to deflect the needle was located originally from a laboratory experimental receiver having basically the same superhet circuit arrangement, i.e. a heptode, a variable-mu S.G. intermediate-frequency amplifier, a double-diode triode and a P.X.4 triode output valve.

The results were illuminating and proved conclusively (a) that by skilful attention to design detail the engineers responsible for the "Fluid-Light Autoradiogram" have succeeded in reducing inherent circuit losses to the lowest minimum possible, and (b) that by comparison with our recognised standards for the type of set the receiver is normal up to approximately 300 metres, but is perceptibly above it from there onwards.

To do full justice to the designers, it is only fair to add that our own predetermined standards are not subject to wide tolerance figures, and are, in a sense, reasonably exacting. Thus, that it should be possible for us to say of the "Fluid-Light Autoradiogram" that it is capable of pushing the needle beyond our tell-tale mark (which alone indicates a first-class performance) is indeed a tribute to the efficiency of this latest H.M.V. production, and one which should guide you in your choice.

Remarkable Selectivity.

As for selectivity, by adjusting the wavelength of our modulated oscillator to the channel adjacent to that of the London Regional station, it is possible for us to subject any instrument to one of the most exacting of all tests for selectivity.

This was duly done in the case of the "Fluid-Light Autoradiogram," and, moreover, the test was made at representative Regional station settings throughout the tuning range of the instrument.

As a matter of interest, we would mention that the received strength of the London Regional station on our particular aerial system is slightly under 1½ volts, and that, with the output from our modulated oscillator adjusted to provide the same field strength, it was found possible *almost completely to separate the two programmes when on adjacent channels!*

That, of course, represents an extraordinarily good selectivity performance, for under practical conditions it is a state of affairs that would never be encountered. The local station might be capable in many localities of providing a field strength of 1½ volts, but it is virtually impossible to receive a station on an adjacent channel at anywhere near this strength.

(*Continued on next page.*)

TECHNICAL SPECIFICATION

GENERAL DESCRIPTION: Five-valve superheterodyne radiogramophone with automatic record-changing mechanism. The instrument is for operation on A.C. mains.

CIRCUIT ARRANGEMENT: Modern five-valve (including rectifier) superhet with circuit sequence of Heptode (combined first detector and oscillator), variable-mu S.G. (intermediate-frequency amplifier), second detector, and P.X.4 triode output. Actual valves employed are Marconi M.X.40; V.M.S.4B.; M.H.D.4; P.X.4 and U.12 (full-wave rectifier).

SPECIAL FEATURES: (1) Advanced automatic record-changing mechanism. (2) Fluid-Light tuning device. (3) Provision of automatic volume control. (4) Static suppressor adjustment. (5) Provision of tone control. (6) Inclusion of separate volume controls for radio and gramophone, with latter on the front of instrument.

CONTROLS (ON MOTOR-BOARD INSIDE INSTRUMENT): One main tuning control; tone control; volume control (radio); four-position switch giving "gram," "H.W.," "L.W." and "Off" positions; gramophone-motor starting button and selector device; and gramophone-motor speed regulator. (OUTSIDE INSTRUMENT): Gramophone-record rejector button and volume control.

PRICE: 33 guineas.

MAKERS: The Gramophone Co., Ltd. (His Master's Voice), 98-108, Clerkenwell Road, London, E.C.1.

"THAT'S WHAT *I* THINK . . ."

By

A Cinema Commissionaire

At the Invitation of "P.W.," Mr. A. Peters, a Cinema Commissionaire, was asked to test, and to give his impressions of, the H.M.V. Autoradiogram Model 570. Below is a faithful record of his observations during this unique experiment.

"YOU want me to use this set for half an hour, and then tell you just what I think of it?" said Mr. Peters.

He lives at 54, Kent House Road, London, S.E.26, and is commissionaire at the State Super Cinema, Sydenham.

He had come straight from there, on his way home, at 9 p.m. on Sunday evening. The wireless set—Model 570, His Master's Voice Fluid-Light Autoradiogram—stood ready to be switched on. And the first-time-in-his-life radio critic looked at it keenly.

"It's a grand machine to look at," he commented, "but I warn you that I go most on quality. Clearness and—you know what I mean. *Natural*. Let's hear it working."

"Work it yourself," I said, pointing to the switch. "Radio or gramophone, as you wish."

Without hesitation he moved the knob over to "Gramophone." This was going to be interesting!

Eight gramophone records were already loaded inside; and at the touch of his finger the motor

THE TEST IN PROGRESS

Here is Mr. Peters (seated) at the controls of the H.M.V. Model 570 Autoradiogram during the test that he made at the invitation of "P.W."

started up, the pick-up arm swung silently into position, and the big room was flooded with orchestral music.

Mr. Peters listened critically. Moved farther back. Said nothing at first. And at the end of that record the automatic changer, of its own accord, put on another.

"Piano!" he said. "Just what I wanted to hear."

After a few moments he nodded, turned the volume control down, and delivered judgment.

"Quality's grand," he affirmed. "Best I've ever heard—that's a fact. I can't say fairer. Best I've ever heard."

A "Grand Bit of Work."

Satisfied on that all-important point, he inspected every inch of the instrument.

He started the gramophone again, pressed the "Reject" button, and watched the unwanted record give place to a new one. He watched the last record finish, and saw how the motor automatically switched itself off. ("*Uncanny*, I call that," was his comment!)

Then came two shrewd questions.

"Why was one control knob *outside*, on the front of the set?" and "What are those clips for?" I explained that the lid was kept closed for "gramophone" working, so its volume control was placed *outside* the lid. And the clips were for the needle box.

That pleased him. And so did the change-over for 8-in. or 12-in. records, and the "Repeat" mechanism, for hearing the same record over again.

"*Grand* bit of work. They've thought of everything," was his summing up on the gramophone side; and then he switched over to "Radio."

Athlone, Stuttgart, Vienna, Brussels, Prague, Lyons, North Regional—the stations came rolling in, one after another, as Mr. Peters turned the "Tuning"! And then the Fluid-Light arrows claimed his attention, and I had to explain them.

He was fascinated by Fluid-Light tuning. Quickly grasping the idea, he tried *tuning by sight alone*.

To do this he put the volume control to the silent position, moved the tuner to the words "Midland Regional," finely adjusted it to make the Fluid-Light arrows as long as possible, and then turned up the volume. And there, sure enough, was Midland Regional, at full strength, perfectly tuned in.

"Beautiful!" said Mr. Peters. "As a piece of furniture, as a wireless set or as a gramophone, it's *grand!*"

Finally he had to go. But he came back from the door to say impressively:

"If anybody asks me, I'll tell him the same as in this room. Best I've ever *seen* or *heard!*"

P. R. B.

SUCCESS OF EKCO NOISE-SUPPRESSION SCHEME

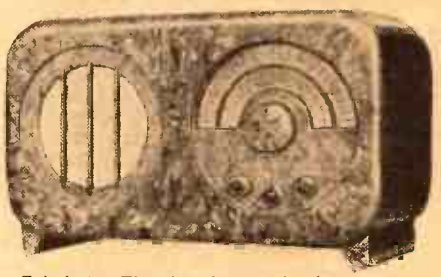
THE reason for the phenomenal success of the Ekco station preselection and automatic noise-suppression scheme is undoubtedly due to the fact that it dispenses with so many of the troubles which are ordinarily encountered in present-day broadcast reception.

With this great new Ekco scheme it is possible, by means of a simple adjustment, placed conveniently on the front of the receiver, to reject automatically all stations below a predetermined level of volume and *to dispense entirely with background noises while tuning between stations.*

An Important Development.

It is obviously a development of first-rate importance, and in our practical tests of the first instrument to incorporate it—the new Ekco Model 85—the advantages of the scheme were very apparent. So much so, in fact, that it has been decided to make this particular instrument the subject of a "P.W." Triple Test, and a detailed report will appear in our next issue. You may look for something good, for the set is definitely one of the highlights of the new season's range.

A POPULAR DESIGN



This is the Ekco Model 85, which incorporates the maker's latest idea of station preselection and automatic noise suppression.

Meanwhile, it is of interest to note in passing that this is not the only Ekco set which is creating a sensation. Practically all of their sets for the new season are outstanding in one respect or another, and they seem to have catered for practically every class of listener.

Their new universal model, for instance, was commented upon in practically every newspaper review of the recent Radio Exhibition, and not without ample justification. At only 10½ guineas it certainly wants beating.

A BATTERY SET FOR £5 17s. 6d.

A highlight in the G.E.C. range of receivers for 1934/5.

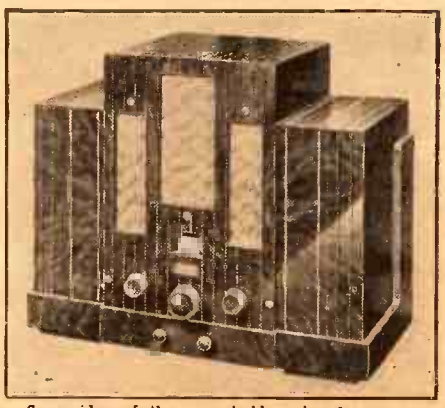
"THE G.E.C., Your Guarantee" is a slogan almost as famous as the one associated with the commodity which "puts beef into you." That is fortunate, for otherwise one might have considerable misgivings—even in these days of bargain prices—concerning the efficiency and general finish of a battery set which sells complete with valves, batteries *and* a moving-coil speaker for something less than £6.

But the fact that it is a product of the General Electric Company completely allays any fears in this respect, and one can only marvel at the fact that the manufacturing facilities of this famous organisation have been brought to such a fine art as to permit of the production of this attractive instrument at the astonishingly low price of £5 17s. 6d.

The "G.E.C. Battery Compact Three," as it is called, is but one of eight fine models with which the G.E.C. has marked the arrival of another season, and in their latest range there is an instrument to suit practically every pocket and requirement.

Of particular interest to the Empire listener is the "Overseas Seven," which is made to a tropical specification, and which provides for the reception of all broadcast waves from 12 to 555 metres. It is provided with delayed and amplified automatic volume control, single-dial tuning and an illuminated frequency-calibrated scale. The set is designed for operation on A.C. mains, and the voltage ranges covered are from 100–150 and from 190–250 at 40/100 cycles.

WITH MOVING-COIL SPEAKER



Some idea of the remarkable value for money that is offered in the G.E.C. Battery Compact Three may be gauged from the fact that the price of £5 17s. 6d. includes valves and batteries.

TECHNICAL TESTS:

THE H.M.V. "FLUID-LIGHT AUTORADIOGRAM."

(*Continued from previous page.*)

The results of our synthetic-transmitter selectivity tests were well borne out in the aerial tests to which the "Fluid-Light Autoradiogram" was subsequently subjected.

Hörby, a matter of only 4 metres away from the London National transmitter, was absolutely clear. Incidentally, the London National occupied less than one-sixteenth of an inch of the tuning scale.

Most modern sets are capable of separating Hamburg—a 100-kw. station on 331 metres—and the London Regional station, which uses 50 kw. and transmits on 342 metres. But in the case of the "Fluid-Light Autoradiogram," and to our surprise, it was actually possible to adjust the tuning dial to a point of absolute silence between the two!

On the output side the "Fluid-Light Autoradiogram" employs a Marconi P.X.4. The maximum anode dissipation of this particular valve is approximately 12 watts, which means to say that the instrument is capable of providing an undistorted output of roughly 2½ watts.

Translated into practical considerations, an output of 2½ watts through a speaker of average sensitivity represents a sound output which would be much too loud to be comfortable in any ordinary domestic setting. The quality of reproduction, judged from standard-frequency records, is right up to standard, and the evenness and extensiveness of the frequency response is distinctly above the average.

A NEW TELEVISION DEVELOPMENT

Mr. G. P. Kendall discusses for "P.W." readers a recent invention that claims to go a long way towards solving the problem of providing a high degree of illumination in projected television reception.

WHENEVER any question arises of projecting a good bright picture upon a screen of large size one naturally thinks at once of the electric arc as a source of light, for it has great advantages from the optical point of view (the light comes from a very small area, and so is easily focused into a beam), it will give a tremendous amount of light, and is very cheap—at any rate, in its simple form.

It has not yet proved a very easy matter to adapt the arc to the purposes of television reception, however. It presents certain points of difficulty which have hindered its use in connection with such forms of light valve as the Kerr cell, and until recently there seems to have been little success in devising a really practical self-modulating arc.

An Almost Ideal Source.

Such an arc, if it could be arranged, would appear likely to provide an almost ideal source of modulated light for reception purposes, for it should give an intensity adequate for the projection of a picture of really worth-while size and great brilliance. It should lend itself, too, to an optical system of a very simple and efficient kind.

Some success has been achieved on these lines in the past, but the methods used have been mostly of laboratory, rather than practical, everyday application. For example, an arc can be modulated by passing the actual television signals through it along with the normal flow of D.C. which keeps it alight.

Fluctuations in the signal currents then produce corresponding variations in the intensity of the light emitted by the arc; but the practical difficulty is that to get an effective degree of modulation in this way one must have signal currents of tremendous strength. (It has been stated on good authority that something like 100 watts of actual signal energy is required to produce effective control of the light from an arc of fair size.)

Small Modulation Power.

Such an arrangement is hardly suitable for general use, since it would necessarily be extremely costly, and many attempts have been made to devise a modulated arc which could be controlled by the 3 to 5 watts or so which is provided by the average good-sized television amplifier.

I have recently obtained details of the results which have been achieved in one such attempt by a German experimenter who seems to have hit upon a scheme which may well become of very considerable importance. Naturally, one receives the claims of inventors with a certain reserve, because their enthusiasm so often leads them to minimise difficulties, so I will present just the broad outlines of the advantages of the new device, pending confirmation of the details.

The arc used in developing the new system is stated to consume 5 amperes at 50 volts for its "striking" current, and although this is only equivalent to 250 watts, it is said to give a really brilliant picture 3 feet wide on an ordinary silver screen as used for cinematograph purposes, thanks to the extreme efficiency of the method of modulation.

This method is certainly highly ingenious, taking the form of a combination of the ordinary "direct" system which I have already mentioned with a special type of magnetic control which again is two-fold in its action.

A FAMOUS INVENTOR

Manfred von Ardenne, to whom is due much of the modern advance made in television. He is here seen examining one of the latest cathode-ray tubes.

The direct modulation, of course, is obtained just as usual by passing the signal currents through the arc itself, the currents being applied through a step-down transformer so as to obtain the desired condition of a large current at a low voltage. The magnetic control is provided, in the first place, by arranging powerful electro-magnets with specially shaped pole pieces on either side of the flame of the arc.

In a Magnetic Field.

Since the flame is thus situated in a magnetic field, it will tend to move in sympathy with any alternating currents which it may be carrying, very much after the fashion of a string galvanometer. To increase the effect, further windings are provided through which the signal currents are passed, in such a way as to supplement the magnetic forces set up by the first arrangement.

In this way it is stated that a considerable vibratory movement can be produced in the arc flame, and some slight further modulation is achieved thereby, as a result of a cooling effect which takes place. The main modulation comes, however, from a detail of the associated optical system, which contains a series of lenses set up behind a small slit in such a way that only light from the most "sensitive" part of the arc flame is allowed to pass.

When the Flame Moves.

Any movement of the flame thus throws the optical system out of line to an extent which depends on the amount of the movement, and introduces the additional modulation effect which is needed. The sum total of all this is that the application of quite a modest amount of alternating energy will exercise quite powerful control of the light getting through the slit and lenses.

The scheme appears to require something special in the way of an arc, since the normal flame is much too broad for this last effect to be of much assistance; but it is mentioned by the inventor that he applies his constant magnetic field is such a way as to compress the flame into a "thin line of light."

The great interest of the idea seems to me to reside in the claim that to get a really heavy degree of modulation all that is needed is an input of controlling energy of only 5 watts. Such efficiency as this should bring really large, brilliant pictures within the scope of quite a normal kind of outfit.

Rectification Quite Easy.

It might seem that the necessity for a supply of direct current for feeding the arc would be a source of difficulty where the supply is from alternating mains, but in view of the comparatively small wattage involved this should not prove unduly expensive. The inventor, for example, gets his D.C. supply with the aid of a mercury-type rectifier associated with quite a conventional sort of smoothing system using very large-capacity electrolytic condensers, which are not at all expensive in so low a voltage rating.

Certainly the invention is one which should be watched by those who want to keep their television knowledge up to date. The claims made are sweeping ones, and a modicum of reserve is permissible, as I have hinted; but at least this can be said: the invention shows an extremely promising application of known principles.

S.T.600 v. DROITWICH

DROITWICH, the Big Bad Wolf of Radio for a million listeners, will meet its doom on October 24th when the S.T.600 is published in "Popular Wireless."

This magnificent ether-shaker is a joy to listen to on the S.T.600, the greatly improved quality providing the long waves with a new popularity. But when you desire to hear Deutschlandsender, Warsaw, Radio Paris and other stations on this waveband, Droitwich spreads and drowns them on most sets.

The Midlands, in particular, are immersed in a radio fog which the S.T.600 will disperse in two seconds. Mr. Scott-Taggart has had Droitwich in mind in all his work on the "600."

In the very neighbourhood of this huge station, with its 150 kilowatts and 700-foot masts, the S.T.600 can receive Radio Paris and other popular long-wave stations. Droitwich becomes as though it were only a tenth or less of the power of Daventry !

JOHN SCOTT-TAGGART, A.M.I.E.E., F.INST.P.,

has effected a miracle in his new set, and the most startling claims will be made—and fully justified—on October 24th.

Nothing like the S.T.600 has ever been produced before. A new S.T. "Star" receiver is always the subject of eager discussion before publication and enthusiastic praise afterwards. But the S.T.600 marks a new approach to the problem of selectivity and sensitivity.

We of "Popular Wireless" are as keen and excited over this receiver as any reader, but we know only the results, not the circuit. Only just before October 24th shall we learn the secret of the S.T.600's brilliant performance. But this we do know: Like every big S.T. set, the S.T.600 is an invented circuit for which patents have been applied. It is not just a conventional assembly of well-known parts.

Mr. Scott-Taggart tells us that he knows of no set, manufactured or otherwise, which resembles his S.T.600 in circuit or principle. And we ourselves know that this applies equally to its performance.

There is a thrill about a big new S.T. design because it is always an invention as well as a design. The public looks for something original and striking from Mr. Scott-Taggart, and this time he has certainly produced a bombshell. His followers will be enthralled and potential critics confuted. Sceptics—the "hardest-boiled" constructors—will be as silent as the B.B.C. "locals" can be made on the S.T.600.

This very day the S.T.600 is being demonstrated—perhaps in your own town. By October 24th Mr. Scott-Taggart will have proved its merits throughout Britain. On Wednesday,

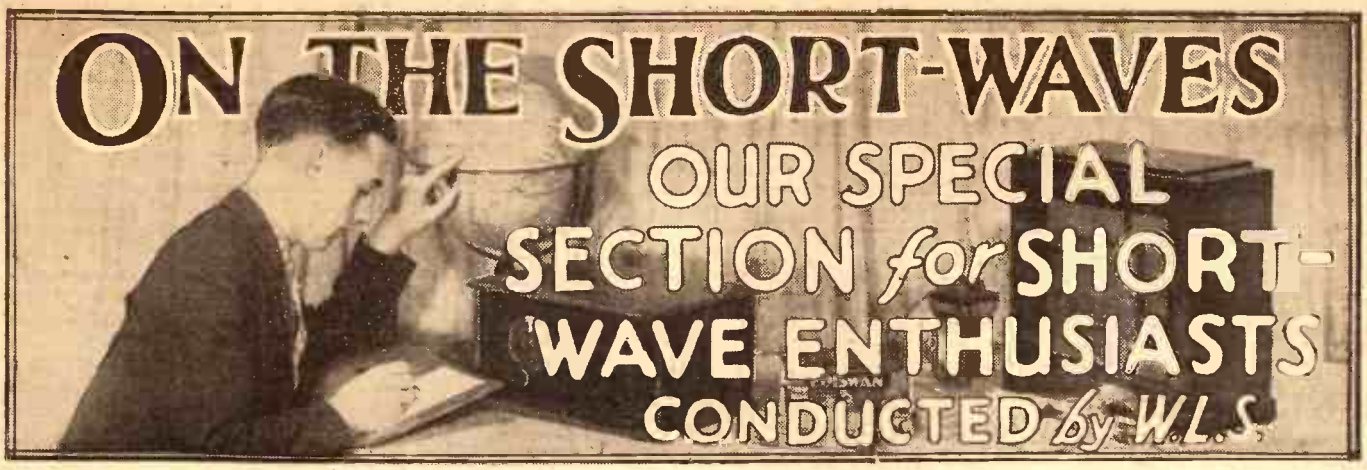
OCTOBER 24th,

over 300,000 constructors will flock to bookstalls and newsagents, and tens of thousands will decide to build what will be the set of their lives and the envy of their neighbours.

Tell all your radio friends to look out for the S.T.600. Delay will mean that at every bookstall and newsagent's the reply "sold out" will greet them. One reader has written to say he is getting up at 6 a.m. to buy his "Popular Wireless" on October 24th !

Many like him will find the next week or two a period of tantalisation, although one in which preparation can be made for building the S.T.600 immediately the description is published.

ACT IN OCT. !



I FORGET whether the character who observed "This 'ere progress, it do go on" was a creation of Bret Harte or Charles Dickens. But it matters very little, for he certainly hit the nail on the head.

Flying, motoring, medicine, *radio*—just look round you if you want the proof. But sometimes one has to stop and wonder whether what we call progress is really progress at all.

By the Sad Sea Waves.

I agree that I can write these notes in a deck chair by the sad sea waves late on a Friday evening, secure in the knowledge that an eagerly waiting Editor will receive them on the Saturday morning; and there *was* a time when one couldn't do that!

Furthermore, I have just come off an entirely admirable pleasure steamer after having a chat with the radio operator, who had been turned out of his "den" because the "Old Man" had a lady friend who wanted to listen to Fécamp! I suppose *that's* progress. But what *isn't* progress is the fact that the same boat can sit at the pier head, let loose a quarter kilowatt of wicked spark over some purely trivial messages and upset radio reception in the whole town.

That Holiday Feeling.

People listening to Henry Hall at tea-time don't want to be told that s.s. Schnozzle wants s.s. Caboodle to put ashore five pounds' worth of half-crowns; neither would s.s. Schnozzle be very popular with the authorities if these little things came to their ears. And *spark!* I ask you; what the——

However, all this is by the way. It's so long since your faithful short-wave correspondent had a holiday that he finds it a little hard to concentrate. Short waves will follow, all in due course. Meanwhile, there are plenty of waves (and, incidentally, quite a few shorts).

Progress, now! Just cast your eye over the three pictures in this section. The three transmitters range in date from 1924 to 1934. The crazy-looking piece of stuff on the left actually put signals into America in 1925 with 10-watts input from dry batteries. The modern affair in Fig. 3 certainly looks the part with considerably more effect, but I doubt whether it could do better than that. The Fig. 2 transmitter was nothing to write home about from the point of view of appearance, but I am credibly informed that it did do its stuff.

Just to ram the point home a bit more before I disclose what it is. I raked out from a cupboard, not long ago, the receiver that I used to use in about 1926, complete with the original valves. Rigging it up on the bench (after decarbonising, etc.) didn't take long; and it worked! *And how?* as we are supposed to say nowadays.

Except for several rather obvious shortcomings, it seemed to work very nearly as well as my own Super-Whatisit, which annoyed me considerably. So now for the point! This Progress, to my mind, has taken us much farther along the lines of appearance and refinement of detail than it has along the line of honest development.

Increased Power to Blame?

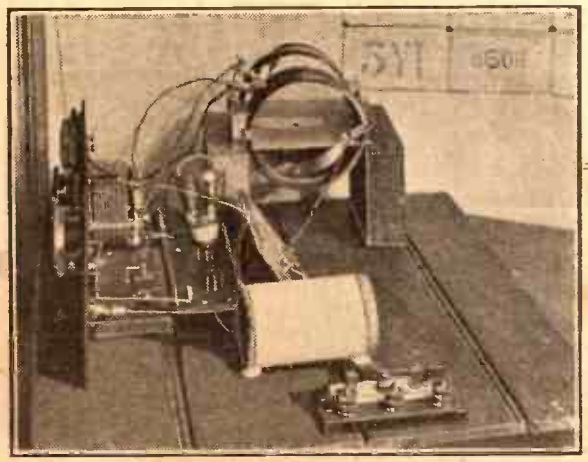
I can't blame anyone for that. If my 1934 receiver isn't much better than my 1926 model, all the blame rests on my own shoulders. But my 1934 receiver is (spare the blushes) just as good as anyone else's 1934 receiver. So it looks as though a whole lot of us are in the cart together.

Perhaps the trouble with me is that my 1926 receiver was too good. But I doubt it. No, the fact of the matter is that we short-wave people have *not* progressed overmuch with the receiving angle, probably because the steady improvement in transmitters and increase in their power have rendered it almost unnecessary.

Well, as I hinted last week, I, for one, am going to get a move on. Those of you who are waiting for some circuits for the "standard baseboard," described a fortnight ago, may be seeing some weird and wonderful receivers described on these pages ere long. So just keep a watchful eye on this section.

THIS PROGRESS

W. L. S. has some disturbing remarks to make this week on the subject of short-wave receiver efficiency. He suggests that the last few years have seen little progress, the better results now obtained being probably due to the increased power of transmitters.



DEVELOPMENT!

These two photographs and the one on the next page, of amateur transmitters, support W. L. S.'s contention that we have progressed chiefly from the point of view of neatness and appearance. The crude looking arrangement on the left (Fig. 1) succeeded in putting 10-watt signals across the Atlantic in 1925! The slightly more business-like transmitter to the right (Fig. 2) was heard practically all over the world; and the modern job on the next page (Fig. 3) is heard in most places with an input of 50 watts.

ON THE SHORT WAVES—*Page* 2.

"HERE AND THERE"

Notes and news about short-wave transmissions and other topical items

THE B.B.C. announces a change in its policy with regard to the Empire Programmes. From now onwards they will be circulated in pamphlet form and distributed to all overseas journals on the mailing list. The said journals will then be free to reproduce the programmes without restriction of any kind.

From October 7th the following changes in the Empire Programmes take place: Transmission 1 (for the Antipodes) will be run from 7.15 a.m. to 9.15 a.m. Transmission 2 (Malaya and the East) will operate from 11 a.m. to 2 p.m. on weekdays and 12.30 p.m. to 2 p.m. on Sundays.

Transmission 3 (India and the East), 2.15 to 5.45 p.m. Transmission 4 (Africa), 6 p.m. to 10.45 p.m. Transmission 5 (Canada and America), 11 p.m. to 1 a.m.

Heard in Southern Rhodesia.

Passengers on the Imperial Airways Atalanta helped to establish what has just been claimed as a record. On Derby Day (long time ago !) they were flying over Southern Rhodesia, and the wireless operator picked up the commentary direct from the Empire station. The Test Matches have come in for similar spectacular feats.

A neat bit of "chain work" is reported from (need you ask ?) the U.S.A. A "W 6" station in California was working 80-metre telephony with a "W 4" in Florida. The "W 4" relayed this telephony via a "5-metre link" to another "W 4" some fifty miles away. This second "W 4" re-relayed the 5-metre stuff, on 40 metres, to a "W 9" in Illinois.

And so it might have gone on, with five wavebands and nine amateur districts. Which all proves something or other—I forget what.

Who says that readers don't co-operate with each other ? Here's F. T., of Co. Durham, and F. W., of Co. Cornwall, indulging in a little back chat. F. T. is troubled with hand capacity (like one or two others that we know of). F. W., whose case with a similar trouble sorely puzzled myself and the Query Department some time back, writes to F. T.

A MODERN AMATEUR STATION

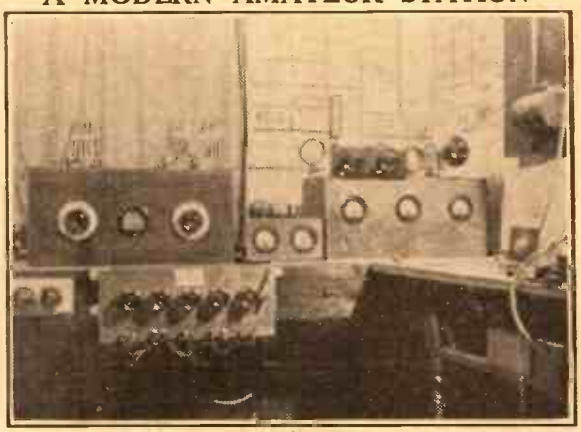


Fig. 3. This is the modern amateur short-wave station referred to by W. L. S. on the previous page. It is interesting to compare this photograph with Figs. 1 and 2.

The result is that, on F. W.'s recommendation, F. T. hangs an odd bit of wire out of the window instead of an earth connection. Presto ! Trouble gone. Can you beat that one ?

They Are All Real People.

Now just look at *this* one. J. W. R. (Birmingham) writes as follows: "Dear W. L. S.,—Much as I enjoy reading your notes, I often wonder whether you imagine us to be taken in by all these answers to correspondents. We know that the correspondents only exist in your imagination, so as to give you something to write about. It must be fun—like pulling the strings at a marionette show—to make them say their little pieces."

My *dear, good* man ! How could you say such a thing ? For one thing, it would be far more trouble to me to invent all these correspondents than to quote the real people; and my time's quite occupied as it is. You write and ask the Query Department how many letters they forward to me each week. Perhaps that'll convince you. Still, thanks for writing.

Readers who want the R.S.G.B.'s "Guide to Amateur Radio," but don't know where to apply for it, write "53, Victoria Street, London, S.W.1" on a bit of paper quickly.

I. K.'s scheme of using an S.G. valve as note mag. has caught on. The last adherent is B. M. (Bangor), who likes it immensely. More of this later.

W. L. S.

ROUND the RECORDS

Selections and recommendations from the latest gramophone lists.

AS a technician, as well as record reviewer, it is always of interest to me to come across anything that is going to help to provide more realistic reproduction, or anything that will enable me to check up the quality of my present receiver output.

Consequently I was extremely glad recently when I was given an opportunity both of improving the quality of my radiogramophone and of checking up its reproduction.

The latter took the form of a Columbia record that I can well recommend to home constructors and listeners alike. It may give some a shock, but others will be gratified at the results their sets give with the record.

A GOOD TEST RECORD

The number is CB774, and on it is a unique orchestra made up of famous solo musicians. Moreover, these musicians in one number come in one by one, so that the instruments and the effects of the instruments on the ensemble can easily be recognised. After they have all "arrived" they drop out again one by one. This item is called *The Breeze.*

The soloists include such artists as Leonard Hopkinson (flute), Leon Goossens (oboe)—you can at last hear exactly which instrument is responsible for that funny noise—Anthony Pini ('cello), Hugo Rignold and Eric Sidey (violins), Rudy Starita (xylo and drums). Then we have saxophones, piano and many other instruments, making up a most expensive orchestra. As a matter of fact, the orchestra had given two special radio programmes earlier in the year, and the two tunes recorded on this disc were introduced at the latter occasion.

They are orchestrated by Van Phillips, and they are his efforts that have resulted in the unique assembly we hear playing. It's a good test for any radiogramophone.

I may mention that I used it, among other records and radio items, to say nothing of constant-frequency records, to test a new loudspeaker that has come my way. You may have seen it at the recent Radio Shows—the Benjamin "Double Six"—and if you heard it working you may have been struck with the remarkable "life" of the reproduction.

I heard it at Olympia, but it is far better in one's own home, and for gramophone test purposes it is ideal—for it really does bring out the very best in the records. The frequency response is exceedingly good. I got a clean 32 cycles out of it from a 5-watt amplifier without any frequency-doubling effect !

All the way up the scale the response is good, and at 6,000 cycles there is plenty left. Actually the speaker goes much higher than this, and with its high sensitivity it is certainly one of the finest I have ever heard.

It nearly breaks my heart to hear, as I often do, well-known records played on a radiogramophone with a "suet-pudding" loudspeaker. You know the sort of thing I mean—plenty of "oomph" but completely devoid of real top—just badly matched pentode screech on 1,000 cycles or so, and cymbals made of cardboard.

I should like to start a movement among home constructors to do away with "mellowness" and to set up free demonstration centres where listeners shall have a chance of hearing what can be done with quite moderate cost and small power.

I do not favour the huge, complicated 25-watt outfit with super-baffles and so forth, but good clean "family" sets, having outputs of 5–7 watts peak (easily provided on mains sets) or less, a well-designed cabinet, and—well, why not the "Double Six" speaker ?

SOME FURTHER SUGGESTIONS

Perhaps some of my readers who feel themselves capable of acting as local demonstrators to those who care to come and listen to "what can be done" will drop me a line so that I can pass on their invitations to others. Or maybe they will be too bashful !

Commercial sets should not be eligible, of course, for it is of little aid to Jones to be shown that Brown's super-radio autotalkiegram in infinitely superior to his. But if he can be shown how fine a reproduction he can get with such and such a circuit, or with this and that alteration, he will be enabled to progress by easy stages. So what about it ? Nothing *more* than 5–7 watts output, or costing more than £30 *sans* valves and speaker. That's a good limit.

As I seem to have gone well "off the deep end" on quality, let me give you a few test-record suggestions from the latest lists. Here's a lively "hot" cinema-organ disc which will let you check up the middle register of your speaker for cleanliness and also some of the bass notes.

It is played by Sidney Torch on the new Regal Cinema organ at Edmonton. Called *I Want to Be Snappy,* the record lives up to the wish, and contains excerpts from famous dance numbers of the past. (Columbia DB1420.)

And here's another: Harry Robbins plays *Kitten on the Keys* and *Twelfth Street Rag* on the xylophone. (DB1421.)

How will *your* set handle this one ? The Gaumont-British Orchestra playing a selection from *Chu Chin Chow* on Columbia DX592. It's "big" recording and will tax any set that is not quite up to the scratch.

YOU MUST HEAR THESE

Do you want to find out what your amplifier and speaker do to deep saxophone notes and the sharp crash of the cymbals ? Try Ray Noble's Orchestra playing on H.M.V. B6503. The items are *I'll String Along With You* and *Fair and Warmer,* and in this latter there are many effects that a set may almost be excused muffing. The tenor saxophone in one number of the record and the cymbals in the other are backed up by further tests that should leave you with little doubt as to the state of your set.

But in case you are left wondering, let me tell you that the record is a perfect example of recording, as are the others I have just mentioned. Any distortion will be—well, not on the disc. And as entertainments these discs are as good as they are tests.

It is becoming the fashion for the various record companies to pick one or two of their records each month for "stardom" or "best of the month." H.M.V. picked a disc of Lawrence Tibbetts this month, and Columbia has chosen Bobby Howes' *Let's Dress for Dinner To-night* and *Yes, Sir ! I Love Your Daughter.* The number is DB1424, and it is full of the boyish breeze that Bobby Howes brings to stage and film. I strongly advise you to hear these tunes because I know that you will like them.

K. D. R.

Solving the DROITWICH Problem

Those who are finding difficulty in cutting out the new high-powered B.B.C. station at Droitwich will welcome the helpful suggestions in this article. These, together with the article we published last week on the same subject, form a complete treatise on the attainment of selectivity on the long-wave band.

THE coming of Droitwich is not proving entirely an unmixed blessing. Many set owners living near to the new high-powered transmitter are finding difficulty in cutting him out when tuning to other long-wave stations on nearby wavelengths.

There are many ways in which the selectivity of a receiver may be improved on the long-wave band. But which one of them, or which combination of two or more of them, will prove most effective is a matter dependent on the particular receiver in question and also on the local conditions under which it works.

Simple Schemes to Try.

This was carefully pointed out last week, when a number of simple selectivity schemes were suggested. It must also be borne in mind in connection with this week's article, in which a number of further ideas are described, including some of a more advanced nature.

The best way to tackle the problem is to try the simpler selectivity ideas first, experimenting with one at a time and retaining any which gives an appreciable degree of relief. The more elaborate schemes should be turned to as a last resource, but there are few cases in which the schemes outlined will not prove efficacious in enabling interference-free long-wave reception.

First of all, then, we will deal with the three considerations indicated on this page. No. 1 shows a metal can, to which is joined by means of a terminal a flex lead running to the earth terminal of the set.

The can is being placed over the H.F. choke in the anode circuit of the S.G. valve. But if you try this scheme see that the can does not short the choke terminals.

Effect of Screening.

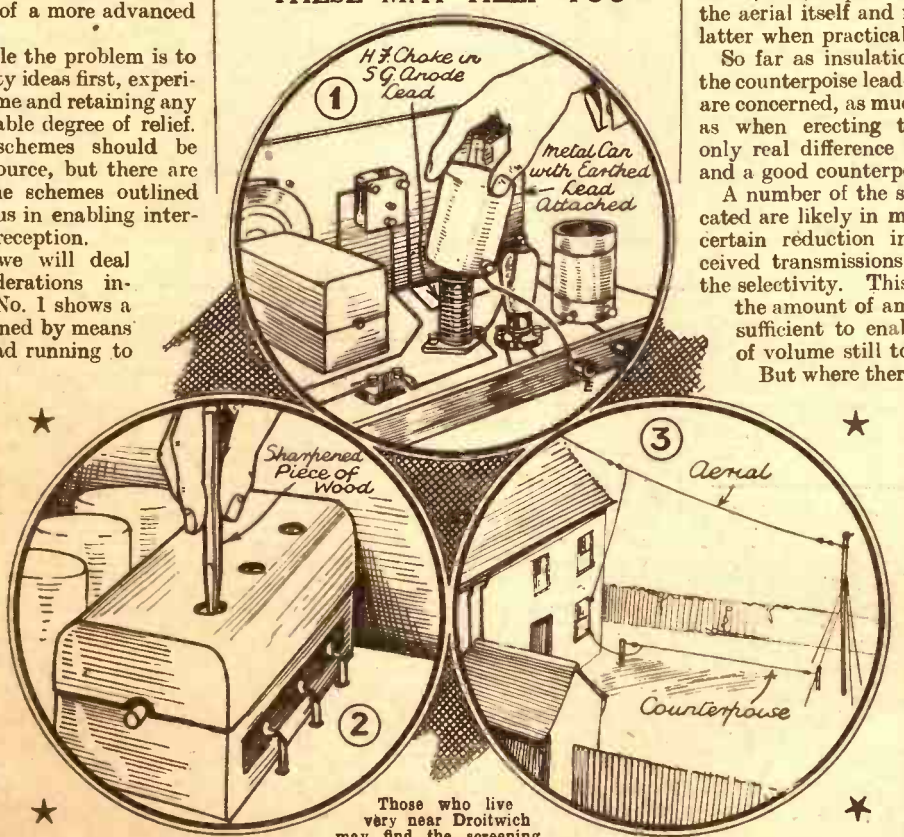
The purpose of this scheme is similar to that of the screen which we described last week, although in this case the necessity of screening is less urgent. Actually, however, the use of a screened choke here will often improve the stability of a set which is a "bit near the edge," and for this reason chokes of this type will usually be found in modern receivers.

The screening can should not fit closely round the windings of the choke. The bigger the air space within reason between the windings and the can the better.

The second item illustrated brings us to an all too common cause of inselectivity. Incorrect ganging can do more to upset the successful operation of a set than any other single maladjustment.

Because of the effects which may be caused by capacity between the operator's hand and the metal of a screwdriver, and between the screwdriver and the variable condenser, it is advisable to use a piece of wood for trimming. This is cut to a screwdriver shape at one end.

THESE MAY HELP YOU



Those who live very near Droitwich may find the screening of the S.G. H.F. choke, as illustrated in No. 1 above, quite helpful. No. 2 is in the nature of a reminder—you cannot get good selectivity unless trimming has been accurately carried out. Where difficulty in obtaining a good earth is experienced a counterpoise (see No. 3) is worth trying.

Always follow instructions about ganging most carefully, employing the sequence of adjustments described. It is usual to trim on the medium waveband; but if you have any doubts about the ganging remaining accurate when switched over to long waves, try making further adjustments on a weak long-wave transmission.

We mentioned briefly last week that a poor earth connection might be the cause of lack of selectivity on long waves. But unfortunately, for some reason or the other, it is not always possible to improve matters in this connection.

Using a Counterpoise.

When this happens to be the case a counterpoise is always worth a trial. The third sketch on this page illustrates how such a device is arranged. It is really a low aerial, and, if possible, should run beneath the aerial itself and follow the shape of the latter when practicable.

So far as insulation and the spacing of the counterpoise lead-in away from buildings are concerned, as much care should be given as when erecting the aerial itself. The only real difference between a good aerial and a good counterpoise is one of height.

A number of the schemes we have advocated are likely in most cases to produce a certain reduction in the strength of received transmissions as well as improving the selectivity. This will not matter where the amount of amplification available is sufficient to enable a satisfactory level of volume still to be attained.

But where there is no margin to permit of such strength reductions a scheme must be adopted that will not call for them. Such is the unit illustrated in the centre of the second page of this article.

An Ideal Solution.

As a matter of fact, far from reducing volume, this scheme will give an increase in almost every instance. It consists of an additional stage of H.F. amplification and is intended for use with receivers which do not already incorporate high-frequency amplification.

The additional tuned circuit gives the desired greater selectivity, while the valve more than makes up for any loss of volume incurred. The extra amplification also permits of very loose aerial coupling, which is obtained via the ·0003-mfd. preset condenser in the input lead.

(Continued on next page.)

SOLVING THE DROITWICH PROBLEM

(Continued from previous page.)

If the set to which this H.F. unit is added was giving satisfactory results prior to the opening up of Droitwich, the unit will be needed only on long waves. For this reason the double-pole change-over switch is provided so that the set can be instantly changed back to its original form.

The switch is wired so that when the unit is out of action its filament circuit is broken, and as a result unnecessary battery power is not wasted.

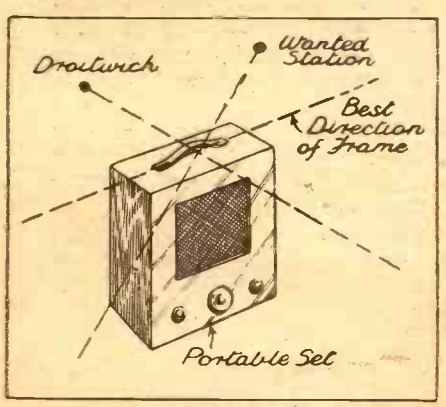
Three Screened Components.

Note that the variable condenser, H.F. choke and tuning coil are all screened to avoid any interaction with components inside the receiver. The coil being of standard dual-range type, there is no reason why this H.F. unit should not be tried on the medium waves if desired.

H.T.+1 is given 60 to 80 volts, H.T.+2 120 volts, and the aerial is connected to the unit's aerial terminal. The output terminal of the unit is then wired to the aerial terminal on the set.

The unit's two L.T. terminals may be connected either direct to the accumulator or across the filament terminals of one of the valve holders in the set. If the latter arrangement is adopted the on-off switch on the set will also control the unit. But in any case the L.T. to the unit can always be turned off by putting the change-over switch to the position which cuts the unit out of circuit.

There will now be two tuning controls instead of one, but you will soon get used to manipulating them, and the improved selectivity makes the slight inconvenience well worth while. Those who desire super-selectivity could easily adapt this circuit for band-pass working.



This diagram illustrates the way in which full advantage may be taken of the directional properties of a frame to cut out interference from Droitwich.

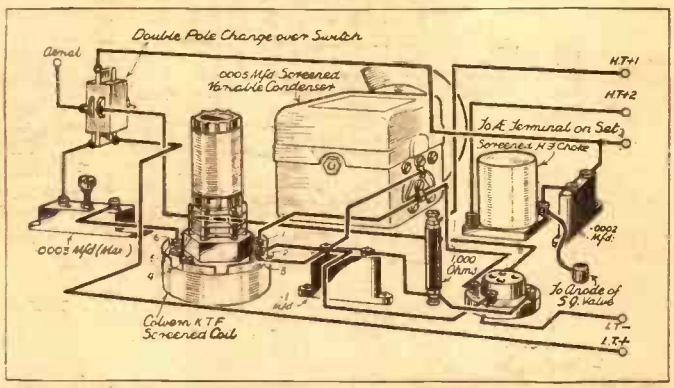
It is merely a matter of substituting two suitable band-pass coils for the single-coil unit and using a dual-gang condenser. Once trimming has been carried out, the operation will be just the same and just as easy as with the original arrangement.

And now let us turn to the other two diagrams on this page. One indicates the connections for a simple but effective selectivity scheme, and the other shows how to take full advantage of the directional properties of a frame aerial in a portable set.

Unfortunately, there is little that can be done with a portable that is not selective enough to deal with the new Droitwich; that is why we are emphasing this point about the frame aerial.

It is quite likely, in many cases, that by turning the frame slightly away from the true direction of the desired station, it can be brought nearer to right angles to the Droitwich station, thus preventing all interference from this station. The diagram should make this quite clear.

If the frame were in a direct line with the desired station, while his transmission would come in loudly, there might be considerable interference from Droitwich. But turn the frame to the position in which it is shown and the effect is to weaken both the desired station and Droitwich; but this effect will be more on Droitwich than on the wanted transmission because the variation produced by a frame is much more acute near the minimum position than near the maximum. The strength of the wanted programme can now be brought up by the use of reaction.



Illustrated above are the full connections for an H.F. unit that can be added to simple receivers. Not only does it provide increased selectivity, but it will also provide stronger reception of distant stations.

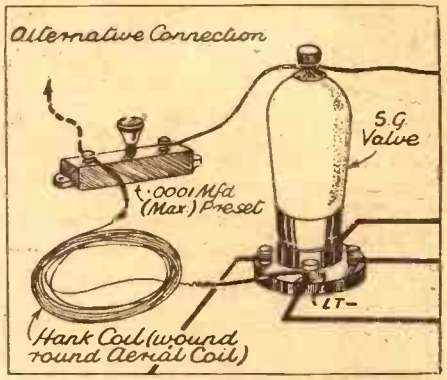
The other scheme applies to an S.G. valve and requires only a preset condenser and hank of wire. The idea is to sharpen the tuned circuit by a suitable adjustment of the preset condenser, its capacity never being set sufficiently high to affect the satisfactory control, or the results of the receiver in any way, except to improve its selectivity.

All adjustment is carried out by means of this preset condenser, and an additional control on the panel is not necessary. When there is a spare winding on the coil with both of its ends unconnected, it can be tried in place of the hank coil. It should be tried connected both ways round, as also should the hank coil.

Adopting Band-pass Tuning.

There are one or two final suggestions to be made, but which we did not consider needed illustrating. For instance, for those who do not mind making considerable alterations to their sets, and providing the designs allow the extra space, band-pass tuning can be used in either the aerial or H.F. circuit instead of a plain tuned circuit.

Also, sets which use tuned-anode coupling, either direct or parallel fed with H.T., will benefit by changing over to an H.F. transformer type of coil. Very often a coil of similar make and design to that already used in the set can be obtained to take its place.



A simple method of improving the selectivity of a receiver by means of a preset condenser and a few turns of wire. It does not introduce any extra panel controls, for the preset, once adjusted, does not require altering.

And with that we must leave you to experiment, once again reminding you that "one man's cure is no good to another." So because one suggestion does not help you out of your Droitwich trouble, don't assume that another—probably just as simple—will not either.

THE MEANING OF THE MHO.

DO you happen to know what a MHO is?

No, it isn't a female giraffe, an extinct reptile, or anything of that sort. It is, in fact, nothing more dangerous than our friend the "ohm" spelt backwards.

You don't hear much of mhos in these modern times, though it would be quite possible to calibrate electrical resistance-measuring instruments in mhos instead of in ohms.

Suppose we say that a circuit possesses a resistance of so many ohms. It is a statement which gives us an exact idea of the current-carrying capacity of that circuit.

On the other hand, if it were stated that the same circuit had so many mhos *conductance*, would the expression ring as clearly in your ears? Probably not, because nobody uses mhos nowadays, although, from a purely practical point of view, the ohmage and the *mhoage* of a circuit mean pretty much the same thing.

The mho is the unit of electrical conductance or conductivity, as it is more familiarly called. Electrical conductivity, as is obvious, is the converse of electrical resistance. Thus the conductivity of a circuit is expressed by the term 1/resistance.

If, therefore, you have a circuit with a resistance of N ohms, it will possess a conductivity of 1/N mhos.

See the idea? It is not a bad one, but, as I have already inferred, the mho has been rather allowed to die a natural death.

J. F. S.

THIS SEAL TELSEN *Triple Tested* GUARANTEED COMPONENTS ....AND WHAT IT MEANS TO YOU!

Look for the red seal on your next component carton—it is your safeguard against faulty manufacture and ultimate breakdown of the component when in use.

The TELSEN seal guarantees that the component has passed all its exhaustive tests in the processes of manufacture and assures you of lasting efficiency throughout its long life.

THEREFORE ALWAYS INSIST ON

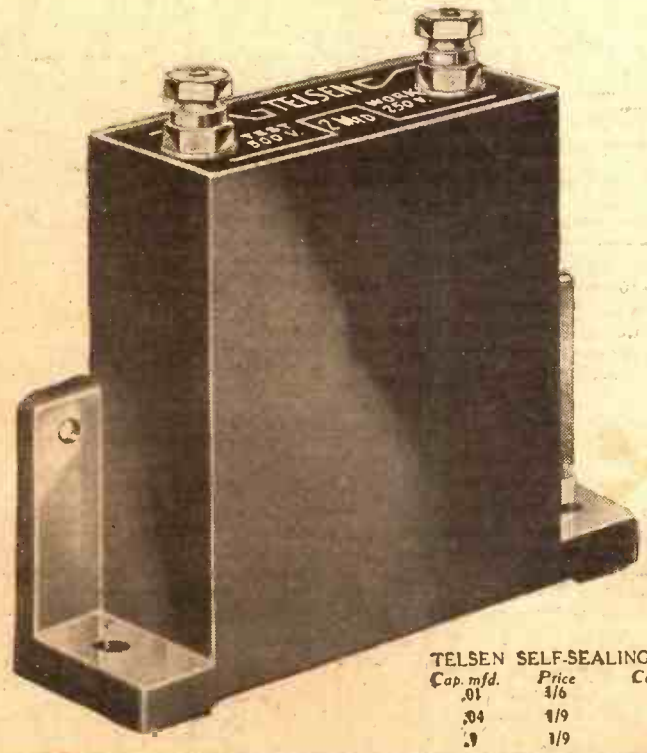
TELSEN *Triple Tested* GUARANTEED COMPONENTS

Permanent efficiency

with matched performance is obtained in the case of Telsen Self-Sealing Condensers by a process of manufacture which represents a definite advance in current condenser practice.

Instead of metallised paper, rolled foil is used with dielectric consisting of pure linen tissue. Impregnation with a special compound takes place in an extremely high vacuum and the rapid cooling process ensures the condensers being hermetically sealed. Factory tests show an insulation resistance of more than 8,000 megohm microfarads, and an electrification of 30%.

These condensers are tested by the Reflecting Galvanometer, which is one of the most sensitive electrical instruments known, as it will record a current of less than one millionth part of an ampere! Capacity bridges in conjunction with this type of instrument are used throughout our Laboratories for testing purposes.



TELSEN SELF-SEALING CONDENSERS

Cap. mfd.	Price	Cap. mfd.	Price
.01	1/6	.25	2/-
.02	1/9	.5	2/3
.04	1/9	1	2/3
.1	1/9	2	3/-

TELSEN RADIO COMPONENTS

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON, BIRMINGHAM

BROADCASTING IN MOROCCO

There is to be an increase of power made by two famous North African broadcasting stations, and we may expect to hear much more of them. Here is an account of a visit to Rabat.

By C. W. LUSTY

HAVING satisfied a small army of native police that I was not a deserter from the French Foreign Legion and that I was a fit and proper person to enter the domains of the Sherifian Empire of the Sultan, I received the freedom of Rabat, capital of French Morocco. After an arduous journey through labyrinths of native markets and heterodyning goats, dogs and sacred bulls, I was rewarded by finding the studios of Radio Maroc.

Many POPULAR WIRELESS readers are, doubtless, acquainted with the short-wave and long-wave transmissions from this 6½-kw. station. The mysterious Land of Islam will be brought nearer to our loud-speakers when, as is planned for the near future, Rabat has increased her power to 50 kw., and Algiers to 75 kw.

Rabat's programmes are of considerable interest. French, as well as Arabic, is taught in the schools, and the educated Berber population is taking an increasing interest in broadcasting. Arabian music, which, in spite of its weird, monotonous notes, proves fascinating to Europeans, figures in the programmes from Morocco, particularly on native ceremonial occasions such as Ramadan, the period of fasting and feasting between new moons.

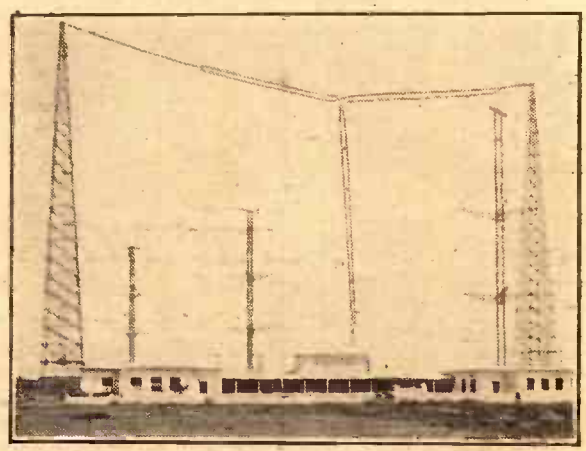
Radio in the Cafés.

Most of the cafés in Morocco are equipped with radio receivers, and I found a typical continental atmosphere. In roadside cafés, such as those between Casablanca and Marrakesh, I frequently saw hooded skeiks of the desert, lantern in one hand and shoes in the other, enter the estaminets to sip aperitifs and listen to broadcast music.

Relays are carried out from Casablanca theatres, while programmes are also given in English. Among the diversified entertainments are performances by the Sultan's Orchestra and the famous Garde Noire—orchestras as popular as our own Henry Hall and his merry boys.

An interesting little station is the short-wave Casablanca transmitter, C N 8 M C, which relays Rabat several times a week. The station is conducted largely as a labour of love by Dr. Veyre, a well-known French resident in Casablanca, who has been an amateur transmitter since 1918. I found the station at his home, Avenue de General Moinier, near the heart of the modern city. The miniature forest of transmitting aerials provides a somewhat strange contrast to the palms and trees adorning the spacious grounds of his residence.

THE FAMOUS RABAT STATION



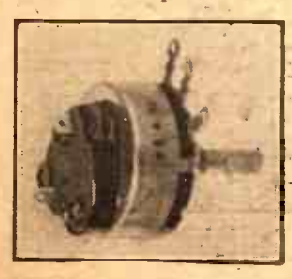
The aerial system and station buildings of the Rabat broadcaster, so well known to British listeners on 499·2 metres.

A DOUBLE-PURPOSE CONTROL

AMONG the numerous advances and improvements in radio-reception technique for which POPULAR WIRELESS can justly claim credit is the combination of switches with potentiometers.

This is an expression of the "simpler and better" policy which has always guided our efforts.

The usefulness of a volume control with switch is so obvious that it is an extremely widely used form of combination component. And one of the most satisfactory makes we have yet encountered is the Polar-N.S.F.



The Polar-N.S.F. volume control with three-point shorting switch is ideal for many purposes, and is especially useful for the control of battery multi-mu valves.

A Most Logical Simplification.

It is shown in the accompanying photograph. As will be seen, the article bears the general appearance of a potentiometer of normal design, but at the back, neatly ganged to the one control, is a switch.

This switch is operated at the minimum position of the potentiometer control. If it is employed for switching the set on and off (its most important use, though there are others) it will be observed that we have at once a most logical simplification of the controls of a receiver.

The set is "automatically" switched off when the volume control is turned right down. To switch the set on you turn up the volume control, which in itself is a rationalisation of adjustments.

But of even greater value is the fact that the set always has to run through the condition of minimum volume after being switched on. There can be none of that aural shock that is experienced when a set, forgetfully left at maximum volume, is switched into action. Or "crashed" into action, we might almost say.

You perforce get the gentler B.B.C. effect, a "fade in" or "fade out" of the programme, as the case may be.

Centralising Two Vital Functions.

But it is as well to remember that combining volume control and on-off switching is the centralising of two vital functions. If all the troubles experienced by radio listeners were carefully analysed we are certain that a majority of them would be found to be due to either faulty switches or faulty volume controls.

Therefore considerable onus rests on the manufacturer who brings the two together into the one inseparable article. However, there need be no misgivings when the manufacturer concerned is a firm of the nature of Messrs. Wingrove & Rogers.

On the contrary, there is this distinct advantage: that you can rest assured that two vital links of your radio chain have been forged in one stout, dependable link, as it were. The potentiometer section of the Polar product is delightfully smooth working and efficient, and chassis builders will note with pleasure that it has an insulated spindle.

As for the switch part, this, too, is first class. It operates easily and with a positive click which denotes an unfailing regularity of action.

"ON THE DOTTED LINE"

Outspoken comments by our broadcasting critic on a recent "feature programme."

LAST week I commented favourably on an item of light entertainment which bore a most unassuming programme title. It was "'So-and-so,' 'So-and-so,' and 'So-and-so' will entertain you." The artists concerned were immediately under way. They went ahead with their stuff without let or hindrance. There was no superfluity of any kind. Everybody was satisfied.

* * *

This week we had a similar item, only it was made into what I believe is called a "feature programme." Atmosphere, so called, was created by mixing the show up with a lot of talk about dotted lines and signatures. A good deal was said about the latter between the musical turns. So much, in fact, that the turns were almost eclipsed by the spoken matter.

* * *

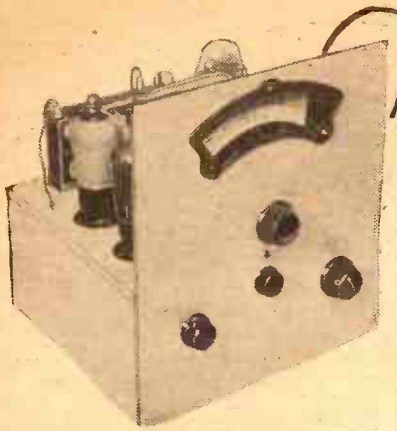
If the spoken matter were intended to be the greater part of the whole, then I must say that it wasn't good enough. It was too laboured. It was just dragged in. If it was meant to help the turns, then it helped to the point of swamping them. Feature programmes are really a good idea. But they aren't necessarily easy to put over.

I think there's great scope here for more clever writing. If this interpolated spoken matter isn't clever (by which I mean cleverly witty), then it becomes a bore. It doesn't fulfil the purpose for which it was intended. As in the case of "On the Dotted Line," it is more of a hindrance than a help, especially as the spoken matter here was terribly feeble and it was allowed to dominate the whole.

* * *

When all is said and done, the song's the thing. No amount of variety in presentation is going to make a poor song get over. On the contrary, an artist with a good song needs no help, and can safely rely on his own powers to entertain us. I don't despise feature programmes. They can, if properly handled, be very entertaining.

(*Continued on page* 89.)



The DOUBLE-PENTODE Three

Further details of the construction of the special economy three-valver introduced to readers last week.

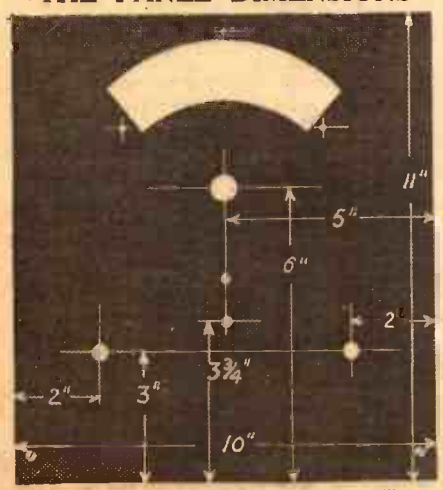
DESIGNED AND DESCRIBED BY THE "P.W." RESEARCH DEPARTMENT.

LAST week we introduced to you a battery receiver that is both economical to run and capable of providing a strength of output comparable with that obtained by many mains sets.

This receiver, which incorporates one of the new double-pentode Q.P.P. valves and a multi-mu screened-grid valve, is easy to build, the construction being carried out on the popular "Metaplex" chassis lines.

This enables a very high degree of screening to be obtained, and the fact that the metal surface of the "Metaplex" can be used as a general earth connection enables several leads to be omitted, while others are kept very short.

THE PANEL DIMENSIONS



How the wooden panel has to be cut and drilled.

Such connections as the negative filament leads from the valve holders and the earthed sides of decoupling condensers are merely taken to the "Metaplex" chassis, which in turn is connected to the earth terminal of the set and to the L.T. negative circuit. This latter connection is via the combined volume control and on-off switch.

The Bonding of the Chassis.

It is best in the construction of this receiver to purchase the chassis ready made, for then the main baseboard and the two side pieces will be sprayed with the metal coating after they have been assembled, with the result that they are perfectly contacted electrically.

If the chassis is made up from a piece of "Metaplex," care should be taken over the bonding of the base and the two sides, and pieces of wire should be used to link them together, the wires being fixed by means of wood screws and washers.

Most of the components are mounted on the underside of the chassis, the coils being placed upside down under the variable condenser which is on top of the baseboard.

This arrangement provides very short wiring, a great aid to efficiency, and stability. The panel is of plywood, and is screwed to the chassis by means of screws at the sides and one in the centre between the condenser and wavechange spindles.

The holes for the chassis-mounting valve holders should be one inch in diameter, in the case of the 4-pin holders, and 1¼ inch for the other holder. The screened-grid valve and the detector are situated on one side of the chassis and the Q.P.P. pentode on the other side. Note that the screened-grid valve is the one nearer the aerial terminal—that is, remote from the panel.

Behind the condenser, towards the back of the baseboard, can be mounted two clips for the grid-bias battery, and here you will have to decide which type of output valve you are going to use, for if the Hivac Q.P.240 is employed the grid-bias battery will have to be of the 16½-volt type. The other two Q.P.P. valves mentioned in the list of valves need a 9-volt battery.

For wiring we recommend the push-back type of wire, which is well insulated and which is very easy to work with. The insulation slides back from the end of the wire very easily, and obviates that awful scraping and cutting that one had to do some years ago.

The output terminals of the set number three instead of the usual two. This is because no output transformer has been fitted for the Q.P.P. valve, it being considered better to use the transformer on the loudspeaker and to take three leads to it. Thus, in connecting up, the two outside terminals will go to the two outside terminals on the transformer, while the centre one on the set will go to the centre tap on the speaker transformer.

The Battery Connections.

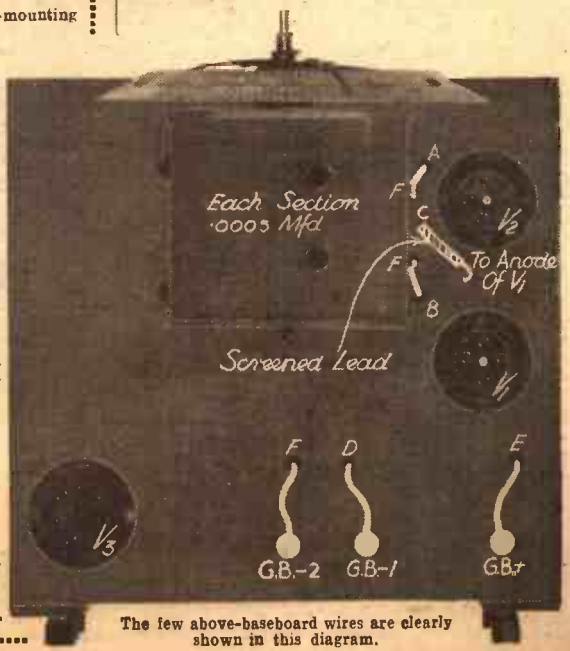
The battery connections are carried out by means of flex leads from the set itself, no terminals being supplied for the purpose. This simplifies the construction and at the same time makes for economy.

On connecting up the set the batteries will best be used as follows: The L.T., of course, is of 2 volts and goes to the two flex leads marked L.T. in one of the special diagrams accompanying this article. That showing the under-chassis wiring is the one in question.

(Continued on next page.)

THE COMPONENTS

1 Polar Minor 2-gang tuning condenser, each section ·0005 mfd.
1 Polar "Arcuate" drive for above (marked in degrees).
1 pair Telsen matched screened coils, type W.287.
2 Clix 4-pin valve holders, chassis-mounting type.
1 Clix 7-pin valve holder, chassis-mounting type.
1 Telsen screened H.F. choke, type W. 341.
1 T.M.C.-Hydra 2-mfd. fixed condenser, type 25.
2 T.C.C. ·1-mfd. fixed condensers, type 250.
1 Dubilier ·0002-mfd. fixed condenser, type 620.
1 Graham Farish 2-meg. "Ohmite" grid leak.
1 Graham Farish 25,000-ohm "Ohmite" resistance, in vertical holder.
1 Graham Farish ·0003-mfd. differential reaction condenser.
1 Bulgin combined 50,000-ohm potentiometer and 3-pt. shorting switch.
1 Varley Q.P.P. input transformer, type D.P.36.
1 Peto-Scott "Metaplex" (both sides) chassis, 10 in. × 9 in., with 4½-in. runners.
1 Peto-Scott plywood panel, 11 in. × 10 in. × ⅜ in.
2 Peto-Scott terminal strips, 4⅜ in. × 1½ in.
5 Clix indicating terminals.
1 Peto-Scott cabinet to suit above panel and chassis.
5 Clix wander-plugs.
2 Clix accumulator spades.
1 Belling & Lee wander-fuse.
1 coil B.R.G. "Quikon" connecting wire.
Screws, flex, etc.
1-yd. length Goltone screened sleeving.



The few above-baseboard wires are clearly shown in this diagram.

THE DOUBLE-PENTODE THREE

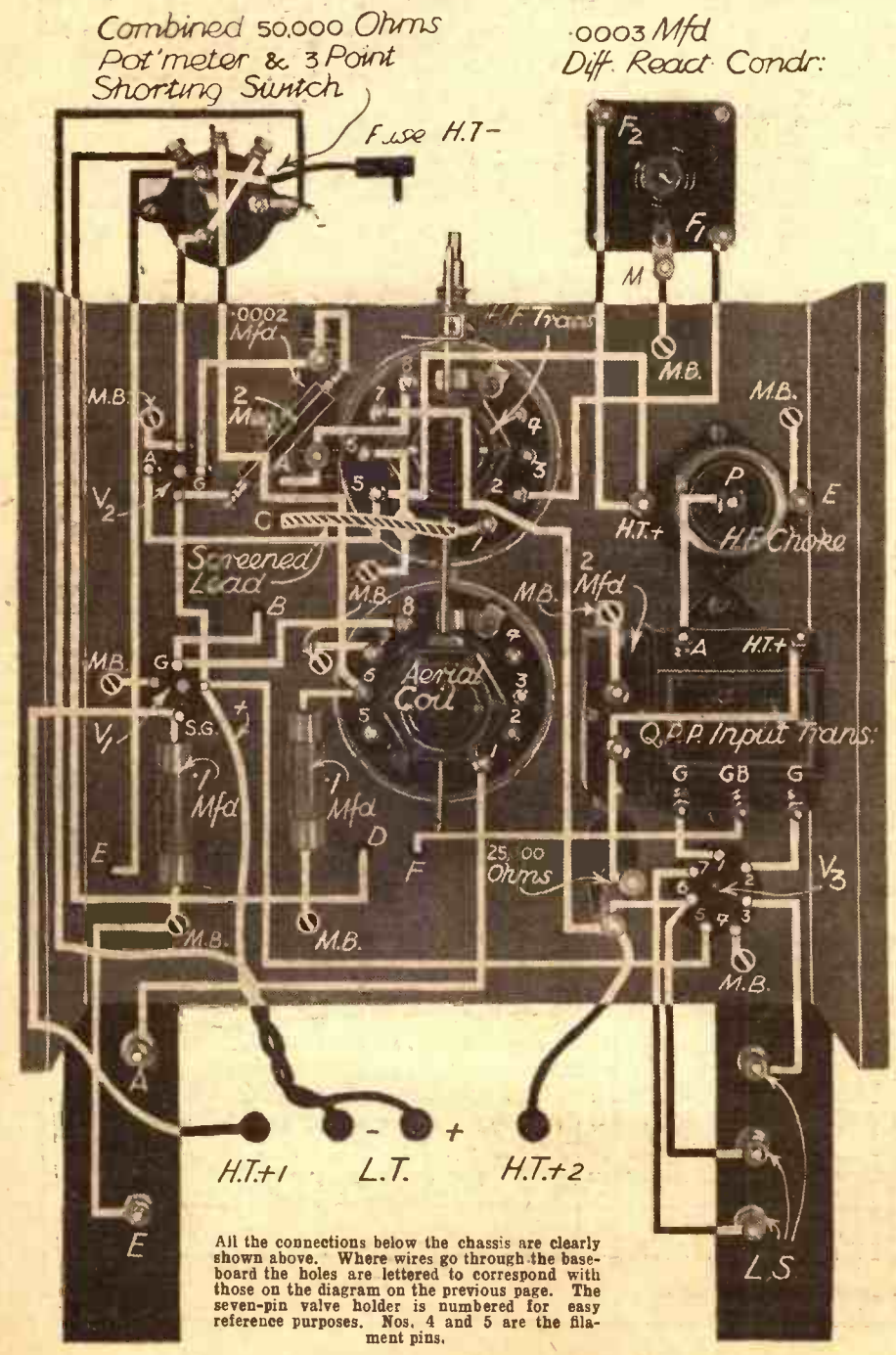
(Continued from previous page.)

There are three H.T. leads in all. The H.T.— should have a wander-fuse plug on it, and this is inserted in the negative end of the H.T. battery. The H.T.1 positive plug is inserted in about 80 volts of the H.T. battery, while the remaining lead for H.T. is placed in the maximum socket.

The grid bias will depend on the output valve chosen, as already indicated. If the Q.P.21 is used about 7·5 or 9 volts will be ample; the values should be tested to find out which gives the better result. For the Hivac Q.P.240 we shall require from 15 to 16½ volts, and here again a test should be carried out to determine which is the more suitable voltage.

The tapping that takes the high grid-bias voltage is, of course, G.B.—2. The other grid-bias negative tap is from 6 to 9 volts. This will control the variable-mu S.G. valve, and the bias should be adjusted so that, at the minimum volume position, the local station can be reduced to a whisper. The voltage that best carries that out, without completely banishing the station, is the best to use in the circumstances. There is no need to use a voltage that will cut the station right out when the volume control is set at minimum, for such a setting is never required in normal working.

THE CONNECTIONS AND LAYOUT BELOW THE CHASSIS



All the connections below the chassis are clearly shown above. Where wires go through the base-board the holes are lettered to correspond with those on the diagram on the previous page. The seven-pin valve holder is numbered for easy reference purposes. Nos. 4 and 5 are the filament pins.

The actual operation of the "Double-Pentode Three" is like that of any other two-gang tuned receiver with reaction and mufti-mu valve. The selectivity can be sharpened up in difficult cases by the reduction of the signal by means of the volume control and the bringing back to full strength again by means of reaction. That is an old dodge, but one that is often overlooked, and it is very useful when the interfering station simply will not go with ordinary tuning.

A High Degree of Selectivity.

Not that this set can be considered to be inselective. On the contrary, it possesses a high degree of selectivity; but there is naturally a limit to what one can do with two tuned circuits, and the reaction control enables that normal limit to be exceeded.

The trimming is carried out in the usual manner on a low reading of the dial on the medium-wave setting of the coils. Trim with the volume control set as far towards the minimum as possible consistent with the station being heard, and with the reaction brought fairly well up to give the maximum sensitivity and sharpness of tuning on the detector circuit.

VALVES AND ACCESSORIES

Make	S.G.	Det.	Output.
Cossor	220VS	210HF	—
Dario	TB452	TB282	—
Hivac	VS215	H210	QP240
Marconi ..	VS24	HL2	QP21
Mazda	S215VM	HL2	—
Osram	VS24	HL2	QP21
Tungsram	SV220	HR210	—

W.B. "Stentorian" Standard Model loudspeaker.
120-volt G.E.C. H.T. battery.
9-volt Drydex grid-bias battery. 16½-volt required for Q.P. 240.
2-volt Lissen L.T. battery.
Electron "Superial" aerial wire.
Graham Farish "Filt" earthing device.

Once the trimming has been set there is no need to touch it unless one changes the aerial or earth or has a new detector or S.G. valve.

It is important to get the grid-bias setting of the output valve right; and though it should fall on one of the voltages we have mentioned, it is possible that in some cases a slightly lower voltage will be required to give the best quality of reproduction. This will certainly be the case if the H.T. battery is a little down, and after the set has been used for some time it is a good plan to revise the bias setting to be in accordance with the H.T.

Concerning the Grid Bias.

Not that much revision will be needed, for the bias voltage will probably drop at about the same rate as that of the H.T. battery, and the receiver will be almost self-setting where the bias is concerned.

But let us warn readers here not to let the grid-bias battery go too long without testing its voltage, for a bias battery that has run down below 1 volt instead of 1·5 volts per cell is usually not much use, owing to its high internal resistance.

Such a battery will cause a great deal of trouble by providing intervalve coupling that is not required, with the result that distortion and possibly L.F. howling will take place.

Why the price is shown SO BOLD

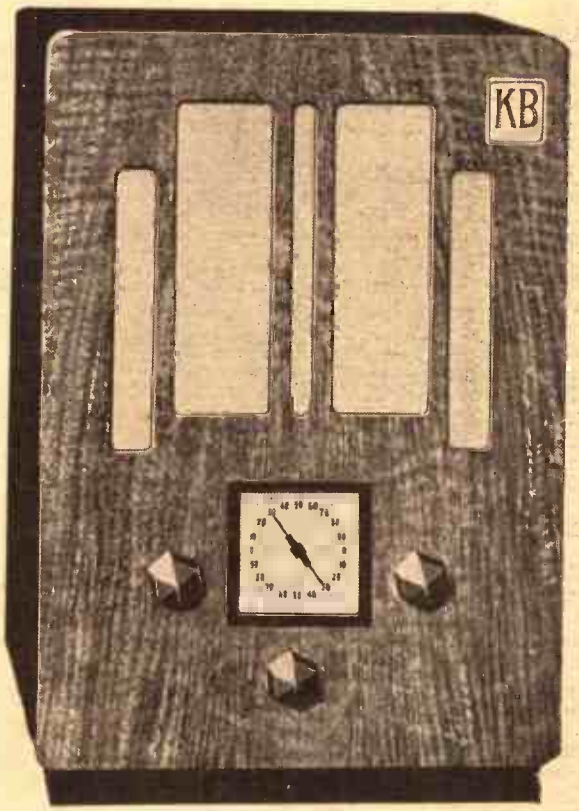
£5·15
OR 10/- A MONTH

KB 'NEW PUP'

3 VALVES WITH MOVING-COIL SPEAKER

When the price is low and the value great we are not afraid to beat the big drum. That's how it is with the KB 'New Pup.' We've simply got to tell you that you've never had the chance of such fully satisfying radio reception for so little money before. Look at the specification. 3 highly efficient valves, one a pentode. High grade moving coil speaker. Full-vision dial with station names. A really attractive and well-finished cabinet. And then look at the price—£5 15s. There's value for you! Real KB value. We christened it the 'New Pup' because it succeeds the original KB 'Pup'—the set that charmed more than 200,000 homes. To appreciate the value of the 'New Pup' you must hear it. KB authorised Dealers are waiting to demonstrate it to you—without obligation.

Over 200,000 of the original KB 'Pup' sets have been sold.



KB 'NEW PUP,' 3-valve Battery model. Handsome Oak Cabinet, **£5 15s.** *or first payment of* 12/- *(including* 2/- *insurance) and* 12 *monthly payments of* 10/-.

KB 'NEW PUP,' 3-valve A.C. model. Fine Walnut-finished Cabinet, **£6 17s. 6d.** *or first payment of* 14/- *(including* 2/- *insurance) and* 12 *monthly payments of* 12/-.

Send for new **KB CATALOGUE**

Post in unsealed envelope using ½d. stamp to
KOLSTER-BRANDES LTD., CRAY WORKS, SIDCUP, KENT
Please send me full particulars of the new KB receivers.

Name .....

Address .....

Pop. W. 29/9/34.

KB RADIO

from £5 15s. to 65 guineas

THE B.B.C. AND TELEVISION

NEWS AND VIEWS FROM THE "BIG HOUSE"

PRESUMABLY the B.B.C. has a pretty shrewd idea of how the proceedings of the P.M.G.'s Television Committee are tending. Anyway, I note a change of attitude towards television at Broadcasting House, and there seems to be a revival of interest. Only a few weeks ago television was practically off the map. No one had any time for it. Now all this is changed. People get quite excited at the mention of the word television.

It is certainly the impression that the P.M.G.'s Committee will hand back television to the B.B.C., with instructions to develop it as rapidly as possible and to spend generously, extra funds for the purpose being found from the Treasury's balance of licence revenue.

* * *

Revelations by Jack Payne.

I hear Jack Payne has just finished a new book of reminiscences, in which his period at the B.B.C. will be the principal part. This will deal frankly and fearlessly with personalities behind the scenes at the "Big House." Some sensations are expected.

* * *

The B.B.C. Letter Bag.

The approach of the main listening months is preluded by an increase in the number of letters received at Broadcasting House. I was interested the other day to see an outline of Programme and Talks correspondence for the second week of September. The number of adverse criticisms was sensibly less than for the corresponding week last year. Vaudeville programmes were well ahead in the public esteem. Gramophone-record recitals came next, with Harold Ramsay and his new Rhythm Symphony Orchestra gaining ground. Correspondence on Talks for that week was negligible.

* * *

The "Silent Fellowship" to Go?

The "Silent Fellowship" broadcasts by Mr. E. R. Appleton late on Sunday nights, weekly from West Regional and monthly from the long-wave National, have become quite a landmark in British broadcasting. Mr. Appleton's correspondence is considerable and seems to reflect a large and enthusiastic following. But the autumn timing changes are such that the "Silent Fellowship" cannot be fitted in without a general disturbance of arrangements. So Mr. Iremonger, the Religious Director at Broadcasting House, proposes to "wash out" the "Silent Fellowship." It will be interesting to see if he succeeds.

* * *

New Orchestral Arrangements.

As I exclusively forecast, the B.B.C. and the City of Birmingham have come to an agreement whereby an orchestra will be supported jointly all the year round. This means enriching the Midland Regional programmes, and it also means many more concert opportunities for music lovers of the Birmingham area. A similar attempt has begun in Manchester, where the B.B.C. hopes to make an agreement with the Hallé Society on similar lines.

Mr. Harry Davidson, Director of the Commodore Orchestra, that entertains listeners on Saturdays.

* * *

Early-Morning Broadcasts.

The next programme development that listeners would like is early-morning transmissions. Although the B.B.C. keeps on saying no to this demand, I happen to have discovered that it is already admitted in the inside circles at the "Big House" that the programmes will have to start earlier next year. It is my own belief that an extension on these lines would be very widely appreciated.

"Back in Town."

More of the radio artists who have been engaged at holiday resorts during the summer (and who can blame them for going, even though their absence from London was made an excuse for somewhat unrepresentative "bills" at the Radiolympia variety shows?) are now back in town, and on October 8th Charles Brewer is presenting a special programme of welcome.

This will be broadcast on the Regional wavelength under the title "Back in Town," and will be of a high-speed nature, representative of concert parties on the south and east coasts.

The programme is really the sequel to the programme given on June 12th, when in "Out of Town To-night" a number of artists, just off to seaside engagements, made a fleeting visit to the studio.

* * *

Sir Henry Wood at Torquay.

Four days after the close of his strenuous season of Promenade Concerts at Queen's Hall, Sir Henry Wood will be conducting the Torquay Municipal Orchestra in the opening concert of the Torquay Musical Festival at the Pavilion, Torquay.

The date is Wednesday, October 10th, and the programme will be broadcast on the West Regional wavelength. Clifford Curzon (pianoforte) is the solo artist, and the Municipal Orchestra will be specially augmented for the occasion.

* * *

Symphony Concert Plans.

The B.B.C. Symphony Orchestra is big news just now.

In addition to the series of twelve concerts which start on October 24th, the orchestra, under Dr. Boult, is to visit Manchester on December 5th, Bristol on February 13th, Birmingham on February 27th and Dundee on April 2nd. Arrangements have also been made for the orchestra to visit Brussels on March 12th.

The twelve Queen's Hall Symphony Concerts, which will go on throughout the winter, will be conducted by Dr. Boult, Sir Thomas Beecham, Albert Coates, Sir Hamilton Harty, Igor Stravinsky, Dr. Felix Weingartner, and Sir Henry Wood. The various programmes will include several important "first performances."

* * *

Theatre Orchestra Leads Dancing.

"You are invited to dance," by programme title and in actual fact, on October 1st during a novel broadcast by the B.B.C. Theatre Orchestra which is to be radiated on the Regional wavelength.

Also in the studio will be Mr. Philip J. S. Richardson, editor of a well-known dancing periodical, who is to act as M.C. and describe to listeners dances which will actually be performed, so that those who wish will be able to step in time in their own homes.

Stanford Robinson, the conductor of the orchestra, has chosen a programme of pre-war dances. It should be good. I must dust my spurs!

O. H. M

LISTEN TO THESE NEXT WEEK

Orchestral. Last Promenade Concert of the Season, relayed from the Queen's Hall, London. (*National, Oct. 6th.*)

Farewell Concert to Sir Dan Godfrey, relayed from Bournemouth. Sir Dan Godfrey retires from the conductorship of the Bournemouth Municipal Orchestra at the end of this month, and this relay from the Pavilion will be the last under his baton. (*National, Sept. 30th.*)

Variety. In the forty-five minute variety programme which has been arranged for West Regional listeners by Ronald Hill, he is to present a "Radio Pie." Included in the programme will be some songs, West Country legends, piano music and sketches. (*West Regional, Oct. 4th.*)

Another programme by the popular "White Coons" Concert Party is to be heard next week, when Stanley Holloway, of "Sam" fame, will, as usual, be the bright particular star. He will be supported by C. Denier Warren, Wynne Ajello, Eve Becke, Dudley Rolph and Joe Morley. (*London Regional, Oct. 3rd; National, Oct. 6th.*)

RADIOTORIAL

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

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

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

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

QUESTIONS AND ANSWERS

CONNECTIONS FOR PARALLEL-FED TRANSFORMER.

H. G. H. (Winchester Street, King's Cross).—"I have an ordinary straight three set with R.C.C. and transformer.

"I understand, according to your article on page 686 and advice given to H. F. B. (Worcester), that parallel feeding is the latest improvement for ordinary sets like mine. I bought the necessary 1 mfd. and 30,000 ohms resistance and transformer, and am at a loss to know the connections."

The left-hand part of the first diagram on page 686 shows practically all the leads going to the transformer, but we will try to make it still clearer by detailing them.

You can see exactly how the "G" and "P" transformer terminals are wired, and the "G.B." terminal goes to the grid-bias battery via the G.B.— lead. The transformer terminal that you cannot see is marked "H.T.," and it goes to the H.T.— and L.T.— wiring.

One end of the 30,000-ohms resistance goes to the detector H.T.+ lead—it is marked + in the diagram. The other end goes to the 1-mfd. condenser and to the detector anode or H.F. choke, if one is used.

As mentioned previously, there are other methods of arranging parallel feeding, but try the above first. When it is going you can, if you like, make a simple change-over of transformer connections, putting the wire that goes to its "H.T." terminal on the "P" terminal instead, and vice versa. But you will probably not be able to notice much, if any, difference when these two terminals are reversed.

A 50-MILLIAMP UNIT FOR CLASS B.

W. P. S. (Dublin).—"I notice, in a reply in 'P.W.,' you say that a 50-milliamp mains unit is necessary for good results with the S.T.500.

"I am using a 25-milliamp unit with mine, and although results are good I would like to have a better margin, as I am probably not doing the set justice with 25 milliamps.

As I do not know of any commercial unit giving an output of 50 milliamps, I wonder if it would be possible to remove the present rectifier and substitute a larger one (even outside the casing of the unit). Would the mains transformer be suitable, or are they matched?"

The components of such a unit are chosen carefully, so we do not like the idea of modifying it with extra apparatus outside it. But perhaps you could use some of your apparatus for making a new unit capable of giving 50 milliamps.

Why not write to the makers explaining the position, and asking if they recommend any particular apparatus for the new requirements?

Alternatively, you will find a full description of a "Class B A.C. Mains Unit" in the Sept. 23rd, 1933, number of "P.W.," and it would be much better to make one to this design.

"A VERY PARTICULAR CUSTOMER"

S. B. (Brixton, London, S.W.9).—"He is a very particular customer, and says everything must be *exactly the same* as in the "500" blue print design by Mr. Scott-Taggart

"But I have left off the output choke, from the bottom left-hand corner of blue print, because he has got a transformer in the loudspeaker he will be using (Class B loudspeaker).

"He seems to think I am doing wrong. If I put him in the choke to satisfy him, and make it exactly like the blue print, will it work with the transformer in his loudspeaker?

"I told him I could put the choke in, but I should have to take out part of his loudspeaker if I did. But no, he won't have it. He is a very particular customer, and I don't want to offend him. What shall I do?"

Leave out the choke and show him what Mr. Scott-Taggart himself said about it, on page 316 of the S.T.500 number of POPULAR WIRELESS (Oct. 21st, 1933).

If that does not quite satisfy all his lingering doubts, offer to connect his loudspeaker to the S.T.500, and give him a demonstration of what the set will do with a Class B loudspeaker joined up correctly to it. That will convince him!

S.T.500—THE RESULTS ARE SIMPLY AMAZING.

A short time ago, while in London, I purchased a Pilot Author Kit S.T.500. I had read such a lot about the latest "Scott-Taggart" in POPULAR WIRELESS *that I decided to try it. Well, I must say that the results are simply amazing. I get practically every European station, and that beginning at Budapest, Beromünster, etc., right down to the bottom of the scale. Owing to the double reaction and aerial and anode coupling I can cut out all interference and always hear the wanted station and not two together.*

Here is something that all the superhets may not be able to do. On my S.T.500 I can cut out Poste Parisien and West Regional and get out Grenoble from between the two. I think that is a feat of selectivity good enough for anyone. Pittsburg and several Yankees come in on the loudspeaker when conditions are favourable. They are always available in phones.

I believe nothing better than the S.T.500 exists for either selectivity or purity of tone, and I wish to thank you for having supplied such a reliable kit, which is a credit to Mr. J. Scott-Taggart and you.

(Sgd.) LIAM WALCH.
The Mount, Passage Road, Waterford.

PICK-UP FOR A MAINS SET.

B. L. C. (Dartford).—"How is the detector wiring altered for a gramophone pick-up on a mains set?

"I have it described very simply for a battery-run set, but it will obviously be quite different where there is a separate heater circuit.

"I quite understand also that the wiring will have to be kept short and screened, and

(Continued on next page.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

that it will not do to use just any type of old switch for the purpose, but a proper gramophone change-over switch. But where do the connections for this go ?"

Fundamentally, the mains version is the same as the battery switching, provided a leaky-grid type of detector is used. You will need to add grid bias.

To do this, the leads connected to the "C" terminal of the detector valve holder should be disconnected and attached instead to one terminal of a 1,000-ohms resistance, and also to one terminal of a 2-mfd. condenser.

That pick-up lead which is not to be connected to the radiogram switch should also be connected to these resistance and condenser terminals.

The remaining terminals of the resistance and condenser should be joined to the "C" terminal of the detector valve holder. The change-over switch connections are then as for the battery-run set, with one exception.

That is, the grid leak should be disconnected and joined between the "G" and "C" terminals of the detector valve holder.

ARE NON-INDUCTIVE CONDENSERS BETTER ?

G. D. (Lincoln).—"Although I have used non-inductive condensers when specified I have never found them make any difference from the ordinary types. And I notice that they are usually only placed in the *high*-frequency circuits.

"What benefits are they supposed to confer ?"

Since multi-electrode valves have made possible efficient amplification at high frequencies, careful H.F. decoupling has become the rule. And when ordinary "paper" condensers are used the benefits of decoupling may be lost if inductance of appreciable amount is associated with the capacity.

For low frequencies the little inductance that might be in a condenser is unimportant. For certain high-frequency circuits it may be different, so non-inductive condensers are then used.

But, generally speaking, the benefits are not apparent to the user when the one type is replaced by the other.

ONE DIAL WILL NOT TUNE ON MEDIUM WAVES.

F. H. Y. (Hanwell, London, W.7).—"I think something must be wrong, because the set works so much better on long waves than it does on the medium.

"On long waves I can use both the tuning dials, and they are both reasonably critical in operation. But on the medium waves I can keep the right-hand dial right out at 0, and it makes no odds.

"Also the medium-wave stations are not so strong as I expect. Can you put me right on this, as I am sure there is something not working as it is supposed to ?"

You are right. Something is certainly letting you down, and we suspect that the trouble is due to a fault in the second wavechange switch.

The usual switching arrangement is for the medium-wave coil to be permanently connected to the long-wave coil, the make-and-break wavechange switch being joined across the long-wave section only.

When it is "open," all the coil is active, and the condenser adjustment covers the long waves.

But when the switch is closed it cuts the long-wave section right out by joining its ends together. So the tuning condenser adjustment is effective on the remaining turns of wire (medium-wave section) and the tuning covers only the medium waveband.

You can see what happens if, when the set is in use on the medium waves, the switch fails to close across the ends of the long-wave winding. Instead of being cut out, it remains, and throws the tuning right out. It's a wonder you get anything worth hearing on the medium waves if the switch is faulty in its action.

What you must do is to examine the wavechange switch very carefully—if it is underneath the coil unit you will have to dismantle the wiring at that point and take the coil unit out.

Operate the control knob, and notice carefully what its effect is. In the long-wave position the contacts should be open and well apart to allow the condenser to join across the combined coils.

In the medium-wave position the contacts should close down firmly, and so cut out the long-wave section.

If they do not appear to make a strong contact, turn the control to the open position and press the spring (or springs) gently with your finger. It (or they) should be bent down far enough (or the lower contacts should be bent up far enough) to ensure strong contact on the medium-wave position and clearance on the long-wave position.

When you replace the coil be careful how you do so if it is mounted on a metal baseboard, as the trouble is sometimes caused by such a baseboard coming into unwanted contact with some of the wiring or terminals on the coil unit.

In fact, it is generally advisable to mount such a coil on a piece of cardboard, shaped to prevent any of the connections accidentally touching the metal covering of the baseboard.

Attention to these points should clear up your trouble completely.

OVER-RUNNING A RECTIFIER.

W. M. (Paddington, London, W.).—"Is it possible to over-run a dry rectifier by trying to take off more current than it can give ?

"This is a point that I do not remember seeing mentioned, but it might easily crop up in practice."

Oh yes ! Dry rectifiers can be overloaded, and that is why the makers have different types for the different classes of output required.

THE DISTURBANCE FROM THE DOORBELL.

Considerable interest seems to have been aroused by the particulars recently given in connection with doorbell noises superimposed upon wireless reception.

It seems that most readers who experience this effect find it very useful in notifying the arrival of visitors whose rings at the door might otherwise go unheard. In this connection our original querist (Lt.-Col. F. F., Fleet, Hants) writes again as follows :

"I am much obliged for the explanation given ("Disturbance from the Doorbell," page 557, August 11th issue). The solution had not occurred to me—viz., the aerial effect of the bell wires.

"As the 'disturbance' is not noticeable in my own house, I rigged up a bell circuit with a 9-volt battery and a 20-ft. aerial, close to the loudspeaker and receiver, without any results whatever.

"Clearly, certain other conditions which may be absent in my own home are necessary, and I should like to produce them, as it is sometimes convenient to hear the doorbell."

Linking to the Aerial Wiring.

It will be found that where the effect does not occur accidentally it may generally be produced by linking one of the bell's terminals, or the wiring connected to one of them, to the set's aerial wiring, but it is not usually desirable to make a direct connection. Generally, the wire from the bell terminal (which may be of very fine gauge, to render it "invisible" where it has to run along a wall, etc.) can be brought close up to the lead-in or wound round it.

If difficulty is found in getting the right strength for convenience, a small pre-set condenser in the lead will sometimes help, adjusted as desirable. If the "disturbance" is at first much too loud or much too weak, a little experimenting with the "coupling" will usually give the desired volume.

ADAPTOR FOR CONVERTING ORDINARY SET TO COVER SHORT WAVELENGTHS

W. C. C. (Grimsby).—"Being very interested in picking up America and other continents besides Europe, I was delighted to hear that your paper had described a unit which could be fitted to almost any set, enabling it to get down to 20 metres.

"But I am now very disappointed to find that you have sold out. Is there anywhere else besides POPULAR WIRELESS where I can get the information for making one of these units ?

"And is it correct that the valve inside the short-wave unit is not an extra one, but the same detector valve as works in the set when receiving long and ordinary waves ?

"I am very keen on getting down to these

(Continued on next page.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

short wavelengths on the 'Economy Three,' and my friend also wants to try on the S.T.500 if it is possible. So any information you can give will be appreciated by both of us."

Although the original "adaptor" descriptions in "P.W." sold out because of their popularity, you can read all about how to make and operate the unit in "P.W.'s" handbook. It is called "Practical Radio," and can be obtained from our Back Number Department for 7½d., including postage, if not on sale at your newsagent's.

You will find that no extra valve is needed—you just plug in the detector from the set. And the construction is quite easy, there being only a few parts required.

The unit will work admirably with the sets you name. And if you cannot get exactly the same parts as chosen by the designer, others of equivalent value will do equally well. (For instance, a round potentiometer instead of the long straight type would be quite O.K.) But if you do deviate in this way so far as makes of components are concerned, see that their values are exactly to specification.

WHY IS TUNING FLAT?

G. B. A. E. (Llandudno).—"I don't suppose you will be able to help me. I have spent over three weeks looking for the trouble.

"It is a 'conglomeration' set, evolved from 'P.W.' circuits, and incorporating A.T.B. and other refinements. Circuit, S.G., det. and Pen.

"Results, as experimentally hooked up, wonderful. But in its final form the selectivity has gone wrong, and I can't understand why.

"It was so good, especially selectivity, on the rough baseboard, that I laid it out exactly in the form it would take in the final cabinet.

"And then I rebuilt, *carefully*, using exactly the *same components*.

"Apart from the cabinet round it and the use of a metallised baseboard instead of the rough wooden one, it is *exactly* as before. But now it depresses me to work it, as I think of how much better it was as I had it at first.

"It works—but no comparison with what I got before it went into the cabinet. Power, etc., is O.K., but all the selectivity has gone from the tuning.

"It is a very great disappointment to me. I thought I would let you know, but I have tried everything, and there is no cure.

"And if I take it right out of the cabinet it is still the same. It was such a grand set that I am terribly disappointed after all my trouble."

Don't let it get you down! If the components are undamaged you can get back all the lost kick, because there *must* be something you have done wrong, despite all your care.

As you are so down about it, try "lifting." Perhaps the coils are too near the metal baseboard, or some of the critical wiring runs too close to it. If so, the trouble will disappear if you raise them a little, on wooden blocks, if necessary. As the placing of coils too close to metal is a common cause of flat tuning, we expect this will cure the fault.

A PECULIAR CASE OF MOTOR-BOATING.

S. E. (Andover, Hants).—"If I put a fuse in the wire between H.T. — and L.T. —, to protect the set, it causes motor-boating to start.

"How should I get over that? Put in a big condenser, wired across the fuse?"

Well, that *might* have the desired effect, but it would certainly be a queer way of tackling the trouble!

If the fuse causes motor-boating, you have a clear indication either that the fuse is unsuitable, or else that the set is right on the edge of instability and "spills over" when an ordinary fuse is added.

In the former case, the obvious remedy is to get a proper fuse.

If, however, the fuse is all right, but the set is wrong, you should stabilise the set by improving decoupling, or by improving its H.T. supply if that is the cause of the instability. (There's nothing worse than an old H.T. battery for keeping a set on the edge of motor-boating.)

ARE THE CONNECTIONS RIGHT?

R. H. (Swanage, Dorset).—"The way my new set works is beyond praise, but I am still wondering if the connections of the L.F. transformer are right.

"They do not agree with the markings put on by the maker.

"The H.T. terminal goes to the grid bias, and the P and G terminals are both connected only to a .5-mfd. condenser, which is joined on its other side to the plate of the detector and also to a resistance.

"The fourth terminal (marked G.B.) is actually joined to the *grid* of the next valve holder.

"Yet, as I said, the quality is beyond praise. How is such a result obtained if the terminals are connected other than they were intended to be?"

The connections you describe are quite in order, although they disagree with the markings of the terminals on the transformer.

Those markings were applicable when the transformer was joined direct in the detector's plate circuit; but you have it "shunt-fed" through a resistance and capacity, so that no H.T. is passing through the primary winding.

Shunt-feeding arrangements vary somewhat for different transformers, but the circuit you describe is a well-known one, and is evidently suitable for your transformer or the results would not be as you describe.

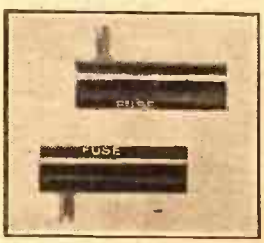
USE FUSES FOR SAFETY

THERE can be no controversy as to the value of fuses. Anyone is at liberty to suggest that there may be doubt as to the ultimate worth of, say, an anti-sulphation tonic for accumulators, but fuses stand above question.

If the high-tension battery of a battery outfit accidentally becomes connected to the L.T. circuit the whole team of valves (costing, perhaps, £2) go west in one pyrotechnic flash. Or, if the gettering on the valves' bulbs is thick, you might not even see a flash. You are not likely to hear any noise, and so the valves just fade away.

Had there been a fuse, only the fuse would have gone, and that can be replaced at a twentieth or an even smaller proportion than that of the cost of a bunch of valves.

And yet many constructors probably do not fix fuses. Perhaps just because there are no



The Belling-Lee wander-fuse replaces the ordinary wander-plug and provides adequate protection in cases of incorrect connection or accidental short circuit.

fuses in their sets they lazily let it go and chance the consequences. Consequences often seem remote—until they happen, and then one says: "Why should that happen to me?" Which is all very illogical.

Actually, it is the simplest thing in the world to add a fuse to any battery set. The interior of the set need not be touched at all. The fuse can be placed in a better position, and that is right on the H.T. battery itself.

That is, in fact, the very best possible place, for it makes every electron of energy passing from the battery first pass through a kind of electrical weighing machine even before it reaches the leads. If the weight is too much (current too great) the machine (i.e. the fuse) says so very plainly by refusing to let any at all pass.

The gadget which allows this efficient safeguarding to be done is the famous Belling-Lee wander-fuse. It replaces an ordinary wander-plug, and therefore does two jobs at once to the benefit of the user.

NEWS FROM THE MIDLAND REGION

Some advance details of forthcoming programmes.

THE many Midlanders in the party which the B.B.C. took to Droitwich recently were almost unanimous in their expressions of disappointment that the new transmitter which is to replace the present Midland Regional apparatus at Daventry was not installed and brought into use at the same time as the new long-wave giant at Droitwich.

So much of the B.B.C.'s big developments in transmitters have taken place in the Midlands—Daventry long-wave, the experimental 5 G B set upon which all Regional and local National transmitters are designed, the Empire short-wave transmitters and now Droitwich—that listeners, influenced by the Press, are beginning to feel that the Corporation is more or less insensible to Midland Regional requirements, and that other parts of the country are allowed to come first in everything.

They want their own new transmitter to be the best of its kind in the land—a transmitter capable of radiating programmes which can be heard all over the country, and they want, too, a new studio at Nottingham, just as the West Region has studios which were opened this month at Bristol.

Many Attractive Programmes.

I think it can almost be said that but for Percy Edgar there would be no Midland Region at all at the present moment, so determined were the forces against him at one time to crush its individuality as a preliminary to absorption.

Those days are past, and Mr. Edgar and his staff are already well ahead with their plans for the time when the new transmitter will be ready to displace the old one at Daventry within the next six to eight months. This autumn and winter he will have many attractions to offer that will compare with anything to be picked up on the ether from other Regions.

One of the new features has been called "The Microphone at Large," the principle of which is to convey the characteristic qualities of a number of historic and picturesque places in the Midlands through a series of microphone visits. The first will come from the old Cotswold market town of Chipping Campden, with others to follow from Ludlow, Tewkesbury Abbey and Southwell Minster.

Several village relays are also being arranged, and there are a number of broadcasts reflecting interesting occasions within the Region. I have previously mentioned the Dr. Johnson celebrations at Lichfield, with the first broadcast from the doctor's birthplace, and on Saturday, October 6th, Nottingham Goose Fair is to appear in the programmes in the form of a direct broadcast.

Two days earlier (on Thursday, October 4th) the centenary of the Birmingham Town Hall is to be celebrated in the relay of a concert in which the Birmingham Festival Choral Society, the City of Birmingham Choir, the City of Birmingham Orchestra and Frank Titterton (a native of the city) are to take part.

Inventor of the Hansom Cab.

Birmingham Town Hall was designed by Hansom, who afterwards achieved even greater fame by inventing the hansom cab. Stories of the building will be told during an interval in the concert by a speaker whose personal reminiscences cover well over half the century.

That being so, there is no need for me to do more than mention such famous names as Mendelssohn, Elgar, Dickens, Jenny Lind, Patti, Gladstone, Chamberlain and Lloyd George, associated with the building.

Most of the conspirators in the Gunpowder Plot lived in the Midlands, so that a special programme marking the event is called for on November 5th. This programme, although to some extent of a topical nature, should not be confused with the series of more strictly topical talks, of which there will be a number in the form

(*Continued on next page.*)

NEWS FROM THE MIDLAND REGION

(Continued from previous page.)

of eye-witness accounts on outstanding events in Midland sport.

Town and country planning will also be explored in a series of talks by Mr. G. M. Boomphrey and other speakers, and there will be discussions on matters of urgency in the social and industrial life of the Region under the title of "Midland Parliament."

Farmers will have their own special talks by Mr. G. M. Thomson, a well-known Midland expert on the subject, and "Youth in Industry" should provide another series of fascinating talks in an area which abounds with opportunities for young people.

Plenty of Light Entertainment.

Midland writers of plays and other radio productions will receive plenty of encouragement from Martyn Webster, who has done so much to brighten that side of the Regional programmes. I have already written about his studio concert party, "The Radioptimists," which will be heard at regular intervals, and there will be plenty of variation in relays of light entertainment from the Grand Theatre, Derby, and from the Theatre Royal, Peterborough.

Many short plays, most of them specially written for broadcasting, will be performed by the repertory companies at Birmingham, Coventry and Northampton, so that the dramatic side of the programmes will be well balanced and consistently good.

I should advise all who can do so to listen to "Promotion" on Wednesday, October 3rd. This is a "straight" play by Francis Durbridge, a young Birmingham playwright, two of whose revues and sketches have already been broadcast. The play has no fewer than fifteen episodes, and the cast includes Vincent Curran, Hugh Morton and John Lang.

So far I have given only a brief outline of the more important aspects of Midland programmes during the autumn months, but it is only right to say that the general high level of the material available to listeners will be maintained in every respect.

Items for Next Week.

Take the week beginning Sunday, September 30th, for instance, on which day one of the oldest Salvation Army bands, that of the Coventry Corps, which will soon be celebrating its jubilee, is to give a programme of "Famous Hymn Tunes."

On Tuesday, October 2nd, the Pleasley Colliery Band from Nottingham is to give its first broadcast, while on Wednesday, October 3rd, Jack Padbury and his Band will provide an entertainment of entirely different music, also from the Lace City.

Saturday, October 6th, will bring another of the popular celebrity concert relays from the Central Hall, Coventry. Even the Children's Hour will not be without its importance to adults that week, because on Monday, October 1st, Sir Charles Hyde, Bart., proprietor of "The Birmingham Post" and "The Birmingham Mail," will make an appeal on behalf of orphans, one of the philanthropic movements in the Midland city in which he has taken a keen interest for over thirty years.

O. H. M.

INSTRUCTIONAL LITERATURE

The latest catalogues reviewed.

By G. T. KELSEY.

THIS is "literature" week! One of the usual aftermaths of the Show is that I get inundated with catalogues and leaflets of every description, and I am afraid that of late there has been so much else of—shall we say?—even greater importance that our postcard literature service has of necessity been neglected.

However, for once I am going to devote the whole of my notes to the question of literature, and then, perhaps, henceforth I can follow the usual procedure of giving details of just one or two every week.

A Very High Standard.

As a matter of fact, the literature standard, if I may so term it, this year, is very high indeed. One is apt to look upon any sort of catalogue as a kind of blatant publicity aid to the manufacturer concerned. In the case of most of the catalogues which I have before me that is very far from being so.

There is hardly one that does not contain a veritable mine of really useful information, and the publicity side of it is very subtly introduced—in fact, so skilfully has it been done in most cases that one is hardly conscious of it!

Any way, publicity or no publicity, you may take it that all the literature referred to below is well worth having; and if after having read about it you would care for any or all of the catalogues mentioned, just send me a postcard giving the number or numbers in which you are interested, and I shall be pleased to make the necessary arrangements. But PLEASE do not forget to include your name and address!

Marconiphone.

The 1934-5 edition of the Marconi Valve Book consists of 64 pages of really useful information. In addition to giving full technical details of all the valves in their famous range (now almost 70!), it contains a most useful appendix. Indispensable to the home constructor, and of interest even to the ordinary listener. **(No.91)**

Bulgin.

Deserving of special mention for their booklet entitled "Bulgin Hints to Better Reception." It easily surpasses all their previous efforts, and I certainly regard it as one of the most helpful free booklets I have ever seen. It tells you practically everything you want to know about the important question of set refinements, and it is copiously illustrated with easily understandable practical diagrams. **(No.92)**

Note: *If you require also a copy of the Bulgin 80-page Manual, you can obtain one by sending 2d. in stamps to cover postage direct to Messrs. Bulgin at Abbey Road, Barking, Essex. But please mention "Popular Wireless."*

OUR POSTCARD SERVICE

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

Cossor.

The Cossor Wireless Book this year (reference B.V.34) is a radio encyclopedia in miniature. Selecting at random from the generous contents, there are such useful features as "Radio Definitions" (a dictionary of technical terms), "Resistances, Chokes and Condensers," "Methods of H.F. Coupling" (with numerous circuit diagrams), "Class B Amplification," "Automatic Volume Control," etc. In fact, there are few subjects which are not covered in this extremely useful handbook. And it is free for the asking! **(No.93)**

General Electric Co., Ltd.

Sixteen modern circuit diagrams are the main feature of the 1934-5 Osram Valve Guide, which is appropriately termed "Every Radio-Man's Pocket Reference Book." In addition there are station charts for medium and long waves and useful tables for easy calculations based on Ohm's Law and for determining watts dissipated. Without a doubt this pocket reference book represents 64 pages of extremely useful information. There is bound to be a run on it, so send in your application early. **(No.94)**

Dubilier.

The Dubilier Condenser and Resistance handbook for 1934/5 is more the straightforward catalogue type of literature, but even so, it is a booklet that should prove of interest to all home constructors. It gives detailed specifications and prices of all the Dubilier productions, and of particular interest to car-radio enthusiasts is a diagram which has been specially prepared to illustrate a car ignition system. **(No.95)**

USEFUL WIRE-END COMPONENTS

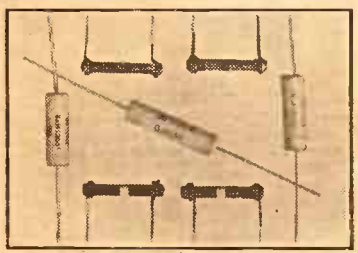
AMONG the most useful innovations of the last few years for constructors are components with wire ends. And they have been so well received that in all probability they may, in due course, tend almost entirely to displace their terminalised equivalents.

Grid leaks and fixed resistances used for other purposes can quite well be wired direct into circuit, for they are light in weight and compact. Indeed, in many cases it would seem almost absurd to use a baseboard-mounting holder which has to be wired up and in which, in its turn, the resistance must be held by pressure contact.

In the case of a wire-end component, pliable wires are taken out at each end, instead of there being terminals. This wire, which is tinned soft copper, can be readily soldered, or it can be twisted into loops for looping under terminals as desired.

"Wire ends" are magnificent for experimenters, and every constructor should possess a range of them. Among the most dependable

VERY EASILY CONNECTED



A selection of the latest Polar-N.S.F. wire-end resistors and condensers. Various values are available.

makes the Polar-N.S.F., made by Messrs. Wingrove & Rogers, Ltd., of Arundel Chambers, 188–189, Strand, London, W.C.2.

The Polar-N.S.F. resistors and grid leaks, for example, are available in various values at only 1s. each for the 1-watt type. There are 2- and 3-watt types available at 2s. and 3s. each respectively.

We have tested a number of samples, and in every instance the values were found to be within 5 per cent of specification, and that is extremely good. We have also had a number in use in a power amplifier, and they have given unblemished service.

The Polar-N.S.F. tubular condensers are also made with wire ends. They retail at 1s. for values from ·0001–·002 mfd., at 1s. 3d. for the ·005 and ·01 mfd., 1s. 4d. for the ·02 and ·05 and 1s. 6d. for the ·1 mfd. The ·2 mfd. and the ·5 mfd. cost 1s. 9d. and 2s. respectively.

The construction of these condensers is simple and highly effective. They are each built into a small tube of hard and durable insulation material.

They are non-inductive, and are said to be non-hygroscopic, and it is not difficult to prove that this is in fact the case.

They are rated to stand up to 350 volts D.C., and are tested at 1,500 volts.

These condensers, too, we find to be perfectly satisfactory in every way, and we can recommend our readers to use them.

"ON THE DOTTED LINE"

(*Continued from page 78.*)

I was greatly impressed with that Midland Regional item called "At Random." It was a programme of old and new tunes given by The Three Knaves and Gerald Martin. To be more precise, it was The Three Knaves who impressed me most. They play pianos, and we don't hear half enough piano soloists on the air.

No! I haven't forgotten the several piano recitals Patricia Rossborough has given us lately. I have such a high opinion of these three gentlemen that I would like to see them become a regular weekly feature. At any rate, for a season. Gerald Martin compered beautifully, but must he croon?

* * *

I listened to a bit of Martyn Webster's "Radioptimists," I liked the several sketches they put on immensely. There's no doubt that there are quite a number of very talented folk in the Midlands. They haven't perhaps such big names as their London contemporaries, but I don't see why, with increased opportunities, they shouldn't have some day.

* * *

It stands ever to the credit of the Children's Hour that, although its programme matter is primarily intended for children, grown-ups never find it a waste of time to listen to it. One of its biggest attractions from the grown-up point of view is the lack of rigidity there is in the methods of presentation.

I wish sometimes that other departments would follow suit in this respect. There must be scores of artists who, if they were given a free hand to do their act as they wished, would do so both to their own advantage and to ours. And wouldn't this be another sort of variety which, it is generally agreed, is essential to good entertainment?

* * *

It was Lady Tree's hour with the children that prompted me to say this. It was a unique hour, full of good things of all sorts. Lady Tree was assisted by "Mac."

* * *

I notice with satisfaction that the football results are now being given out in alphabetical order. Many thanks, News Department!

* * *

The other evening Debroy Somers brought back pleasant memories of his early broadcast triumphs from the Savoy by playing a medley called "Tunes of the Early Twenties." This was before the invasion of hot music. Unfortunately, this invasion hasn't left Debroy unaffected, as he played one or two tunes which he confessed "were a little on the hot side." Personally, I prefer the flavour of the early twenties. Progress since that date has been retrograde, in my opinion.

C. B.

FREQUENCY RESPONSE AND QUALITY

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

READERS often tell me that they cannot get good frequency response from their sets. In most cases they blame this on the loudspeaker. As a matter of fact, the speaker is not necessarily the cause of the trouble. In case you may not be clear what I am referring to, perhaps I should say that we have to distinguish between distortion and cut-off of the high and low registers.

It is true that, if the reproduction is weak at the upper and lower notes of the scale, this will interfere with the quality, and in that sense we may regard it as a type of distortion. Usually we understand distortion to be something quite different, which is not confined to the end of the register, but may occur in the middle region.

It May Not Be the Speaker.

However, to revert to the question of the frequency response, good frequency response naturally has a very important effect on the all-round quality of the reproduction. The bad effect due to frequency cut-off is nothing like so objectionable as ordinary distortion. When distortion is bad, anybody with half an ear can tell it; but when frequency cut-off is present it may be that only a sensitive ear will notice the lack of faithfulness in the reproduction.

The loudspeaker is obviously one possible cause of frequency cut-off, some speakers being unable to respond to the lower notes, others failing on the upper notes. But, as I said above, you may go wrong if you just assume that the fault lies with the speaker itself. It is a good plan to try another speaker; but if the effect is still present, then turn your attention to the low-frequency couplings, grid-bias voltages and tuning circuits.

Try Resistance Feed.

A loudspeaker of an old pattern, especially a horn speaker, will almost certainly be poor on the lower notes. The L.F. transformers used in the intervalve couplings may be inefficient, and, if this proves to be the case, it would be better to connect them on the resistance-feed principle.

The H.T. voltage is another point which has a definite bearing on this question of frequency response; the voltage should be as high as is convenient, and care should be taken to adjust the grid-bias voltage to suit.

If you are using a single-circuit tuner, fairly sharply tuned, as distinct from a band-pass tuner, you may expect a certain amount of high-note loss. In this case you can change over to band-pass tuning or use a more efficient tuner, or again apply tone correction in the low-frequency stages.

S.G. Coupling.

The coupling between a screened-grid valve and detector very often consists of a tuned circuit connected to the grid condenser of the detector: this circuit is also connected via a fixed condenser to the anode of the screened-grid valve and the anode is fed through a high-frequency choke.

The selection of this choke calls for a certain amount of care, because it must be a fairly low-loss component if you are to get anything like the amplification which you expect from the screened-grid stage.

Specify the Right Choke.

I have often come across cases where the stage was not coming up to expectations owing to an inferior choke being used. In cheap chokes you almost invariably find that there is insufficient wire used, not to mention the more serious matter of insulation leak or breakdown.

It is really worth while, if you want efficiency from the screened-grid stage—and, after all, this is one of the primary reasons for using an S.G. stage—to go in for a good choke and condenser. A special screened-grid choke should be specified.

Whilst on the subject of chokes, you know that the impedance of a choke should be as high as possible at the frequency at which it is to be operated. The range of frequencies met with in ordinary radio reception is very wide, and it is not really a practicable proposition to design a choke which will operate efficiently when used indiscriminately on different frequencies.

General-Purpose Type.

It is for this reason that we have on the market the so-called "general-purpose" H.F. chokes, which can be used on either the medium or long broadcast bands. A general-purpose choke is generally suitable for receivers to be used on normal broadcast wavelengths. Of course, if you are going in for short-wave working, special short-wave chokes will be essential.

In a superheterodyne receiver, in the intermediate-frequency side, chokes must be used with higher inductances than those in ordinary "straight" sets, owing to the lower frequency. So when you go to buy a choke make sure beforehand that you know exactly what type is required for your set.

At the Show.

When you were at the Radio Show at Olympia I wonder if you noticed what a lot of new firms seemed to be manufacturing wireless batteries. To me it was absolutely astonishing. Everywhere one turned there

(*Continued on next page.*)

S.T.600 DEMONSTRATIONS

Mr. J. Scott-Taggart finds it impossible to correspond with all who have written to him on this matter. He is, however, writing direct to all whom he will visit and making appointments with them. Everywhere he goes, the S.T.600 is proving an extraordinary success.

FREQUENCY RESPONSE AND QUALITY

(Continued from previous page.)

were fresh battery makers showing their wares.

When mains units—"eliminators," as they were optimistically called—first made their appearance, it was said that battery makers might as well put up their shutters; in case they were not completely disheartened, then the finishing touch was added by the appearance of all-mains receivers.

How Many Battery Sets?

Contrary to the expectations of some, however, the battery trade refuses to die, and, in point of fact, has greatly increased and flourished during the past few years. It seems to go on from strength to strength, and the appearance of all these new concerns making wireless batteries would seem to be the best of all possible proofs that, notwithstanding the enormous numbers of mains units and all-electric sets sold, there are still a *few* people who use dry batteries. Goodness knows where all the batteries go to, but the fact that such vast quantities are used, and the presumption that there must be corresponding large numbers of battery sets in use, makes you think that it is worth while, after all, giving attention to the battery-set user in other directions. So all those of you who are given to thinking up new ideas should remember that these need not be exclusively devoted to all-electric sets!

Charging H.T. from L.T.

Incidentally, there were a number of high-tension accumulator batteries on view, and this is a proposition which those of you who use a battery set would do well to consider. The lead-accumulator high-tension battery has been greatly improved, and, in addition, there is the nickel-iron cell for which great advantages are claimed. The only thing about an H.T. accumulator battery, as distinct from an H.T. dry battery, is that it requires periodical recharging. Most of the makers now have an arrangement by which it can be recharged from the low-tension battery, so that you only have to haul the low-tension battery round to the charging station.

Indoor Aerials.

I suppose the majority of people now use indoor aerials, and these generally consist of a wire stretched around a picture rail. Recently the adhesive type of "strip" aerial has made its appearance, and this is really a great convenience, as I know from actual experience. You know what a satisfactory job adhesive insulating tape is; well, the adhesive aerial is something of the same kind. All you have to do is to run it round wherever you want it, either around the picture rail, up the staircase or anywhere else, and just press it against the wall as you go along, where it most conveniently "stays put." In this way you will save all the fiddling, knocking staples into the wall as you go along, not to mention the damage which you generally do in the process. A further advantage is that if you wish to remove the aerial at any time, it is just as easy to take off and stick it on again in some other position. These adhesive strip aerials are really a very great convenience and can be bought cheaply.

Grid-Circuit Impedance.

A point which is often overlooked is the matching of the grid-circuit impedance of the first valve and the aerial tuning circuit. The aerial-and-earth system acts, as you know, as a condenser, and the capacity of this condenser varies roughly between 0·001 microfarad and 0·0001 microfarad. The "condenser" formed of the aerial and earth is thus connected across the terminals of the aerial coil, and its impedance acts in a sense as a resistance connected across the coil. The efficiency of the coil is therefore impaired, although the coil in itself may be a very efficient one, and it may not match up with the grid-filament impedance of the valve.

Series Condensers.

If you put a condenser in series with the aerial lead-in, however, this acts as a series impedance and has the same effect as decreasing the resistance which is in parallel with the coil. The impedance of the condenser, consisting of the aerial-earth system, may easily be, say, 500 ohms at broadcast frequencies, and in the absence of a series condenser this impedance is across the tuning coil. If, however, a condenser of, say, one quarter of the capacity of the aerial is connected in series in the aerial lead to the coil, this will raise the impedance to five times as much, which will result in a gain in efficiency and also in selectivity.

This shows why it is that an aerial-series condenser increases selectivity and in many cases does not reduce the sensitivity of the receiver; it depends very largely on the relative capacities of the aerial-earth system and the series condenser which you use.

(Continued on next page.)

FREQUENCY RESPONSE AND QUALITY

(Continued from previous page.)

Knobs.

Have you ever noticed that in many commercially made sets the knobs, such as the switch and tuning knobs, are much too small? Perhaps the designer is a slave to convention, or it may be done deliberately, with the idea that it improves the appearance of the set.

In my opinion, large knobs can be made to look quite as attractive as small ones, and there is no doubt that, from the point of view of practical utility, they are very much better. This applies particularly to the tuning knob, where very fine adjustments are almost invariably necessary.

Easy Control.

These remarks are prompted by an experience I had only a few days ago. I was examining a set which had many excellent qualities, but the control knobs were so small (and one or two of them so stiff) that they simply put you out of patience with the whole thing. Beautifully smooth working knobs, large enough to get a good hold of, are a very great asset to a set, and I am surprised that some manufacturers have not awakened up to this fact.

Iron-core Coils.

Iron-core coils, which have made such great headway during the past year or more, and which have undoubtedly come to stay, are by no means new in principle. The idea of using finely divided magnetic material for the core is, I believe, relatively old. But although the principle is old enough, it is only recently that methods have been found for manufacturing coils with these cores in a way to be really efficient and practical.

In the well-known "Ferrocart" coil a narrow strip of paper is used, and on this is deposited the finely divided iron. By special arrangements the iron particles are, as it were, "lined up," and then the particles are automatically cemented or fixed to the paper whilst in this position. This arrangement gets over the effect of eddy-currents. The core is made up to the necessary thickness by means of many layers of this metallised paper and then bound up in a composition container. The result is that the core consists of alternate laminations of paper and iron, the iron being, as I say, so arranged that eddy-currents are almost entirely eliminated.

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